# **SOCIO-ECONOMIC RESEARCH**





Agricultural Economics Division Bangladesh Agricultural Research Institute Gazipur-1701, Bangladesh

# RESEARCH ABSTRACTS OF AGRICULTURAL ECONOMICS DIVISION (1978-2015)



Agricultural Economics Division Bangladesh Agricultural Research Institute Gazipur-1701, Bangladesh

# AGRICULTURAL ECONOMICS RESEARCH ABSTRACTS

(1978-2015)

Edited by

Dr. Md. Rezaul Karim Dr. Md. Kamrul Hasan Dr. M. A. Monayem Miah A. F. M. Saddatul Anowar



Agricultural Economics Division Bangladesh Agricultural Research Institute Gazipur-1701, Bangladesh Published by Agricultural Economics Division Bangladesh Agricultural Research Institute (BARI) Joydebpur, Gazipur-1701

Printed:

Compiled by Dr. Md. Abdur Rashid Morsalina Khatun Sayla Khandoker

Design and Word Processing

Printed at

Citation



## FOREWORD

Agricultural Economics Division is one of the research divisions of Bangladesh Agricultural Research Institute (BARI), where a number of agricultural economists are conducting socioeconomic research on BARI mandated crops since 1978. I do believe that without proper economic assessment it is simply impossible to disseminate any variety or technology to the end users. So the contribution of this division towards agricultural research in Bangladesh is undeniable.

Review of literature along with necessary methodology of different socio-economic studies is essential to conduct new and demand based research program. It is also crucial to document scientist's research findings to share with other researchers and beneficiaries. I am glad to know that the Agricultural Economics Division has taken an initiative to assemble the outputs of research those were conducted during 1978-2014 in abstract form.

The compiled research abstracts of Agricultural Economics Division is an attempt to exhibit a list of the abstract come out from a series of economic studies of BARI mandated crops. I think this concise but comprehensive summary of the research activities developed by the scientists of this division will be helpful to the researcher, extension personnel, students, NGOs, and development partners for future use.

Writing of this proved to be a bigger assignment than it was assumed to be and would not have been possible without the support of the scientists, scientific assistant and other supporting staffs of Agricultural Economics Division. They all deserve heartfelt thanks. I recognize their contributions and express my sincere thanks and gratitude for their hard work in preparing this useful publication.

Dr. Md. Rafiqul Islam Mondal Director General Bangladesh Agricultural Research Institute

#### PREFACE

The Agricultural Economics Division is one of the research divisions of Bangladesh Agricultural Research Institute which has started functioning in 1978. Previously scientists of the division were working in various divisions of BARI as there were no physical facilities that would permit initiation of research programme. In fact, the initial two years were spent for reorganizing and strengthening the division. However, the division started its own research programme in 1978. The main objective of the division is to conduct research on socio-economic aspects of crop production and disseminate the research findings to the policymakers and researchers to help in evolving national policy measures to develop economic condition of the farmers in Bangladesh. Keeping this in mind, the division is working on agro-economic research to provide useful information. Moreover, it is cooperating with other divisions of BARI to suggest economic feasibility of new technologies and findings for the farmers.

Some of the research results and suggestions have already received attention of the researchers of other divisions and are in the stage of implementation. Besides, working on co-ordinated projects of BARI, the scientists of the division undertake different research programmes to uphold national demand. Since its inception, the division is engaged in various socio-economic researches giving emphasis on crops which are under BARI's research programme. The cost return structure, marketing, processing, cropping system research, technology adoption, assessment of impacts of new technology adoption, price fixation etc. are the main theme of the present research programme. The research reports already published by the division have created interests among the policy makers and scientists as national and international level. Therefore, an attempt has been made to publish a complete abstracts of all the work of this division.

Dr. Md. Abdul Matin Chief Scientific Officer and Head Agricultural Economics Division BARI, Gazipur

### CONTENTS

Forward	
Preface	
Abstracts index	
2014-15	
2013-14	
2012-13	
2011-12	
2010-11	
2009-10	
2008-09	
2007-08	
2006-07	
2005-06	
2004-05	
2003-04	
2002-03	
2001-02	
2000-01	
1999-00	
1998-99	
1997-98	
1996-97	
1995-96	
1994-95	
1993-94	
1992-93	
1991-92	
1990-91	
1989-90	
1988-89	
1987-88	
1986-87	
1985-86	
1984-85	
1983-84	
1982-83	
1981-82	
1980-81	
1979-80	
1978-79	

### **ABSTRACTS INDEX**

Сгор	Crops/variety	Year	Page
Cereals	Wheat	2014-15	
		2013-14	
		2012-13	
		2010-11	
		2009-10	
		2006-07	
		2005-06	
		2003-04	
		2002-03	
		1998-99	
		1997-98	
		1994-95	
		1991-92	
		1989-90	
		1987-88	
		1983-84	
		1982-83	
		1981-82	
		1979-80	
		1978-79	
	Maize	2014-15	
		2012-13	
		2007-08	
		2006-07	
		2005-06	
		2004-05	
		2001-02	
		2000-01	
		1995-96	
		1994-95	
		1993-94	
		1987-88	
		1984-85	
		1979-80	
	Millet	1983-84	
Tuber crops	Potato	2013-14	
		2010-11	
		2009-10	
		2008-09	
		2007-08	
		2006-07	
		2005-06	
		2004-05	
		2003-04	
		2001-02	
		2000-01	

Crop	Crops/variety	Year	Page
		1999-00	
		1998-99	
		1997-98	
		1996-97	
		1995-96	
		1994-95	
		1993-94	
		1983-84	
		1982-83	
		1981-82	
		1979-80	
	Sweet potato	2013-14	
	•	1983-84	
	Aqua aroid	1996-97	
	Panikachu	2010-11	
		1989-90	
	Mukhikachu	1995-96	
		1989-90	
Oilseed	Oilseed	2013-14	
		1992-93	
		1987-88	
	Mustard	2009-10	
		2007-08	
		2006-07	
		2001-02	
		2000-01	
		1995-96	
		1994-95	
		1993-94	
		1983-84	
		1981-82	
	Soybean	2007-08	
		1993-94	
		1992-93	
		1991-92	
		1990-91	
		1981-82	
	Sunflower	2014-15	
		1993-94	
	Groundnut	2013-14	
		2008-09	
		1992-93	
		1981-82	
	Sesame	2003-04	
		1982-83	
Pulses	Pulses	2013-14	
		2011-12	
		2007-08	

Crop	Crops/variety	Year	Page
		2006-07	
		2005-06	
		2003-04	
		2000-01	
		1992-93	
		1986-87	
		1985-86	
	Black gram	2005-06	
		2000-01	
	Lentil	2006-07	
		1998-99	
		1993-94	
		1983-84	
	Chickpea	2013-14	
		1999-00	
		1996-97	
		1995-96	
		1994-95	
		1993-94	
	Mungbean	2010-11	
		2008-09	
		2006-07	
		2002-03	
		2001-02	
		2000-01	
		1999-00	
		1997-98	
Spices	Spices	2009-10	
•		1994-95	
		1993-94	
	Turmeric	2014-15	
	Chilli	2012-13	
		1983-84	
	Onion	2008-09	
		1991-92	
		1987-88	
	Ginger	2009-10	
		1989-90	
	Garlic	2013-14	
		2008-09	
	Betel leaf	2013-14	
	Betel nut	2001-02	
Vegetables	Teasel gourd	1992-93	
		1989-90	
		1986-87	
	Vegetables	2014-15	
		2013-14	
		2012-13	

Сгор	Crops/variety	Year	Page
		2011-12	
		2010-11	
		2009-10	
		2008-09	
		2007-08	
		2006-07	
		2004-05	
		2003-04	
		2002-03	
		2001-02	
		1994-95	
		1992-93	
		1989-90	
	Winter vegetables	2011-12	
		1992-93	
		1989-90	
		1994-95	
	Pointed gourd	1993-94	
		1992-93	
		1991-92	
	Cabbage	1991-92	
	BARI Lal shak-1	2001-02	
	Tomato	2013-14	
		2011-12	
		2010-11	
		2007-08	
		2005-06	
		2004-05	
		2000-01	
		1993-94	
	Bitter gourd	2011-12	
		1994-95	
		1993-94	
	Sweet gourd	2012-13	
	Carrot	1998-99	
	Vegetables seed	2007-08	
		1998-99	
	Radish	2013-14	
		2000-01	
	Country bean	2001-02	
	Cowpea	1996-97	
		1989-90	
	Cucumber	2002-03	
	Cucurbits	2004-05	
	BARI Gimakolmi-1	2002-03	
Fruits	Fruits	2013-14	
		2004-05	
		2000-01	

Сгор	Crops/variety	Year	Page
_		1999-00	
	Mango	2014-15	
		2008-09	
		2005-06	
		2004-05	
		1989-90	
	Kazi peyara	2001-02	
		2000-01	
	Guava	1994-95	
		1993-94	
	Coconut	2001-02	
		1998-99	
		1996-97	
		1992-93	
	Jackfruit	1992-93	
	Watermelon	2004-05	
		1994-95	
		1989-90	
	Pineapple	2009-10	
		1998-99	
		1995-96	
		1993-94	
		1990-91	
	Рарауа	1991-92	
	Banana	1992-93	
		1991-92	
		1990-91	
	Jujube	2012-13	
	Lemon	2014-15	
		1996-97	
		1994-95	
Farm Machinery	Power tiller	2008-09	
		1995-96	
		1994-95	
		1993-94	
		1992-93	
	Farm mechanization	2014-15	
		2009-10	
		2001-02	
	Machinery	2004-05	
		2002-03	
Flower	Tuberose	2009-10	
		1993-94	
		1992-93	
	Gladiolus	2014-15	
		2000-01	
	Rose	2014-15	
		2010-11	

Сгор	Crops/variety	Year	Page
Others	Char area	2008-09	
		1995-96	
	Zero tillage	2008-09	
		1993-94	
	Irrigation payment	2008-09	
	system		
	Food grain loss	2008-09	
	Off farm income	2010-11	
	Role of women	2010-11	
	Climate change	2011-12	
	USG applicator	2011-12	
	Kind support system	2011-12	
	Hill farming	2004-05	
	Nursery business	2002-03	
	BARI Technology Village	2007-08	
		2005-06	
		2004-05	
		2003-04	
	Elephant Foot	1999-00	
	Crop cultivation practices	2000-01	
		1999-00	
	IPM	2013-14	
		2012-13	
		2011-12	
		2010-11	
		2008-09	
		2005-06	
		2002-03	
	Land tenure system	1997-98	
		1996-97	
		1995-96	
	Irrigated crop	1997-98	
	TPS technology	2001-02	
		2000-01	
		1997-98	
	Fertilizer	2008-09	
		1996-97	
	Human labour	1996-97	
	Floating bed	2001-02	
	Торассо	2013-14	
		1987-88	
	Cotton	1987-88	
	Agricultural Credit	2013-14	
		2012-13	
		1989-90	
		1988-89	

#### Abstract 2014-2015

#### IMPORT AND EXPORT PARITY ANALYSIS OF SELECTED VEGETABLES AND SPICES IN BANGLADESH

M. A. Rashid, M. A. Monayem Miah and Tanvir M. B. Hossain

The study was undertaken to find out the export potentialities of selected vegetables and import substitution of selected spices crops in Bangladesh. A total of 720 vegetables and 320 spices growers, 25 suppliers, and 25 exporters were randomly selected for the study. Net margin analysis was done on both variable and total cost basis. Domestic resource cost (DRC) analysis was also done for estimating comparative advantage of the selected vegetables and spices. The study revealed that net margins were positive for all vegetables and spices producers. However, the highest net margin was estimated for brinjal producers (Tk 273799/ha) followed by bitter gourd producers (Tk 152145/ha). In the case of spices, the highest net margin was received by ginger producers (Tk 231399/ha) followed by onion producers (Tk 122308/ha). Comparatively low net margins were found for okra (Tk 51830/ha) and garlic producers (Tk 99352/ha). Vegetables exporters received the highest net margin (Tk 32852/ton) from UK market which was higher than the Middle East market (Tk 22869/ton). The highest benefit cost ratio (BCR) was calculated for brinjal (1.9) followed by ash gourd (1.8). The estimated BCR were 2.1 and 1.8 for ginger and garlic respectively. Bangladesh had comparative advantage of producing all selected vegetables and spices as the estimates of domestic resource cost (DRC) were less than one. The values of DRC for all selected spices were less than unity implied that the production of these spices would be highly efficient for import substitution.

#### INTRODUCTION AND ECONOMICS OF BT EGGPLANT CULTIVATION IN BANGLADESH: A PRELIMINARY ASSESSMENT

#### M. A. Rashid and M. Kamrul Hasan

The study was carried out at fourteen districts of Bangladesh to develop a data set to assess the economic impact of Bt eggplant technology on reducing use of pesticides and cost of production, contributing to better market opportunities, yield and net farm income. Seventy four Bt eggplant farmers was selected purposively and 30 non-Bt eggplant farmers were selected randomly for this study. It was found that Bt farmers, who were cultivating Bt eggplant make expected profit. Higher gross margin and net return was obtained by the respondents of Bt farmers than that of non-Bt farmers. Less amount of insecticide were used introducing Bt technique of the study areas. The status of money spends for the insecticide is found that the farmers can save around 74% of money for eggplant cultivation by using Bt technology. The Bt technology was successful to prevent fruit and shoot borer (FSB) and drastic reduction of pesticides application in the study areas. Bt technology will be very effective to reduce the indiscriminate use of insecticides as expressed by the farmers and they are requested to selecting those commercial local varieties for Bt which are popular in the localities.

#### EXPERT ELICITATION FOR ESTIMATING VARIETAL ADOPTION OF LENTIL IN BANGLADESH

#### M. A. Rashid and Tanvir M. B. Hossain

The study was undertaken to find out variety wise adoption rate of lentil in Bangladesh through expert elicitation procedure. Many varieties have been developed by BARI and BINA but in details of varietal information and adoption information database was not developed which is very important and valuable for the scientist and policy planner. This study through expert elicitation for constructing detail varietal development and adoption database is timely and necessary for the research institute. From all over the Bangladesh 12 experts was invited to share their valuable knowledge and experience on lentil cultivation and adoption in the country. The average age of the experts was 51 yrs and average experience on lentil adoption was 21 yrs. The lentil expert informed that 16 major varieties are adopted by the farmers in the recent year (2013-14). Among those varieties, Barimasur-6 covered highest cultivated area (54,642 ha) which shared 30.04% of total lentil cultivated area. Barimasur-4, Barimasur-3 and Barimasur-5 ranked 2nd, 3rd and 4th position according to the share of cultivated area covered. The seed production information showed that BADC the only lentil seed producer supplied 2151 mt of lentil seed in the year 2009-2013. The trend of seed production by different lentil variety revealed that over the period 2009-13, the seed production of Barimasur-3 increased sharply but Barimasur-4 gradually decreased. The adoption of variety Barimasur-6 increased due to its high yield attribute. The another variety Barimasur-4 and Barimasur-3 adoption increased due to its high yield, resistant to rust disease attributes which showed increasing adoption path among the expert. Satisfying higher demand for lentil consumption and ensuring food security through providing alternative to winter crops are the major concerning issue of the policy planner and the scientist.

# EXPERT ELICITATION FOR ESTIMATING VARIETAL ADOPTION OF MAIZE IN BANGLADESH

#### M. A. Rashid and Tanvir M. B. Hossain

The study was undertaken to find out adoption of maize in Bangladesh through expert elicitation procedure. Very valuable information about maize was collected through the elicitation of 14 experts who had expertise of different discipline of maize sector through involving in maize research and extension at different corners of the country. On an average, the expert's age was 47 years, and had 12 years of experience on maize research and extension. The seed releasing authority of Bangladesh released 86 varieties in the period 1986-2014. Among those varieties highest number of variety released in the period 2006-10 followed by 26 released variety in the period 2010-2014. Although all the varieties were released by the authority, but 21% of them are developed and released by the public research institute. Highest percentage of variety cultivated within the period 1986-2014 were hybrid which developed by nationally and imported by private organizations. The adoption information provided by experts revealed that 17 different varieties were cultivated on highest percentage of cultivation area. Among those cultivated varieties, Dekalb 981 covered highest percentage (13.78%) of cultivation area followed by Miracle (11.11%), NK 40 (9.03%) and Pioneer 30V92 (7.75%). The highest adopted variety Dekalb 981 covered 42167 ha of maize land which is followed by Miracle (33,997 ha), NK 40 (27632 ha), Pioneer 30V92 (23715 ha). Very recently the demand for Dekalb 981 maize increased due to its high yielding attribute. Another variety Dekalb 942 is getting popularity among the farmers due to its heat tolerant and lodging resistant attributes. The experts identified that the demand for NK 40 is decreasing due to its lower yield compare to newly introduced variety and susceptibility to leaf blight disease. The locally developed maize varieties can't keep their position in the varietal competition leaded by imported varieties. Variety developed by NARS with the support of CIMMYT has a small share in adoption status. This indicated that there is a very wide scope to give more emphasis on varietal improvement of maize by NARS.

## EXPERT ELICITATION FOR ESTIMATING VARIETAL ADOPTION OF WHEAT IN BANGLADESH

#### M. A. Rashid and Tanvir M. B. Hossain

The study was undertaken to find out variety wise adoption of wheat in Bangladesh through expert elicitation procedure. Many varieties have been developed by WRC but in details of varietal information and adoption information database was not developed which is very important and valuable for the scientists and policy planners. Expert elicitation for constructing detail varietal development and adoption database is timely and necessary for the research institute. A total of 14 experts were invited to share their valuable knowledge and experience on wheat cultivation and adoption in the country. The average age of the experts was 54 years and average experience on wheat was 23 years. The wheat experts informed that 13 major varieties are adopted by the farmers in the recent years (2013-14). Among those varieties, BARI Gom-24 (Prodip) covered highest cultivated area (186026 ha) which shared 41.03% of total wheat area. BARI Gom-21 (Shatabdi), BARI Gom-26 and BARI Gom-23 (Bijoy) ranked 2nd, 3rd and 4th according to the share of cultivated area covered. The seed production information showed that BADC the only wheat seed producer supplied 24913 mt of wheat seed in the year 2013-14. The trend of seed production by different wheat variety revealed that over the period 2010-14, the seed production of BARI Gom-24 (Prodip) increased and BARI Gom-21 (Shatabdi) decreased. Increased seed production trend of Prodip variety leaded to highest adopted area of that variety. The main reason behind highest adopted area of Prodip variety was high yield, big spike, large grain and lodging tolerance character. Although the Prodip covered highest area but other newly developed varieties like BARI Gom-25, BARI Gom-26, BARI Gom-27 and BARI Gom-28 were the most promising varieties which showed increasing adoption path among the expert. These varieties have very good potentiality due to having short duration, tolerance to terminal heat stress, tolerant to salinity and lodging. Satisfying higher demand for wheat consumption and ensuring food security through providing alternative to rice are the major concerning issue of the policy planners and the scientists.

#### ASSESSMENT OF BARI MANGO VARIETIES IN COMPARISON WITH OTHER VARIETIES

#### S. M. A. Shiblee

This study was undertaken to know the existing status of BARI released mango varieties in contrast with other varieties in the field level. Three large commercial firms having mother orchard mango trees, namely, Basherhat, Dinajpur (2066 mango trees); Chilahati, Nilphamari (7118) and Nayadingi, Manikganj (1341) were selected purposively. Thus, the study constitutes a total of 10525 mother mango trees. More than forty varieties were found in the surveyed commercial firms and among the ten BARI mango varieties, four varieties, namely, BARI Aam-1, BARI Aam-2, BARI Aam-3 and BARI Aam-4 were found there. Among all the varieties, BARI Aam-3 appeared to be the best in all the firms in terms of last four year sale of stions (stock+scion), of which amount of sale was much higher than that of other remaining varieties' accumulated sale. Hence, it is easily comprehended that BARI Aam-3 is likely to be the single most popular variety to be unparallel with any other variety. Apart from this variety, Kiozoi, Haribhanga, BARI Aam-4 and Mohachanak were identified as the most promising varieties. However, BARI Aam-3 is known as Amropali not as BARI Aam-3 in the field. People even do not know that this variety is a BARI released variety. Therefore, initiative should be taken to acquaint this excellent variety as BARI Aam-3 in the field.

#### SOCIOECONOMIC IMPACTS OF WHEAT SEED STORAGE AT HOUSEHOLD LEVEL IN BANGLADESH

M. A. Monayem Miah, Q. M. Shafiqul Islam, M. Elahi Baksh, Frederick. J. Rossi and Thakur Prasad Tiwari

Small and marginal farmers have little access to improved seed from institutional sources and are thus largely excluded from the benefits of new varieties. The production and storage of improved seeds at the household (HH) level can successfully overcome this problem. Therefore, an attempt was made to assess the impacts of wheat seed storage systems at HH level, with a particular emphasis on how the farmers are benefited by doing the seed storage business. The study analyzed data and information collected at random from 210 supported and 60 non-supported farmers spread over three wheat growing districts namely Mymensingh, Faridpur and Rangpur. The study revealed that wheat farmers used different storage containers and showed highest level of satisfaction towards plastic sac along with poly bags and plastic/metal drum due to cost effectiveness and better quality seed. On an average, supported and non-supported farmers retained respectively 103 kg and 100 kg of seed at household level for own use (79-85%), sale for higher price (63-65%), timely sowing (28-35%), and higher yield (27-37%). They sold most of their seeds to neighbouring farmers, local markets, and dealers. Wheat seed storage at household level was a profitable business to most of the respondent farmers. They could earn a reasonable net income (Tk. 1127 - Tk. 1210) from seed storage. The farmers who stored seed in plastic/metal drum received the highest net income for higher storage capacity, less storage cost, and higher seed price. A substantial increase was recorded in wheat area, productivity, and financial benefit of the wheat farmers as a whole. Nevertheless, improved wheat seed is now available at farm level and most farmers become enthusiastic towards wheat cultivation because of this program. Respondent farmers did not face any critical problem during seed storage. The study strongly recommends that the existing training and dissemination program should be extended to other new and promising areas for fostering wheat cultivation as well as improving farmers' income in Bangladesh.

#### FINANCIAL IMPACT OF SHIFTING OF LAND UNDER CEREAL CROPS TO MANGO CULTIVATION IN SELECTED AREAS OF BANGLADESH

#### S. Khandoker, M. A. Monayem Miah and M. Khatun

The study was conducted in three mango growing districts namely Chapai Nawabganj, Natore, and Rajshahi during 2014-2015 to estimate the financial benefit of shifting cereal lands to mango production, factors influencing shifting decision, and explore related problems of mango cultivation in the study areas. A total of 180 farmers taking 60 farmers from each district were selected randomly for the study. About 49% lands were shifted to mango cultivation from cereal crops which was higher in Chapai Nawabganj (55%) followed by Natore (48%) district. The main reason of this shifting was reported to be higher profit compared to other crops. The average total cost of mango cultivation was Tk. 133889 per hectare. Higher cost was observed in the 16th -20th year of garden (Tk. 152010) followed by 11th -15th year (Tk. 1,48952). The average yield of mango was found to be the highest in 16th – 20th year (26.48 t/ha) followed by 11-16th year (19.38 t/ha). Per hectare net return from mango cultivation was Tk. 175244. Total cost of mango cultivation was 10% higher than Boro-Fallow-T.Aman cultivation. On the other hand, total cost was about 40% lower than Wheat- Jute- T.Aman, Wheat-Aus-T.Aman and Potato-Fallow-T.Aman. The net return from mango cultivation was 75% higher than other cropping patterns. The shifting of cereal lands to mango cultivation was found to be a profitable enterprise since the BCR (2.89), net present value (Tk 337166) and internal rate of return (39%)

was very high. Relative income, farm size and education turned out to be positively significant, whereas age was negatively significant for shifting decision from cereal crops to mango cultivation. Insects and diseases infestation, non-availability of quality insecticides, dominance of intermediaries, and lack of storage facilities were the major problems for mango cultivation.

# SUNFLOWER CULTIVATION IN SELECTED AREAS OF BANGLADESH: A FARM LEVEL STUDY

#### M. Khatun, M. A. Rashid, M. A. Monayem Miah, M. S. Hoq and S. Khandoker

The study was conducted in Bogra and Satkhira districts to assess the socioeconomic status of sunflower cultivation in Bangladesh. A total of 100 sunflower cultivating farmers, taking 50 farmers from each district, were randomly selected for this study. The highest 59% farmers cultivated sunflower because of its higher profitability than other crops. Per hectare cost of producing sunflower was estimated as Tk. 62,199. Per hectare net return and BCR were Tk. 15,282 and 1.25 respectively which indicated that sunflower cultivation was profitable. Stochastic frontier function revealed that the use of labour, seed, organic fertilizers, cost of irrigation, and land type had positive and significant effect on the yield of sunflower. Average technical efficiency of the farmers was 86% which implies that there is a scope of increasing productivity of sunflower by 14% using current level of inputs by increasing the farmers' efficiency. Lack of irrigation facility, scarcity of seed on time, absence of sunflower oil mill and sunflower market, low demand for sunflower, high cost of seed, etc. were the major problems of sunflower production and marketing. In spite of having some problems 18% female farmers became interested to cultivate and 56% farmers mentioned that their demand for edible oil is becoming fulfil. So there is great potentiality of sunflower cultivation in Bangladesh. The availability of sunflower seed with low cost and establishment of sunflower oil mill is needed to sustain this crop in Bangladesh.

#### PROFITABILITY AND TECHNICAL EFFICIENCY OF TURMERIC FARMING: EVIDENCE FROM KHAGRACHARI DISTRICT

#### M. E. A. Begum, M. A. Monayem Miah, M. A. Rashid, M.K. Hasan and M. A. Matin

The study estimated the profitability and technical efficiency of turmeric farming in Khagrachhari district. A total of 150 turmeric farms located in Khagrachari Sadar, Panchari and Matiranga Upazila of Khagrachari district were selected randomly for primary data collection. Data were collected, using a pre-tested questionnaire during January, 2015. The study revealed that turmeric farming is a profitable farming with some dominating variable costs like seed (rhizome) and sowing, harvesting and carrying. The net return was Tk. 112139 per hectare and the BCR was 2.20, indicates that turmeric farms have greater benefits than costs as well as positive net benefits. Seed (rhizome) and fertilizer showed significant positive effects on the turmeric production in the stochastic frontier production model. Turmeric farming displayed much variability in technical efficiency ranging from 44.2 to 95.2% with mean technical efficiency of 82%, which suggested a substantial 18% of potential output of turmeric can be recovered by removing inefficiency. Besides improving technical efficiency, potential also exists for raising turmeric production through higher education and extension services. For a land scarce country like Bangladesh this gain could help increase income and ensure better livelihood for the hilly farmers. The key policy implication of the analysis is that investment in education and extension service would greatly improve technical efficiency.

#### IMPACT OF FARM MECHANIZATION ON POTATO PRODUCTION AND LABOUR USE PATTERN IN SOME SELECTED AREAS OF BANGLADESH

Moniruzzaman, M. A. Rashid and M. A. Matin

The study was conducted in three districts namely Rajshahi, Dinajpur and Rangpur of Bangladesh during 2014-2015 to find out the effect of mechanization on productivity and labour use in potato cultivation. A total of 130 samples taking 75 from conventional and 55 from mechanized potato farms were selected randomly for the study. The findings revealed that the yield of potato under mechanized farms (22.60 t/ha) was higher than that of conventional farms (20.53 t/ha). Total cost of production was significantly higher for conventional farms. Gross margin was found to be higher for mechanized farms (Tk.129937) compared to conventional farms (Tk. 138777). Cowdung, TSP and MoP had significant positive effect on the yield of potato production under mechanized farms. On the other hand, human labour and irrigation had significant positive effect on the yield of potato production for conventional farms. Mechanized farm used less number of labours compared to conventional farm. Family labour was mostly affected by the mechanization. Animal power and output have positive effect on labour requirement, while power tiller and input costs have adverse effect on labour requirement for potato cultivation. The probability of adopting farm mechanization was significantly influenced by experience, education, farm size, training on potato cultivation, organizational participation and extension contact. Lack of technical knowledge for all machines operation was mentioned as a major problem of mechanization in the study areas.

#### PRODUCTION AND EXPORT OPPORTUNITIES OF JARA AND COLOMBO LEMON FROM BANGLADESH

#### M. I. Kaysar, M. A. Matin and M. A. Ullah

The study was conducted in two districts namely Sylhet and Narsingdi to know the production technology of Jara and Colombo lemon growers, estimate profitability and identify the constraints of Jara and Colombo lemon cultivation. A total of 120 farmers taking 60 for Jara lemon from Sylhet and 60 for Colombo lemon from Narsingdi were selected randomly for the study. Data were collected through a pre-tested schedule during April-May, 2015. Cost return analysis revealed that Jara and Colombo lemon cultivation were profitable in the study areas. Among different years, per hectare highest cost was incurred Tk. 413575 in the (11-15)th year garden and lowest cost was Tk. 365777 in 2<sup>nd</sup> year garden in Jara lemon cultivation. Gross return was highest in 5th year garden (Tk. 1995750/ha) and lowest Tk. 975600/ha in (11-15) th year garden. The benefit cost ratio at 6.5% rate of interest was 2.85 and IRR 98%. Colombo lemon cultivation highest cost was estimated Tk. 316505/ha in 4th year garden and lowest cost was Tk.257543/ha in (11-15) th year garden. Gross return was highest Tk.841522 in 5th year garden and lowest Tk. 413616/ha in (11-15) th year garden. The benefit cost ratio at 6.5% rate of interest was 1.81 and IRR 124%. Lack of improved production technology, poor quality saplings, insect/pest infestation, adulteration of fertilizer and insecticides and less number of export buyers were found major constraints both Jara and Colombo lemon.

#### CONSTRAINTS AND OPPORTUNITIES OF CUT-FLOWER PRODUCTION AND EXPORT FROM BANGLADESH

#### M. S. Hoq and M. A. Matin

Bangladesh has immense prospect for exporting cut-flowers to the world market. Although the share of export earning in cut-flowers increasing day by day, export is constrained some barrier. Thus the present study was undertaken in Jessore (Jhikargachha) and Dhaka (Savar) to examine the financial profitability, value addition and constraint of cut-flower production, marketing and export in Bangladesh. A total of 170 respondents consisting 120 producers, 48 traders and 2 exporters were selected for the study. Multi-stage simple random sampling technique was followed and both primary and secondary data were used. The per hectare total cost, net return and BCR were Tk. 687439, Tk. 261509 and 1.38 for gladiolus cultivation. The BCR, NPV and

IRR of rose cultivation were 1.46, Tk. 2325762 and 146% which indicated highly profitable to the farmers. Farmer-cum-wholesaler, local traders, local wholesaler, wholesaler Dhaka, retailer Dhaka, other district retailer and exporter were the main actors of cut-flower marketing and export. In rose marketing highest value addition (Tk.185/100 pieces) was observed for retailer Dhaka and lowest value addition (Tk. 70/100 pieces) was observed for local traders (faria) in Jessore. In gladiolus marketing highest value addition (Tk. 302/100 stick) was also observed for retailer Dhaka and lowest value addition (Tk. 88/100 stick) was observed for local traders (faria) in Jessore. The growth rate of export earnings from cut-flower during 2008-09 to 2013-14 was 14.4 which indicate export earnings increased by 14.4% per annum. The exporting cost of rose in Japan markets was Tk. 407/kg or Tk. 13.56/piece and net value addition was Tk. 556/kg or Tk. 18.53/piece. Despite such potentialities, cut-flower export was constrained by high airfreight charge, insufficient cargo place, absence of refrigerated transportation, lack of improved packaging materials, lack of quality flower as international standards etc.

#### Abstract 2013-2014

#### ADOPTION OF WHEAT VARIETIES IN SELECTED AREAS OF BANGLADESH

#### M. A. Haque, M. A. Monayem Miah and M. A. Hossain

The study assessed the level of adoption and profitability of wheat varieties at farm level. Data were collected from 600 randomly selected wheat farmers from Dinajpur, Kurigram, Rajshahi, Faridpur, Jessore and Barisal districts. The results indicated that Shatabdi was highly adopted variety (33%) followed by Prodip (29%), Bijoy (12%), BARI Gom-26 (11%), and BARI Gom-25 (8%). BARI Gom-24 (Prodip), BARI Gom-21 (Shatabdi), and BARI Gom-23 (Bijoy) covered 53%, 23%, and 16% areas of land in 2012-13. The areas under Prodip, Bijoy, BARI Gom-25, and BARI Gom -26 varieties are gradually increasing and the areas under Shatabdi, Protiva, Sourov, and Sufi varieties are decreasing year after year. The adoption level of sowing time and irrigation were high. The adoption level of manures was low and the adoption level of Urea, TSP and MoP were high. BARI Gom-26 produced the highest yield and gave higher net return than other varieties of wheat. The benefit cost ratio of BARI Gom-25 was the highest (1.49). The net return of wheat was higher than its competing crops like lentil and mustard, and lower than potato, maize, and Boro rice. Human labour, seed, Urea and TSP had positive and significant effect on wheat cultivation. Non-availability of new variety seed at proper time and lack of technical knowledge about improved cultivation practices were the major constraints of wheat cultivation.

#### BETEL LEAF CULTIVATION AND MARKETING FOR SUSTAINABLE INCOME IN BANGLADESH

#### Q. M. S. Islam, M. A. Matin, M. A. Rashid and M. S. Hoq

The study was conducted in four betel leaf growing areas, namely Barisal, Chittagong, Rajshahi and Kushtia districts during 2013-2014 to assess the productivity, profitability, and to identify the problems of betel leaf cultivation. A total of 256 farmers were interviewed. The findings of the study revealed that betel leaf cultivation was profitable in the study areas, although BCR in the first and second years was below one due to higher investment cost. Gross return of betel leaf cultivation was found to be the highest yield received by the farmers also in fifth year. The benefit cost ratio was found to be the highest in 6-10 year followed by 5<sup>th</sup> and 11-15 year. The benefit cost ratios at 12%, 15% and 20% rate of interest were 1.27, 1.25 and 1.21 respectively. IRR was calculated 62% in current situation, IRR 37% was found by 10% decrease of return and 39% by 10% increase of cost. Farmers faced some problems like leaf rot

disease, high price of Boroj materials, vine died, lack of capital, low price, high price of oilcake, non-availability of modern variety, etc.

# FARM-LEVEL STUDY OF PESTICIDE USE ON BRINJAL IN DIFFERENT AREAS OF BANGLADESH

#### S. M. A. Shiblee, A. K. M. Z. Rahman and M. E. A. Begum

The study was conducted in Jessore and Comilla districts. A total of 60 farmers, 30 from each district, were selected randomly. As many as 23 and 14 types of pesticides were used by the farmers in Jessore and Comilla districts respectively to control all the insect pests. For controlling brinjal shoot and fruit borer, farmers used 12 and 8 types of pesticides in Jessore and Comilla respectively. The farmers of Jessore used excess pesticides and mixed two or three pesticides together to apply what they call 'cocktail'. The highest number of farmers used voliam flexi in both Jessore and Comilla districts. The farmers of Jessore incurred a huge amount of money (Tk. 162652 per hectare) for controlling shoot and borer, which had a wide gap in terms of money invested for controlling other insect-pests both in Jessore and Comilla. Farmers of Comilla incurred only Tk. 21491 per hectare for controlling brinjal shoot and fruit borer. Total amount of pesticide application in hectare per farmer for controlling shoot and fruit borer was 4808 ml and 1351g in Comilla, 23255 ml and 15111 g in Jessore. Not a single farmer was found having any idea about pre-harvest interval of the pesticides. Most of the farmers opined that they gave emphasis on shiny, fresh, spot free vegetable in order to get higher price. For judicious use and knowledge on pre-harvest interval of pesticides, training of farmers, as well as dealers is essential. Ethical motivation of the farmers, bio-rational method of controlling insect pests should be ascertained with a view to having toxic free fresh food for long healthy human life.

#### STUDY ON RURAL HOUSEHOLDS' FOOD SECURITY IN COASTAL REGION OF BANGLADESH

#### Moniruzzaman, M. A. Monayem Miah and M. A. Hossain

The study focused on the status of food security and its determinants among coastal households' during 2011-2013. It also identified their livelihood risks and coping strategies during stress situations. A total of 1350 households were randomly selected from nine coastal districts, namely Khulna, Bagerhat, Satkhira, Barguna, Patuakhali, Bhola, Noakhali, Lakshmipur and Cox's Bazar for this study. The study revealed that most of the households (53%) were food secured whose calorie intakes (2753kcal/capita/day) were much higher than the national average (2318 kcal/capita/day). Among various food items, rice supplied 72.96% of the total daily calorie intake of the food secured households followed by edible oil (6.47%), fish (6.14%), potato (3.20%), and other vegetables (2.27%). Logit regression model revealed that farm size, farm income, off-farm income, and household crop production had positive and significant impact on attaining food security of the coastal households. Besides, small households and the households with more earning members were more food-secured than large ones. Flood, heavy rainfall, salinity problem, reduction of land productivity, lack of modern technology, crop damage by rat, and high price of inputs were found to be livelihood risks for the coastal households. They borrowed money from relatives or others, sell of poultry, sell of livestock, use previous savings, sell of own assets, sell of labour, received help from various institutions, moved elsewhere to find work and reducing adult consumption to provide for children during different stressed situations.

#### IMPACT OF SPECIALIZED AGRICULTURAL CREDIT (SAC) POLICY ON SPICES PRODUCTION

#### M. Khatun, T. M. B. Hossain, S. Khandoker and M. E. A. Begum

The study captured the impact of credit on onion farmers of Faridpur and garlic farmers of Natore district. The survey was conducted on 200 farmers of which credit recipient farmers were 50 and non-recipient farmers were 50 from each district. The study revealed that only 6% farmers of a village received credit for spices production at 4% interest rate. Credit recipient farmers received on an average Tk. 26,255 as SAC. Due to access to SAC facility, farmers increased 16 decimal of land for spices cultivation, increased number of spices crop for cultivation, and used increased amount of quality inputs. Credit recipient farmers harvested spices with higher yield, which finally helped to increase farm income. Based on farmer's experience of getting credit facility, it was revealed that the performance of spices credit with lower interest rate was a good facility for the farmers to increase spices production in Bangladesh. Farmers' age, number of spices cultivated, distance of bank from farmers' home, farmers personal acquaintance with bank officials, and good relation with bank officials were found positive and significant effect on the probability of accessing to SAC. Credit recipient farmers received higher net return from onion and garlic cultivation. The highest percentage of farmers (82%) mentioned that lack of information about spices credit was a main reason behind not getting credit facility. SAC facility for farmers needs to be widening through spreading information of spices credit facility among the farmers as well as increasing the amount of credit.

#### POST-HARVEST LOSS ASSESSMENT OF VEGETABLES IN SELECTED AREAS OF BANGLADESH

#### M. I. Kaysar, M. E. A. Begum, M. Khatun, M. S. Hoq and M. A. Hossain

The study examined the nature and extent of post-harvest losses of vegetables in Narsingdi, Jessore, and Bogra districts. Multi stages sampling technique was used for selecting 270 vegetable growers and intermediaries, out of which 15 farmers and 15 intermediaries from each district for each vegetable were selected at random. Three major vegetables, namely potato, brinjal, and bitter gourd were selected for the study. A multiple linear regression model was carried out to estimate the factors affecting post-harvest losses of vegetables at farm level. The major post-harvest practices by the farmers and intermediaries were harvesting, grading, packaging, storing and transporting. The aggregate post-harvest losses in sample vegetables were calculated by taking together losses at farmer, arathdar, bepari, and retail level. Postharvest losses were occurred at maximum level in brinjal (23.38%), followed by bitter gourd (17.97%) and potato (16.73%). Across different levels, it was found that the losses were maximum at the growers' level in all the vegetables. The highest losses of growers was found in brinjal (12.51%) followed by potato (9.59%) and bitter gourd (9.53%). It was found that losses for brinjal (5.96%) were maximum at retail level followed by bitter gourd (4.35%) and potato (3.61%). Lossess at arathdar level for potato was 1.53%, brinjal was 2.35% and bittergourd was 1.86%. Losses at bepari level were 1.62%, 2.65% and 2.23% for potato, brinjal and bitter-gourd respectively. Some important factors such as farming experience, selling price and, transportation had negative and total production, and weather had positive and significant relationship with the total post harvest loss of vegetable. Absence of post harvest treatments, low

market price, lack of available storage facilities, and poor and costly transportation were the major problems at farms and intermediaries level.

# ECONOMICS OF SWEET POTATO CULTIVATION IN BANGLADESH: A FARM LEVEL STUDY

#### S. Afroz and M. A. Monayem Miah

The study was conducted in two districts, namely Comilla and Jamalpur to assess the relative profitability of sweet potato cultivation. A total of 120 sweet potato farmers, taking 60 from each district, were selected randomly for the study. Data were collected through a pre-tested interview schedule during February-March, 2014. Costs and returns analysis revealed that the total cost of sweet potato cultivation was Tk. 93430 per hectare. The average yield of sweet potato was 16.7 tons per hectare. Per hectare net returns from sweet potato cultivation were Tk. 72597 in Comilla and Tk. 90981 in Jamalpur district. About 30% farmers showed positive attitudes towards sweet potato production in the next growing season which were due to higher yield, low cultivation cost, high profit, and needs less labour. Although sweet potato was a profitable crop, due to some drawbacks many farmers showed negative attitudes towards sweet potato production. Functional analysis revealed that the cost of human labour, seedling (vain), manure, education, and experience in farming had positive and significant effect on the gross return of sweet potato production. Farmers could not use inputs efficiently in sweet potato production. The major problems of sweet potato cultivation were scarcity of HYV seed, lack of credit facility, scarcity of vain, lack of storage facility, and higher input cost.

#### EXISTING MARKETING SYSTEM AND ITS OPPORTUNITIES OF GROUNDNUT PRODUCTION IN CHAR LANDS OF BANGLADESH

#### M. S. Hoq, T. M. B. Hossain, M. A. Matin and Q. M. S. Islam

The study was undertaken to examine relative profitability, marketing system, production, and marketing problems of groundnut in char lands of Faridpur, Jamalpur, and Kishoreganj districts. The sample size was 225 including 90 groundnut farmers and 135 traders. Majority of the groundnut farmers (56%) cultivated Dhaka-1 variety and only 23% farmers cultivated BARI chinabadam-8. The study revealed that per hectare production cost of groundnut was Tk. 61547, net return was Tk. 42033 and BCR was 1.68. The result of partial budgeting analysis showed that if farmers cultivate groundnut instead of its competitive crops like sesame and wheat, they would get Tk. 24445 and Tk. 21990 as an extra profit. On the other hand, the net change of benefit of groundnut cultivation with potato was negative which indicated that groundnut cultivation was not profitable in Kishoreganj district. Major five marketing chains were identified on the basis of product flow. The average estimated per quintal marketing costs incurred by different actors were Tk.102 for faria, Tk. 357 for bepari, Tk. 55 for arathdar, Tk. 112 for paiker, Tk. 128 for retailer, and Tk.1388 for stockiest per quintal. Per quintal net marketing margin was Tk.231 for faria, Tk. 310 for bepari, Tk. 59 for arathdar, Tk.1212 for stockiest, Tk. 225 for paiker and Tk. 306 for retailer. The major problems of groundnut production were lack of irrigation facilities (34%), low rate of germination (31%), and lack of cultivable land (29%). Major marketing problems reported by the intermediaries were lack of cash capital (82%), lack of storage facilities (55%) etc. Arrangement of institutional credit with low interest rate (80%), collateral free credit (45%), and arrangement of storage facilities (72%) were the trader's opinion to minimize the marketing problems.

## PROFITABILITY OF RADISH PRODUCTION IN SELECTED AREAS OF BANGLADESH

#### R. Islam and S. Hossain

A financial analysis was done for determining the factors which inclined the farmers to cultivate radish as major crop in this study. One hundred fifty radish farmers were randomly selected from Bogra, Chittagong, Jessore and Narsingdi districts as sample. Farmers of the Chittagong areas cultivated HYV of radish while the farmers of the other areas cultivated local varieties. The farmers of Chittagong incurred higher amount of cost than that of other areas. The farmers of Narsingdi got higher yield than that of other areas. Due to higher price, the farmers of Chittagong got higher income through radish cultivation. Human labour was the major cost item in every area. Fertilizers were the next costly input to farmers. Though, the farmers used lower quantity of fertilizer than recommended dose. The farmers used higher quantity of human labour to the production chain of radish. Higher price of radish had a chance to get higher income. Quality seeds and technologies can reduce the cultivation cost of radish. Radish farmers faced insect and disease problem like stem rot, leaf spot, hollow heart disease etc. Radish cultivation was profitable and it could be increased through boosting up productivity.

#### MARKETING AND VALUE CHAIN ANALYSIS OF GARLIC: A STUDY IN SELECTED AREAS OF BANGLADESH

#### M. K. Hasan and B. R. Banik

The study was undertaken to determine price fluctuation, marketing system, efficiencies and to examine the value chain of garlic aiming to determine the value addition in different steps of garlic marketing channel. Secondary data were collected from various published sources during 1985/86- 2011/12 for time series analysis. Primary data on production were collected from Dinajpur, Natore and Rajbari districts and marketing data from Dhaka and Bogra districts. A multistage randomized sampling procedure was used in selecting 120 farmers, 36 farias, 45 beparies, 15 arathdars, 30 wholesalers, and 30 retailers. The study showed that the extent of annual price fluctuation of garlic was identified which was between -55 to 173 percent, while the extend of fluctuation of area, production and yield ranged between -14 to 46, -18 to 73 and -5 to 18 percent respectively during the study period. Four major marketing channels were identified for domestic produced garlic marketing. Channel-III (Farmer-Bepari-Inter district arardar-Retailer-Consumer) was the most important supply chain through which 40% domestic produced garlic reaches to consumers. Marketing costs for each 100 kg of garlic were estimated from Tk. 86.82 to 388.28 and marketing margin Tk. 546.19 to 1474.72 respectively for different intermediaries. Marketing margin and profit were the highest at retailer than those of other intermediaries. The study showed, out of four marketing channel, Channel-II (Farmer-Bepari-Inter district arathdar-Retailer-Consumer) was more efficient than those of other channels. Six actors like; farmer, faria, bepari, arathdar, wholesaler, retailer and consumer were identified who were involved in the garlic value chain. Retailer added the highest amount of value (Tk. 1474.72) followed by producers (Tk. 877.15), bepari (Tk. 676.60), faria (Tk. 559.16), and wholesalers (Tk. 1474.72) respectively for 100 kg garlic transection. Eleven marketing problems were identified, among them price fluctuation, high transport cost and lack of loan facilities were the major problems.

#### OPPORTUNITIES OF FALLOW LAND UTILIZATION THROUGH SORJON CULTIVATION TECHNIQUE IN SOME SELECTED COASTAL AREAS OF BANGLADESH

#### N. D. Kundu, T. M. B. Hossain and M. A. Hossain

The study was conducted in three coastal districts, namely Patuakhali, Jhalokati and Pirojpur for the assessment of profitability, farmers' attitudes and constraints to fallow land utilization. Data for the study were collected through an extensive field survey during 2013-2014. A total of 222 farmers were interviewed. The study revealed that farmers cultivate crops in plain land only two times a year. In the study areas farmers got BCR 1.72 by cultivating crop on Sorjon and it was 1.28 in the case of cultivating crops on plain land per year. Farmers received higher return from Sorjon cultivation than on plain land. Major constraints to fallow land utilization were high depth of water on cultivable land during Kharif-1/Aus season, late sowing (July-Mid August) of T. Aman as well as late harvest (November- Mid February), and late joe condition of soil due to stagnant water on land etc. Labour crisis, irrigation problem, low price of harvested crop, high price of agricultural inputs, disease infestation, and insect attack were found to be the major problems in the study areas for both plain land and Sorjon farmers.

#### ADOPTION OF SUMMER TOMATO CULTIVATION IN JESSORE REGION

#### P. Hajong

The study assessed the level of adoption and profitability of summer tomato varieties at farm level. Data were collected from 90 randomly selected tomato farmers of Bagherpara Upazilla, Jessore Sadar, and Jhikorgachha Upazilla of Jessore district. The results indicated that BARI hybrid tomato-4 was highly adopted summer tomato variety (75%) followed by BARI hybrid tomato-8 (16%) and ACI summer king (9%). The adoption level of ploughing, manure and fertilizer use was low, whereas planting time and irrigation was high. Total cost of production of summer tomato was Tk. 584822/ha, whereas variable cost was Tk. 507355/ha and fixed cost was Tk. 77467 /ha. Among the cost items, Mancha preparation incurred the highest cost which was 26.89 % of the total production cost followed by labour cost (26.10 %). The average yield of summer tomato was Tk. 50.41/ha and gross return was Tk. 1542300/ha. Benefit cost ratio was 2.64. Marketing cost of summer tomato was Tk. 683/ton. Human labour, seed, fertilizer, hormone and irrigation had positive and significant effect on the gross return of summer tomato production. Pest and disease, lack of seed at proper time, lack of agricultural credit and higher cost of production were the major problems of summer tomato adoption.

#### SOCIO-ECONOMIC IMPACT OF BARI SARISHA-14 IN JAMALPUR DISTRICT

#### N. Akter and S. Hossain

The study assessed the socio-economic impact of BARI Sarisha 14 at farm level. A total of 60 farmers were selected randomly from Jamalpur district for primary data collection. In the study areas maximum farmers were found to be illiterate, small land holders, and aged between 28-37 years. The total cost of BARI Sarisha-14 cultivation was Tk. 33013/ha. The average yield was found to be 948 kg/ha. Per hectare net return was Tk. 9547/ha. BARI Sarisha-14 production was found to be profitable as Benefit Cost Ratio (BCR) was 1.29. The application of human labour should be reduced to get better return from BARI Sarisha-14. Farmers should be trained for scientific and efficient management of production technology.

#### STUDY OF IPM AND NON-IPM TECHNOLOGY IN THE SELECTED VEGETABLES GROWING AREAS IN BANGLADESH

M. R. Karim, M. A. Rashid and M. S. Rahman

The study was undertaken to assess the existing level of pesticide and IPM technology used in vegetable production; compare the costs and profitability of IPM and Non-IPM technology used in vegetable production; and to assess the impact of pesticides and IPM technology on environment. The study areas covered three intensive vegetables growing districts, namely Comilla, Jessore and Narsingdi. Total of 450 vegetables cultivating farmers interviewed for collecting field level data. Three vegetables were selected for this study such as, country bean, bitter gourd and brinjal. The study revealed that the non IPM farmers of Jessore district applied pesticides to the highest frequency of 29 times, while the IPM farmers used different biopesticides for 5 times. Average spraying interval for the IPM farmers was 5-7 days and for the non-IPM farmers it was 3-4 days. Trend of area under IPM cultivation is also increasing over the last three years. Presently, respondent farmers used different IPM technologies like sex pheromone, bio-pesticides, soil amendment and grafting technique. Net return was found to be higher for IPM farmers compared to non-IPM farmers due to higher yield and low pesticide application cost. Findings of the study also suggested that the farmers could save around 73%, 70% and 70% of pesticide cost for country bean, bitter gourd and brinjal respectively, if they follow IPM method of cultivation. IPM farmers in the study areas were technically more efficient (0.94) than non-IPM farmers (0.84). About 74 % of the farmers opined that the application of pesticides creates health problems. Lack of technical know-how was the major constraints reported by 70% farmers. Less effectiveness of the pheromone trap was another important constraint regarding the IPM technology. Based on the findings, it can be concluded that the cultivation of country bean, bitter gourd and brinjal through IPM technologies produced higher yield, income and required less cost of production over the non-IPM farmers.

#### TARGETING AND INTRODUCTION OF CHICKPEA IMPROVED CULTIVARS IN BARIND REGION OF BANGLADESH

M. A. Rashid, S. Hossain, U. Deb, D. K. Charyulu, M. S. Davala and C. Bantilan

Chickpea is one of the important food legumes of Bangladesh and traditionally cultivated under rainfed condition. The area and production of chickpea have declined because of high emphasis on enhancing area and production of staple cereals and short duration oilseeds. Bangladesh has vast potential for cultivation of chickpea in rice-fallows cropping pattern in Barind region. Tropical Legumes-II (TL-II) project supported by BMGF has provided a huge opportunity for ICRISAT and BARI for better targeting and re-introduction of chickpea improved cultivars in the country with aim of increasing the income and nutritional security of farmers. With this introduction, the study identified and assessed the suitability of improved chickpea cultivars for the Barind region through Farmers' Participatory Varietal Selection (FPVS) approach. For deeper understanding about chickpea cultivation in the targeted region, a comprehensive baseline survey was undertaken during 2012-2013 in Rajshahi and Chapai Nawabganj districts with a sample size of 270 farmers. Detailed information on socio-economic characteristics of chickpea growers, relative importance of chickpea, extent of adoption of improved cultivars, average productivity levels, household incomes and perceptions about improved cultivars etc. were collected and analyzed. Six major chickpea improved cultivars (BARI Chola-1, BARI Chola-3, BARI Chola-4, BARI Chola-5, BARI Chola-9 and BINA Chola-4) were observed during the baseline survey in the study areas. Among all, BARI Chola-5 was the dominant cultivar (55%) followed by BARI Chola-3, BARI Chola-9 and BINA Chola-4. However, BARI Chola-9 is the newly introduced variety which has the highest yield advantage than BARI Chola-5. The main sources of information about new cultivars were research institute and agricultural extension officers. BARI Chola-5 was the most preferred cultivar in the targeted districts because of high yielding, better fit into existing cropping patterns and its disease resistance. The overall feedback generated from this study has provided the inputs for research prioritization of chickpea breeding in the country.

### SOCIO-ECONOMIC IMPACTS OF PULSES RESEARCH AND DEVELOPMENT IN BANGLADESH

M. A. Matin, Q. M. S. Islam, M. S. Hoq and R. A. Begum

The study was undertaken during 2011-12 to evaluate the past investment on research and extension of pulses in Bangladesh. The production function, probit and logit model, financial analysis, partial budget, economic surplus model, growth, and instability index techniques were used in this study. Fifteen pulse growing districts were selected for this study. The total sample size was 2700 farmers. The area and production of pulses decreased to a great extent during the post adoption period. These happened due to development of irrigation facilities, competition with high value crops, unfavourable climate, disease and insect infestation etc. Area instability of mungbean (46.35) was the highest followed by chickpea (27.12), lentil (26.29), grasspea (24.47) and blackgram (20.84) during pre-adoption period. But during post adoption period highest instability was found in blackgram (30.07) and lowest in lentil (14.06).

The adoption of improved mungbean was much higher compared to other four pulses. In 2011-12, high yielding varieties of lentil, mungbean, blackgram, chickpea and grasspea occupied 93, 100, 56, 74, and 3% of the total pulses areas respectively in Bangladesh. The adoption of improved pulse cultivation at farm level was influenced by different socio-economic factors. Study revealed that the gross margin, net return, and Benefit Cost Ratio (BCR) for improved pulses were much higher than traditional varieties. The adopters of improved lentil, mungbean, blackgram, chickpea and grasspea showing 45, 51, 32, 27 and 24% higher yield over their corresponding local varieties. Marginal analysis gave an MRR ranged from 51 to 598 percent. All the pulse crops and mustard had MRR more than 50 percent and hence recommended for farmers practice with the existing technology. It was observed that if the farmers invest in blackgram cultivation instead of grasspea, they would receive Tk. 262 for every 100 taka additional investment and if farmers invest in chickpea cultivation instead of blackgram production, would earn Tk. 598 for every 100 taka additional investment. Similarly, investing in mustard, mungbean, lentil and wheat cultivation instead of chickpea, mustard, mungbean and lentil correspondingly would provide Tk. 86, Tk. 53 Tk. 51 and Tk. 60 for every 100 taka investment respectively.

The mean value of technical efficiency was 0.64, 0.89, 0.94, 0.82 and 0.73 for lentil, mungbean, blackgram, chickpea and grasspea respectively. This implied that, on average, the producers in the study areas were producing different pulses for about 64-94% of the potential (stochastic) frontier production levels, given the levels of their inputs and the technology currently being used. This also indicated that there existed an average level of technical inefficiency of 6-36%. The technical efficiency was found slightly higher for the HYV adopters compared to nonadopters. The DRCs for all pulses were observed to be less than unity explaining that Bangladesh had comparative advantage in selected pulse crops for import substitution. Study indicated that a total of 52039 M.ton nitrogenous fertilizer was added in the soil valuing Tk. 1041 million within the period from 1988-89 to 2010-11. This achievement was attributed to higher adoption of improved varieties and technologies. It was calculated that additional human labour required per hectare for cultivating improved lentil mungbean, blackgram, chickpea and grasspea were 27, 33, 11, 13 and 7 man-days of respectively. The additional labour was mainly required for weeding, harvesting and threshing to increased production of pulses. During 1989-90 to 2010-11, a total of 32.84 million man-days of additional human labour valuing Tk.6568 million were generated from the cultivation of improved pulses. The additional livestock feed and household fuel produced valued Tk. 498 million during 1990-2010.

Consumers' surplus was about 99% higher than producers' surplus, because the elasticity of demand for pulses was very high under small-open economy market. The estimated total

surplus/benefits ranged from Tk. 32.03 million in 1988-89 to Tk. 2635.11 million in 2010-11, and the total surplus accrued as Tk. 25376 million from the pulses R&D in Bangladesh. Total net benefits (NPV) obtained from pulses R&D were Tk. 22632 million for the year 1984-85 to 2010-11. The NPV indicates the total social benefit for a country, and it was found negative up to 1987-88 and then it became positive. Using the base parameters, the IRR of the pulses R&D was estimated to be 71%. The Benefit Cost Ratio (BCR) of the project is estimated at 9.25 over the period. A Sensitivity analysis was undertaken in this study by altering supply elasticity, supply shifter (farmers adoption rate), and research cost. The estimated NPV, BCR and IRR of the pulses development program ranged from Tk. 19861.73 to Tk. 24831.11 million, 8.24 to 10.17%, and 55 to 71% respectively. By increasing the research expenditure by 20%, IRR was 65% and by decreasing the research expenditure by 20%, IRR was 55% and 61% respectively. The IRR was estimated to be 77% by increasing 25% adoption rate and IRR was 63% by decreasing 20% adoption rate. Similarly when the adoption rate was increased by 10% and decreased by 10% and period.

Lack of suitable land, disease infestation, unavailability of HYV seed, uncertainty of rainfall, high input price, lack of training/ knowledge, insufficient water in dry seasons, lack of storage facilities, and adulterated fertilizer were the important constraints for pulse production. Respondent farmers opined some facilities to expand the pulse area as well as to boost the production. More land should be brought under pulse cultivation. Proper crop zoning should be established for pulse growing. During Rabi season Boro rice covers major areas of the farmers. In most cases, farmers are not interested to sacrifice the boro rice. It should take necessary actions to develop short duration pulse varieties so that it could easily be fitted in the boro based cropping pattern. Some pulse crops are susceptible to specific disease so resistant varieties should be developed.

To some extent, irrigation is an important factor for pulse production. But many farmers still do not have any irrigation facility. So, it is necessary to develop light irrigation facilities for the pulse crops. Institutional credit facilities should be made available especially at the time of pulse cultivation. Important inputs like good quality seed, fertilizer and pesticides should be made available for the farmers. Farmers should be informed about the modern technologies for pulse production. Not only the farmers but also extension personnel should be oriented to the modern technologies of pulses through training programmes. Facilities should be provided for introducing of pulse cultivation in non-traditional areas.

Investment in the pulses research and extension programme is found to be very efficient in terms of higher BCR, NPV and IRR compared to many cereal, fibre, vegetables and other crops in Bangladesh. Thus, it indicates that the investments by Bangladesh government and donor agencies on pulses research and extension programme are realistic and justified.

There is little scope of horizontal expansion of pulse area in our country due to the limitation of cultivable area and competition with other crops. Therefore new thrust on research must be undertaken in the direction of evolving high-yield-cum-high-stability short duration varieties suitable for rainfed, saline, coastal and hilly areas. Steps should be taken to make farmers aware of cultivation of pulse crops in the existing cropping patterns for improving their soil quality and health and crop zoning for pulse is essential for increase production. Moreover, the study indicates that the research and extension of pulses represents a good public investment opportunity. Therefore, both government and donors should continue their investments in such a research and extension programme so that more improved pulses variety could be developed in near future under favourable ecosystems.

#### POTENTIALITIES OF MAJOR FRUITS FARMING, MARKETING SYSTEM AND PRICE BEHAVIOUR IN HILL REGIONS OF BANGLADESH

#### M. A. Hossain, M. A. Matin, M. F. Dewan and M. Mohabbatullah

The study was conducted for understanding the present situation of production, processing, price behaviour, and marketing system of major fruits in different hill regions of Bangladesh. The study areas covered four hill districts, namely Rangamati, Khagrachhari, Bandarban and Moulvibazar where fruits are intensively grown compared to other parts of Bangladesh. Primary data were collected from 1230 fruit growers and 1569 intermediaries of eight (8) upazilas considering accessible and less accessible areas for each district through face to face interview method. Secondary data related to this study were also taken into consideration. The major highlights of the findings of the study are summarized and mentioned below:

In the study area, as many as 17 different ethnic minorities (indigenous people) were found and majority of them live in the CHT of Bangladesh. Of total population, 32% were Bengalis, and the remaining 68% were under tribal groups. Among the tribal groups Chakma, Tripura, Marma and Bom constituted about more than 50% of total population. The survey results indicate that the people of hilly areas are mostly illiterate (74%) and majority of them can sign their name only (46%). The overall literacy rate in hill regions is estimated at about 26% compared with the national average of 58.4%. The average family members were 5.42 person per family (national average being 4.85). Large family size and more dependent members in a family are responsible for over exploitation of natural resources. It was estimated that the average farm size was 1.75 ha/farm and the average fruit garden was estimated to be 0.81 ha/farm, which was about 46% of total land allocated for fruit cultivation in all locations. The average per capita income (Tk. 45420/annum) of the hill areas was lower than that of national average (Tk. 57652/annum). Though agriculture is the major income generating component (67%) but it contributed only about 36% of the total income. It means that the poor performance of farm related activities with seasonal unemployment over the year prevailed in the hilly areas. Local varieties and poor production practices were followed by the farmers. As a result yield level for different fruits was not satisfactory. Farmers obtained 25%, 29%, 21%, 11%, 23% and 32% less yield respectively for banana, pineapple, orange, mango, litchi and jackfruit cultivation in comparison to the research managed yield in the study areas. The use of human labour, fertilizers and management practices had significantly influenced on the yield in almost all study areas. It is evident that for banana cultivation most of inputs factor were found to be insignificant for different locations as a result more care should be taken for recommended level of input use for its higher production. The regression co-efficients with negative sign for different inputs indicated that they have adverse impact on yield of banana with further application of these inputs. So, appropriate production technologies should be followed for obtaining higher yield. The project analysis indicated that BCR is greater than one, NPV is positive and IRR is greater than opportunity cost of capital. Fruits cultivation is highly profitable for the farmers. Sensitivity analysis also suggested that fruits cultivation can earn profit under changing situation (20% increases in cost or 20% decrease in return). At farmers and trader's level, the total post-harvest loss of banana, pineapple, orange, mango, litchi and jackfruit were 37%, 27%, 20%, 24%, 17% and 38% respectively. The main post harvest losses were incurred due to severe attack of insect and severe attack of bat, squarrel and monkey for farmers. For traders, major loss was incurred during transportation. On the basis of retail price, the total economic loss was estimated as Tk. 2341.66 crore and the maximum loss was incurred for banana (Tk. 705.79 crore) followed by pineapple (Tk. 550.58 crore) and mango (Tk. 508.95 crore) and the lowest for orange (Tk. 1.12 crore). It is interesting to note that, transportation dummy and market demand dummy were negatively significant for all fruits in all locations. If these facilities like transportation, market demand and labour availability can be increased, post-harvest loss will be decreased to an acceptable level at the study areas. Nine major chain was identified among them four chains were important, by which 82% fruit flow out from producer to consumer. These four chains were:

Chain I: Farmer-Local Traders-*Bepari-Arathdar-Paiker*-Urban Retailer-Consumer Chain II: Farmer-*Bepari-Arathdar-Paiker*-Urban Retailer-Consumer Chain III: Farmer-*Bepari- Arathdar*-Urban Retailer-Consumer Chain IV: Farmer-Local Traders-Rural Retailer-Consumer

According to the number of intermediaries involved in each chain and volume of product run

through the chain, we can say that, chain II (Farmer- Bepari-Arathdar-Paiker-Urban Retailer-Consumer) is the most efficient chain for the fruits marketing system. In the efficient chain (chain-II), the highest producers' share in consumer price was found for litchi (53%) and the lowest was found for banana (27%). High price variation was observed between the accessible and the less-accessible areas. In 2012, price variations for banana, pineapple, orange, mango, litchi and jackfruit in accessible areas were 5-19%, 3-16%, 7-13%, 2-9%, 22-34% and 5-7% higher than those of less accessible areas. The net value addition for mango jam, pineapple jam, orange jelly and mixed jam were 18%, 26%, 29% and 17% of the total cost respectively for the processing industry (BD Foods Limited). From the analysis of spatial price integration for the selected fruits for the selected markets pairs, it was observed as a whole that most of the markets were co-integrated with the study markets except some of the nearby districts. In case of future price prediction, price will be increased by 3%-25% for all fruits for the next three years (2014, 2015 and 2016) based on the price of 2012. So the farmers of hilly areas who are still in indecision about the future prices of fruits should come forward to fruits farming as the analysis provides a positive insights for fruits cultivation. Farmers in hilly areas are reluctant to produce fruits due to their ignorance and lack of modern technical knowledge. In this respect, awareness of the farmers should be developed through providing training for proper utilization of these input factors (like human labour for different operational activities, proper fertilizer doses, rate of seedling/suckers, weedings, insecticide application etc.) for optimum yield. Modern fruits production technologies should be disseminated at hill areas for increasing yield and income of the farmer. Lack of modern technical knowledge, storage facilities, transportation facilities, agro processing industries, unplanned plantation, use of local varieties, severe attacks of insect and pest, attacks by bat, squirrel, monkey, scarcity of ground water and low prices were identified as the major problems in the hill areas of Bangladesh.

#### ASSESSMENT OF SOCIO-ECONOMIC IMPACTS OF OILSEED RESEARCH AND DEVELOPMENT IN BANGLADESH

#### M. A. Monayem Miah, M. A. Rashid and S. M. A. Shiblee

The acute shortage of edible oils has been prevailing in Bangladesh during last several decades and spending on edible oils and oilseeds import has been increasing to meet the country's demand. But, oilseeds area has been decreasing for the period from 1990 to 2012 due to various economic and technical reasons. Bangladesh experienced positive growth rates of the productivity of mustard, groundnut, and sesame in the above mentioned period.

Bangladesh government has given emphasis on R&D (Research and Development) of these crops and invested a lot of money for attaining self-sufficiency. BARI and BINA have released a good number of improved varieties of these crops. Adoptions of these varieties have created additional employment, income, and saved foreign exchange for the country. Conversely, a large number of farmers are still reluctant to grow these improved oilseeds varieties for various unknown reasons that need to be investigated properly. The present study will provide up-to-date data and information on the adoption, profitability, and impacts of oilseeds R&D which will be the basis of formulating concrete policy for investing more on oilseeds improvement programs in

Bangladesh. Therefore, the present study has been conducted to assess the technological adoption and relative profitability of oilseeds cultivation at farm level, and to estimate the socioeconomic impacts of oilseed R&D in Bangladesh.

Both primary and secondary data were used in this study. Primary data were collected through household survey, while secondary data were collected from various published sources. The household survey was conducted by purposively selecting 11 districts, namely, Manikganj, Faridpur, Tangail, Mymensingh, Rajshahi, Pabna, Dinajpur, Noakhali, Lakshmipur, Comilla, and Jessore. Four major oilseed crops, namely mustard, sesame, groundnut, and soybean were considered for the study. For survey, a total of 180 households cultivating oilseeds were randomly selected and interviewed from one district for each crop. Due to non-availability of soybean growing areas, soybean data were collected from two districts. Thus, the total sample size was 1980. The study used different statistical tools for analyzing collected data. An *ex-post* evaluation with the help of economic surplus model under both closed and small-open market economy situations was also adopted to estimate the rate of returns (BCR, IRR & NPV) of the investment in oilseeds R&D in Bangladesh.

Most of the adopters and non-adopters of improved oilseeds varieties were relatively young (age 31-50 years). About 21% of the adopters and 26% of the non-adopters had no formal education. More than 40% of the adopter and non-adopters had primary level education. Agriculture was the principal occupation of both adopter (93%) and non-adopter (97%) oilseed farmers. More than 32% adopters and 34% non-adopters were in the experience group of 6-10 and 1-5 years respectively. About 14% adopters and 10% non-adopters received training on oilseed cultivation once in life. However, 50% of the adopters and 38% non-adopters received training on agriculture mostly from the Department of Agriculture (DAE). The average farm size of the adopter (1.349 ha) and non-adopter (1.216 ha) oilseed growers was more or less similar. The highest farm size (1.9 ha) was reported for groundnut adopters followed by mustard (1.3 ha) and sesame (1.0 ha). Sub Assistant Agriculture Officer (SAAO) significantly created interest among them to adopt improved oilseed varieties. Most of the farmers belonged to different social organizations and had regular contact with extension personnel. Cosmopolite farmers used more improve oilseed varieties than that of less cosmopolite farmers.

Majority of the farmers used BARI old varieties of oilseeds. About 60% mustard, 82% groundnut, 78.5% sesame, and 84.4% soybean farmers used BARI old varieties. Farmers were very much enthusiastic towards BARIMustard-14 & -15 varieties due to their short duration and high yielding characteristics. In 2010-11, the areas planted to improved mustard, groundnut, and sesame varieties were about 27, 7, and 11% of the total respective oilseed areas respectively. Except sowing period and sowing method, the levels of adoptions of other crop management practices were low. Majority of them often did not follow the recommended seed rate, fertilizer dose, irrigation, and weeding. The common factors that significantly influenced oilseed farmers to adopt improved varieties of oilseeds were the availability of family labour, availability of improved seed, cosmopolitness, and extension contact.

The yields of improved oilseed varieties were found to be much better than that of BARI old or local varieties at farm level. The yield of improved mustard was 1.64 t/ha which was significantly higher (46.4%) than that of BARI old variety (Tori-7). The yield of improved groundnut (2.40 t/ha) was 48.7% higher than that of Dhaka No.-1 variety, but 25% lower than the yield of BARI Groundnut-5 & -6. The yield of improved sesame variety was 27.8% higher as compared to Til-6 variety. The yield of BARI improved soybean was 25% lower than its potential yields, and about 5.2% higher than the yield of Sohag variety.

Irrespective of varieties, the cultivation of oilseeds was profitable from both financial and economic point of view. The profits of improved varieties were much higher than their

corresponding BARI old or local varieties. The average net returns of cultivating improved mustard, groundnut, sesame, and soybean were respectively Tk. 28,859, Tk. 84,200, Tk. 13,879, and Tk. 3,761, whereas BCRs were 1.56, 2.36, 1.32, and 1.1 respectively. These net returns and BCRs were significantly higher than that of BARI old oilseeds varieties. Unfortunately, the overall profitability of mustard, sesame, and soybean production was lower than most of their competing crops. The highest net return under import parity level was calculated for groundnut (Tk. 82,594/ton) followed by sesame (Tk. 44,578/ton) and soybean (Tk. 5,544/ton). The value of DRC implied that the domestic production of mustard, groundnut, sesame, and soybean was more profitable than their imports from foreign countries.

Different factors, namely improved seed, human labour, organic fertilizer, Urea, TSP, loamy soil, pesticide, and land rent had positive and significant influence on oilseeds production. Personal quality and managerial capability of farmers also influenced oilseeds production. The farmers with higher education, more farming experience, extension contact, improved seed, and innovativeness were technically more efficient than other farmers. The oilseed farmers could produce oilseeds to 72-89% of the potential (stochastic) frontier production levels, given the recommended levels of inputs and technologies currently being used. It means that the levels of technical inefficiency involved in the oilseed production ranged from 11 to 28%. Area-specific technical efficiency revealed that the level of technical efficiency was higher for the intensive oilseed growing district and less intensive for low growing areas.

Adoption of improved oilseed technologies at farm level has made some positive impacts on productivity growth, farmers' income, employment generation and foreign exchange savings through producing more of these crops. Highly significant structural breaks occurred in the area, production and yield of these two crops between pre- and post-adoption period. Improved mustard variety cultivating farmers got about 75% higher net incomes. Almost similar benefits were also received by improved variety groundnut and sesame cultivating farmers. The adoptions of improved mustard, groundnut, sesame, and soybean variety varieties at farm level created an additional employment of 12.7, 11.6, 15.4, and 6.1 man-days/ha for the respondent farmers respectively. It was also found that the livelihood status of the adopting households was much better than that of non-adopting households.

Ex-post analysis of the past investment (Tk.1268.91 million) on oilseeds R&D during 1998 to 2012 revealed an internal rate of return (IRR) to be 24%. Under various assumptions, the IRR ranged from 22 to 26% and BCR from 2.84 to 3.50. The yield advantages of different improved oilseeds varieties as compared to BARI old varieties ranged from 5.27 to 48.67%. The amounts of NPV and foreign exchange savings due to R&D of oilseeds (i.e. higher production and less importation) for the period from 1997/98 to 2011/12 were Tk. 4,769.04 million (US\$ 61.14 million) and Tk. 7,574.19 million (US\$ 97.105 million) respectively. Therefore, the investment on R&D of oilseeds was found encouraging in Bangladesh.

SWOT analysis was done to explore the constraints and investment opportunities put behind the R&D of oilseeds in Bangladesh. The analysis identified different strengths and opportunities in oilseed cultivation, such as research capability, good varieties, higher profitability, farmers' interest, existing extension services, availability of potential areas, and private sector involvement. In addition, there were also some weaknesses and threats in oilseed cultivation which were climate variability, high competition with other crops, lack of short-duration variety, low adoption of improved varieties, and insects & diseases infestation. Overall findings suggested that the strength and opportunities of oilseed cultivation outweigh the weaknesses and threats of its cultivation in Bangladesh.

The following recommendations were thus made for consideration to enhance oilseed production for attaining self-sufficiency in Bangladesh.

- Dissemination of existing improved rice and oilseed varieties
- Availability of improved seeds of oilseeds and rice
- Strengthening existing extension services
- Bringing potential areas under oilseed cultivation
- Involving private sectors to oilseed production and value addition
- Strengthening oilseed research and development
- Conducting regular training programme
- Providing institutional credit facilities
- Availability of production inputs at reasonable prices
- Strengthening international collaboration

Besides varietal improvement research of oilseeds, the following socio-economic studies related to oilseeds production, consumption, and marketing need to be implemented.

- Assessment of demand and supply of oilseeds in Bangladesh.
- In-depth value chain analysis of oilseeds in Bangladesh.

#### CONSEQUENCES OF TOBACCO CULTIVATION IN BANGLADESH

#### Tanvir M. B. Hossain, S. Hossain and Moniruzzaman

Tobacco has been producing in Bangladesh since 1751. Tobacco is a highly debated product considering consumption and its partial health effect. In spite of that, Bangladesh and the world is still producing tobacco due to its high value and mass demand. Details knowledge of tobacco cultivation in Bangladesh and its consequence was necessary. This study was aimed to assess past and present status of tobacco production, trade and tobacco product consumption in Bangladesh. This study also explored the reason of tobacco cultivation, financial profitability of tobacco and its alternative crops, best tobacco alternative crop for cultivation, farmer's attitude towards tobacco cultivation in future, comparative economic status of tobacco and non-tobacco farmers, cultivation and consumption effect on health of farmers, tobacco control management in Bangladesh.

Tobacco cultivation area attributed negative decline rate since independence but the production and yield increased significantly. In spite of overall decreasing trend, tobacco cultivation increased significantly in the last decade which is alarming for the society. Farmers were producing tobacco because they get profit, quick cash return, sell confirmation facility, input and credit facility from the tobacco company. Tobacco cultivation decision of farmers mostly depended on tobacco price of last year, price of other crop and company's demand for tobacco. Farmers knew that they could cultivate potato, rice, wheat, maize, mustard, vegetables, chilli, pulses, eggplant, cauliflower, onion, groundnut, garlic as an alternative to tobacco cultivation. Tobacco alternative crop selection through composite rank indexing method suggested that among 15 crops farmers can cultivate onion, chilli, mustard, bean, lentil, wheat, brinjal, potato, groundnut, rice, cabbage and maize as an alternative to tobacco cultivation.

Composite indexing analysis with considering various livelihood and economic status indicators showed that tobacco farmers had better socio-economic and livelihood status compared to alternative crop producers. As tobacco is a labour intensive crop, so many farmers mentioned that if tobacco industries stop giving facility they will shift to cultivate other profitable crops. Tobacco leaf postharvest processing through flue curing method is completely anti-environmental friendly but processing activities are compulsory. Farmers used fuel materials like wood, jute stick, dhaincha, crop residue and forest wood through flood. To get one kg of cured

tobacco leaf, farmers have to burn 5 kg of wood. This means they have to burn 11 mt of wood for tobacco leaf processing harvested from one hectare of land.

A very small percentage of famers (30%) mentioned about facing health problem due to tobacco cultivating and processing. The health problems faced by the farmers were asthma, weakness, headache, cough, and high blood pressure. A good percentage of farmers (96%) supported that smoking is harmful for health. More than 50% of tobacco farmers didn't have smoking habit. 22% of smoker farmers were facing health problems due to smoking habit. The farmers informed that if the price of cigarette will be increased by 29% then they will stop smoking. So, it will be very effective to increase tax on cigarette to reduce consumption of the smokers. Most of the farmers realised that they are producing a harmful crop which need to be stopped through cultivating tobacco alternative crop. But higher percentage of farmers didn't get any advice to stop tobacco cultivation from any different expected sources. This indicated that there is lot of opportunity to increase awareness among the farmers which might help them to take decision against tobacco cultivation.

The success of tobacco cultivation reduction depends on effective tobacco control management policy implementation. The anti-tobacco organization should work actively at the farmers' field through formatting of an activist group among the farmers. The government should introduce health tax and the tax revenue will be utilised by health ministry for public health cost. Increase of export and domestic tax is necessary to reduce tobacco production export and consumption. The government authorities should formulate a policy to form an agricultural price commission to provide satisfactory price of tobacco alternative crops. The government authority should formulate a policy so that agro-based industries can be involved in business for collecting their raw materials from farmers under contract growing system. Through introducing contract growing system in other crop cultivation, farmers will stop tobacco cultivation and switch to other crops like maize, wheat, potato and vegetable for cultivation.

#### Abstract 2012-2013

#### ADOPTION OF WHEAT VARIETIES IN SELECTED AREAS OF BANGLADESH

#### M. A. Haque and M. A. Monayem Miah

The study assessed the level of adoption and profitability of wheat varieties at farm level. Data were collected from 300 randomly selected wheat farmers from Thakurgaon, Kushtia and Tangail districts. The results indicated that Shatabdi was highly adopted wheat variety (46%) followed by Prodip (19%), Bijoy (17%), Kanchon (7%) and Sonalika (5%). The adoption levels of ploughing, manure and fertilizer use were low, whereas planting time and irrigation were high. The cost of producing Shatabdi was highest (Tk. 66565/ha) followed by Prodip (Tk. 63244/ha), Bijoy (Tk. 62873 /ha), Sonalika (Tk. 61701/ha) and Kanchon (Tk. 55322 /ha) varieties of wheat due to higher cost of human labour, land preparation, seed and irrigation cost. The yield of Shatabdi was reported to be the highest (4.27 t/ha) in the study areas followed by Prodip (4.10 t/ha), Bijoy (3.98 t/ha), Sonalika (3.62 t/ha) and Kanchon (3.42 t/ha). The net return of Shatabdi was highest (Tk. 34987/ha) followed by Prodip (Tk. 34467/ha), Bijoy (Tk. 31917/ha), Sonalika (21321/ha) and Kanchon (Tk. 19895/ha). The net return of wheat was higher than its competing crops like lentil and mustard and lower than potato and maize. Human labour, land preparation, seed, fertilizers and irrigation had positive and significant effect on wheat cultivation. Non-availability of new variety seed at proper time, lack of technical knowledge about improved cultivation practices of wheat, high price of fertilizer and low price of wheat were major constraints for the adoption of wheat technologies.

#### IMPACT OF IPM TECHNOLOGY ON SWEET GOURD PRODUCTION IN SELECTED AREAS OF BANGLADESH

#### Q. M. S. Islam and S. Hossain

The study was undertaken to examine the adoption of IPM practices in Jessore, Magura, Comilla and Bogra districts during 2012 to assess the impact of IPM on pesticide use, yield and producer profits of sweet gourd farmers in Bangladesh. A total of 320 farmers taking 80 (40 IPM and 40 non-IPM) from each district were selected randomly. The yield of sweet gourd was found to be 20.10 t/ha and 18.20 t/ha in IPM and non-IPM farmers respectively. The cultivation of sweet gourd was profitable since BCR were 2.17 for the IPM and 1.93 for non-IPM farmers. Gross return and gross margin of IPM practices were 10% and 20% higher than non-IPM farmers respectively. Farmers in the study areas adopted IPM practices as most of the farmers were influenced by IPM school. IPM farmers mainly used sex pheromone traps, soil amendment and hand picking. Trend in area of IPM practices in sweet gourd cultivation in future. The use of traps and other IPM practices in sweet gourd cultivation was found very effective in reducing insect infestation. The availability of pheromone traps and other IPM technologies must be ensured to the farmers.

#### FARM-LEVEL PESTICIDE USE ON BRINJAL AND OKRA AT THE SELECTED AREAS OF CHITTAGONG AND MANIKGANJ DISTRICTS

#### S. M. A. Shiblee

It is alleged that farmers' irrational and indiscriminate use of pesticides and not maintaining pre-harvest interval in using pesticides has been causing serious health hazards to the human body. The study was undertaken to know the real situation at the field level and suggest some policy directions. The study was conducted in Chittagong and Manikgani districts. A total of 120 farmers, 30 from each district for each vegetable crop, namely brinjal and okra were selected randomly. All the respondent farmers, except one, used pesticides. It was believed that there was hardly any yield found without using pesticide. As many as 31 and 22 pesticides were used by the farmers for brinjal and okra respectively. Detrimental effect of the pesticides to the human body was more or less admitted by the respondent farmers. Not a single farmer was found having any idea about pre-harvest interval of the pesticides. It's a common practice of the farmers that for the next harvest they apply pesticides at the following day of the previous harvest. The average success of applying all the pesticides to control insects was more or less ranged from 50% to 100%. Farmers complained that the effectiveness of a pesticide declines when it becomes popular. Most of the farmers opined that they would give priority on the quality of the vegetable in terms of shape, size and color for getting higher price than maintaining pre-harvest interval. With respect to choosing and fixing the dose of pesticides, farmers are fully dependent on the suggestion of the dealers, which might lead the farmers of being deceived. For judicious use of pesticide, farmers' dependency on SAAO not dealers, knowledge on pre-harvest interval of pesticides, biological and cultural method to control insects etc should be ascertained for producing safe food.

#### IMPACT OF SHIFTING OF LAND UNDER CEREAL CROPS TO JUJUBE CULTIVATION IN SELECTED AREAS OF BANGLADESH

#### S. Khandoker, M. A. Monayem Miah, M. Khatun and S. Hossain

The study was conducted in three districts, namely Pabna, Natore and Chapai Nawabganj during 2012-2013 to assess the relative profitability of jujube cultivation, factors influencing

and problems of shifting cereal lands to jujube cultivation. A total of 120 farmers, taking 40 from each district were selected randomly for the study. The total costs of jujube cultivation were Tk. 277232 in the 1<sup>st</sup> year, Tk. 227925 in the 2<sup>nd</sup> year and Tk. 190217 in the 3<sup>rd</sup> year. The average yields of jujube were found to be the highest in the 3rd year (15540 kg/ha) followed by 2<sup>nd</sup> year (9959 kg/ha). Per hectare net returns from jujube cultivation were Tk. 145978 in the 2<sup>nd</sup> year and Tk. 345720 in the 3<sup>rd</sup> year. The total cost of jujube cultivation was 48-62% higher than the costs incurred for different cropping patterns in the study areas. The net return from jujube cultivation was more than 57% higher than different cropping patterns in the study areas. The shifting of cereal lands to jujube cultivation was found to be a profitable enterprise since the BCR (1.47), net present value (Tk. 231791), and Internal Rate of Return IRR (94%) of jujube cultivation was very high. Relative income and education turned out to be positively significant, whereas age and food requirements at home negatively significant for shifting decision from cereal crops to jujube cultivation.

#### EXISTING VAULE CHAIN ASSESSMENT OF CHILLI MARKETING IN SELECTED AREAS OF BANGLADESH

#### M. S. Hoq, T. M. B. Hossain, M. A. Matin and S. Hossain

The study was conducted in two chilli growing districts, namely, Jamalpur and Bogra to examine the value chain, value addition at different levels, post- harvest losses, and seasonal price variations of both green and dry chilli. A total of 166 respondents consisting of 60 chilli growers and 106 chilli traders were selected. Farmer, input dealer, farm labourer, faria, bepari, paiker, arathdar, retailer, local processor/miller, company agent, and agro processing industry were the main actors of the value chain. It was observed that green chili cultivation was profitable and per hectare net return was Tk. 92250 and BCR was 1.64. Per hectare net returns and BCR of dry chilli cultivation was estimated at Tk. 102853 and 1.67 respectively. The net value addition per quintal of green chilli at farm level was Tk.1105.25 and the highest value addition was found at intermediaries' level which was Tk. 333 for Retailer (Dhaka). The postharvest loss of green chilli was the highest at retailer (Dhaka) level which was Tk.180 per quintal. The overhead, processing and marketing cost and net value addition of agroprocessing industry were Tk. 3522 and Tk. 4231 per quintal of dry chilli. The post harvest loss of dry chilli was found to be the highest at agro-processing industry level which was Tk. 2497per quintal due to weight loss, milling loss and shortage. Seasonal price variation showed that price of green chilli was remained minimum in the month of April which was due to late harvesting period and maximum in the month of August which might be due to nonavailability of green chilli. Again, the price of dry chilli found to be minimum in the month of May which might be due to adequate supply in the market and maximum in the month of January for non-availability of dry chilli.

#### CONSTRAINTS TO ACCESS TO CREDIT AND ITS IMPACT: A STUDY ON FARM HOUSEHOLDS

#### M. Khatun, Tanvir M. B. Hossain, S. Khandoker and S. Hossain

The study was conducted in Rajshahi, Jamalpur and Rangpur district to identify the constraints to access to credit and its impact on farm household. A total of 180 farmers taking 30 credit users and 30 credit nonusers from each districts were selected for the study. The study revealed that highly reported constraints for bank credit were its cumbersome procedure (83%) followed by late disbursement of credit (62%) and requirement of adequate collateral
(61%). High interest rate, short term and small amount of credit were the constraints for credit from NGOs and local money lenders. The impact of these constraints created a lot of troubles for agricultural activities (59%), increase cost of credit and sell of agricultural crops at low price to manage the money of every installment. Level of education, having off farm income, membership of any institution and farmers' knowledge level about credit were significant determinants to increase the probability of access to credit. Access to credit may increase if the NGOs reduce their interest rate of credit. Access to credit from formal institution may increase through improving credit disburse system for hassle free, quick and timely sanction of credit.

# ASSESSMENT OF THE MAIZE SITUATION, OUTLOOK AND INVESTMENT OPPORTUNITIES TO ENSURE FOOD SECURITY IN BANGLADESH

#### M. A. Monayem Miah, Tanvir M. B. Hossain, M. A. Matin Sahadat Hossain and Moniruzzaman

Maize is introduced as relatively a new crop in the rice based cropping patterns of Bangladesh. Now it has become an important cereal crop to its growers and diversified uses in home and abroad. It has high potentiality to provide feed for poultry & fish and fodder for livestock. Dry maize plant is a good fuel for rural households.

The demand for maize is increased due to increase in poultry and fish industry and increase the per unit cereal productivity to tackle the problem of teeming population. About three-fourths of the country's maize productions are used as feed for poultry and fish farms. Maize as an ingredient for starch, used in textiles and other industries, does not seem to be an important factor in immediate future increase in the demand for local maize. Because of its higher nutritional status, it could be a potential source of nutrients for malnourished population in Bangladesh.

In spite of higher genetic yield potential, current maize yield is very unpleasant. The present yield-gap of maize is 62.91% and 86.35% from experimental yield and potential yield. So, there is an ample scope of increasing the current yield in the country. Bangladesh still deficits in maize production and has to import a huge quantity of maize every year in order to fulfill its demand. Therefore, immediate steps are needed to increase the current level of production to meet up the country's demand and save valuable foreign exchange.

Through an analysis of various data sources, the study generated information regarding maize situation, outlook and investment opportunities. More specifically, the study generated data and information related to current status of maize production; past trends, maize markets, value chain, and available opportunities for the investment in maize research and development in Bangladesh. Based on the study findings, research intervention, and policy decisions can be taken for maize technology development to ensure food security in Bangladesh. The specific objectives of the study are as follows:

- 1. To analyze the past and present situation of maize production technologies, its dissemination, and consumption.
- 2. To assess the outlook of maize for medium and longer term perspectives.
- 3. To assess the investment opportunities for maize research and development to exploit full potential of the sector.

The study used both primary and secondary data and information. The main categories of information used in this study were: (i) Synthesis of relevant findings from existing literature;

(ii) Secondary data and information from available sources; and (iii) Primary data and information obtained through Focus Group Discussion (FGD).

In order to estimate the cost and return regarding maize output and input used per hectare were collected from secondary sources like MS/PhD thesis and journal. Later this output and input data were multiplied by the current price of the respective input and output for specific area to compare the status of farm level profitability of maize cultivation in different regions.

The study analyzed annual growth rate of area, production, and yield of maize through fitting a semi-log trend equation using time-series national data (1990 to 2011). The decomposition of output growth was also analyzed through Hazell's Varience decomposition procedure to find out the sources of growth. The variability in area, yield, and production of maize for the period of 1990-2011 were computed by using Cuddy Della Valle Index.

ARIMA model was used for predicting future area, production, and yield of maize. Time series data for 25 years (1989-2013) were used for this purpose.

The study discusses the past and present maize production situations in Bangladesh. It identified maize production situations that include importance and geography of maize production; characteristics of maize producers; technology use; factors associated with technology use; and economics of maize cultivation.

Area, production and yield: In 2011, area under maize cultivation is found to be 165.62 thousand ha with a production and yield of 1018.28 thousand tons and 6.15 t/ha respectively. The overall growth rates of area and production of maize were negative and their instabilities were medium for Bangladesh during period 1990-1999. During that period positive growth rates in area and production registered for Rangpur and Khulna division, but their instabilities were found to be high and very high respectively. In period 2000-2011, highly impressive growth rates with low instability were registered in maize area and production in all the divisions except Sylhet due to expansion of poultry and fish farming across the country. Decomposition analysis reveals that a change in cropped area was the principal contributor to change in the mean productions of maize in both the period.

Maize geography and ecology: Dinajpur, Rangpur, Kushtia, Dhaka, Bogra, Rajshahi, Comilla, Jessore, Pabna, and Jamalpur districts are intensive maize growing areas of Bangladesh. These 10 districts covered more than 98% of total maize area and production in Bangladesh. Among the different divisions the average area, production, and yield of maize is higher in Rangpur and Khulna division compared to other divisions. According to the Department of Agricultural Extension (DAE), 84.4% maize is grown in the Rabi season and the rest in the Kharif (summer) season. Area under maize cultivation increased up to 136 and 40% during summer and winter season respectively in 2011 compared to 2010. The highest production growth performance was observed in both summer and winter maize compared to other crops. Most Agro-Ecological Zones (AEZs) of Bangladesh are suitable for maize cultivation. The average rainfall recorded in 2009 and 2011. Optimum temperature for maize cultivation varied over the growing seasons.

Maize-based Cropping Patterns: Hybrid maize is generally cultivated in Bangladesh after the harvest of transplanted *Aman* rice. Currently farmers are fitting maize with a widening range of other traditional crops, such as potato, jute, and various vegetables. Maize- Fallow-*T. Aman* was the major maize based cropping pattern in different districts. Maize- *T. Aman*- Vegatables was a prominent pattern in Dinajpur district. Cropping patterns like Maize- Jute- Fallow and Maize-T. Aus- Vegetables were followed by the growers of Chuadanga district. Intercropping and relay cropping with maize are also getting popularity in Bangladesh. The present maize-based

intercropping systems are Maize+Groundnut; Maize+Mungbean; Maize+Soybean; and Maize+Tomato.

Maize producers: All categories of farmers are involved in maize cultivation. FGDs in two districts revealed that mostly small category farmers are involved in maize cultivation. Most maize growers (81%) are literate of which the highest 38% have primary level of education. Agriculture is their primary occupation. Recent study revealed that average size of holdings for small, medium and large category maize farmers were 0.66 ha, 1.40 ha, and 3.76 ha respectively. A maize growing household owned 3 nos. cattle, 1.02 nos. goat and 6.28 nos. poultry. Maize growers of generally receive advices and information regarding maize production mostly from extension personnel, namely Sub Assistant Agricultural Officer (SAAO). The most important factor that influences the farmer to cultivate maize was advice from neighbouring farmer followed by extension personnel. Recent survey showed that about 33% of the maize growers were involved with different organization as a member. Recent FGD revealed that more than 95% of the production was sold and the shares of food and feed were very negligible. The average shares of household income from maize were 7% and 12.3% of the total household income and total farm income respectively. Bangladeshi women are commonly engaged with various post-harvest activities like de-husking and shelling of maize, sun drying, winnowing, and storing.

Maize technology: More than 90% of the farmers were using power tiller for ploughing their lands. They used exotic hybrid maize seed. Different studies showed that majority of the farmers cultivated 900M (33%) variety followed by NK-40 (22%) and Pacific-11 (18%). Farmers used 21kg of hybrid maize seed per hectare. They used Urea, TSP, MoP, gypsum, and zinc at lower than the recommended dose. Medium and large category farmers used more seed and fertilizer per hectare compared to small category farmers. Almost all the farmers used mechanized irrigation system for maize. The activities of women are mostly confined to post-harvest processing. Gross return from maize production, subsistence pressures (persons per household) and soil suitability index were the important factors that significantly influenced farmers in cultivating maize in the winter. Again, annual household income and extension contact had positive and significant relationship with the adoption of maize production technologies. Different factors like tillage, amount of Urea, MoP and manure used had positive and significant effect on maize yield for small and medium farms, while application of Urea, boron and irrigation positively influenced the yield of winter maize for large farms. Planting methods also significantly affect maize yield. Bed planting method received higher yield compared to other methods. Severe drought/rainfall variation and high wind causing up to 40-60% yield reduction in maize crop. Training on maize cultivation had also a significant effect on yield. Farmers after receiving training obtained 15.4% higher yield compared to pre-training period.

Economics of maize: The total cost of maize production was Tk. 88762/ha in different locations of Bangladesh of which 83.4% and 16.6% was variable cost and fixed cost respectively. The cost of maize production was slightly higher in western part of the country compared to northern part. The average farm level yield of hybrid maize is 7.39 t/ha, whereas, national yield is 6.15 t/ha. The yield gap between farmers' yield and experimental and potential yield were found 32.7% and 41.4% respectively. The average gross return was from maize production was Tk. 108611/ha, whereas gross margin and net return were Tk. 34,662 and Tk. 20,004 per hectare respectively. Different studies revealed that there were a positive relationship between farm size and profitability. The cost and yield of maize for large farmers was reported to the highest compared to medium and small farm. Net return was also higher for large farms compared to other farm categories. Land preparation, fertilizer, irrigation, manure and pesticide had positive and significant effect on the gross return. Maize is relatively more profitable compared to other cereal crops. The DRCs of maize were less than unity under import parity prices. The EPCs were

also less than one and ERPs were negative for maize production implies that the domestic market of maize was not protected. Domestic production of maize may require substantial protection in future for import substitution.

The study highlights the main features of the supply of maize related inputs and Research & Development (R&D) including recent past.

Maize seed supply: In Bangladesh both public and private sector companies are involved in supplying maize seed. Maize growing areas are now mostly covered by a wide range of exotic hybrid varieties of non-QPM type. Only the tribal peoples of Chittagong hilly areas are cultivating composite varieties. A recent survey showed that about 70 types of hybrid maize seed were available at seed stores across the country. BRAC, Grameen Krishi Foundation (GKF) and Rangpur Dinajpur Rural Service (RDRS) were the pioneer NGOs in maize seed production program in Bangladesh. BADC is the only public sector mandated to produce large quantity seed of various kinds and still supply the majority of the high volume/low profit seed. Currently, BADC is producing BARI hybrid maize seed in about 97.28 ha of land using their 9 seed producing farms, and 8 contract growing zones. Total hybrid seed requirement in the country is estimated about 4500 MT, whereas only about 1000 MT is being produced locally. BRAC is producing hybrid seeds of its own developed varieties and using parental lines of pacific seed company. BADC, ACI seed, CCDB and Agri Concern are producing hybrid seeds of BARI developed varieties through contact growers. In the private sector, there are more than 100 companies involved, with over 8000 registered seed dealers operating across the country. BADC distributed seed by seed sales centres and through private seed dealers. In the import based system of marketing, importers are importing seeds directly from foreign countries and making available to the farmers or seed users through whole-sellers and retailers. At present the legal and regulatory framework for seed is provided by (i) The National Seed Policy (1993); (ii) The Seed Ordinance 1977 (Amendments in 1997 and 2005), and (iii) The Seed Rules 1998. The Plant Quarantine Regulation is considered part of the regulatory framework as it also affects the seed sector.

Agro-input supply: After the independence only BADC is responsible to supply fertilizers, seed, minor irrigation equipment, and limited mechanized services to the farmers. BADC's role has diminished over the years with increasing private sector involvement during the 1990s. Private traders were given permission to have a direct access to the bulk purchase of chemical fertilizers as well as to import TSP and MoP fertilizers freely which has led to increased availability and wider adoption of chemical fertilizers at the farm level. The marketing channel of pesticides in Bangladesh consists of pesticide companies, distributors, wholesalers, wholesaler cum- retailers, retailers and farmers. The consumption of pesticides increased from 7350 MT in 1992 to 16200 MT in 2001. Agricultural mechanization plays a vital role to increase production and cropping intensity. Maize farmers are using farm machinery mainly during land preparation, intercultural operation, irrigation, and shelling. Presently, more than 40000 small and medium sized local metal working workshops have grown up to manufacture agricultural machinery all over the country

Supply of other services: Agricultural credit plays a crucial role in crop production for marginal and small farmers. Access to institutional sources of credit almost tripled between 1988 and 2008. Maize farmers need credit mostly to buy production inputs. The Katalyst is promoting partnerships between input companies and the Department of Agriculture Extension (DAE) to promote maize-based cropping patterns in locations with potential. It is also trying to promote the contract farming system which enables farmers to link with traders who can provide them with know-how regarding maize production, access to larger buyers and credit to buy inputs. Maize is a labor-intensive crop employing approximately 148 person-days per hectare every growing season. In 2009-2010, around 375,000 farmers and 93,000 laborers were involved in the

production of approximately 1.5 million tons of maize. Irrigation is mainly needed in winter maize cultivation. About 80% irrigation is done by ground water and the rest by surface water. The Department of Agricultural Marketing (DAM) has undertaken an e-government initiative to develop and disseminate critical agricultural market information to farmers, traders, government, policy makers, development agencies and other stakeholders.

Maize research system: A large share of the innovations in the agriculture sector is now originating from both public and private sector. Many actors in the private sector have entered into agricultural R&D. The private sector is increasingly involved in plant breeding and seed production in response to the opportunity presented by growing demand for new varieties and for production intensification. The Plant Breeding Division (PBD) of BARI has a solid and systematic program and is now leading the maize research in Bangladesh. After the establishment of the BARI in 1976, maize R&D program got renewed thrust with a view to develop high yielding varieties. Many germplasm were introduced and tested in different locations. During the period between 1986 and 2002, BARI has developed and released 8 composites including one each of popcorn and sweet corn of which some have got popularity among the farmers. Besides, using introduced and locally developed inbred lines BARI has so far developed 11 hybrid maize varieties from 2000 to 2008 of various kinds and some of which are now being cultivated commercially. The plant breeding division of BARI is now also giving thrust to develop different abiotic stress tolerant maize varieties to address problems of excess water, heat, drought and saline soils. In private sector, BRAC started maize research activity since in early 1996 in a limited scale with the cooperation from CIMMYT. With their small effort it has so far released three maize hybrids (Uttaran, Uttaran-2 and Uttaran-3) by the seed board of the government.

Maize development system: In Bangladesh, plant breeding and variety development of maize is usually carried out by plant breeders in the public research institutions and to some extent in large seed companies. BRAC receives the parent lines of hybrid maize varieties and produces the  $F_1$  generation seed in Bangladesh. The PBD of BARI is also trying to disseminate and popularize BARI developed technologies among public and private agencies and farmers through training, demonstrations and field days. WFT program has had a substantial impact on modern maize cultivation practices, and on the promotion and increased production of maize in the mid 2000s in Bangladesh. DAE has established maize demonstration plots across the country and thus plays a role in promoting new varieties. Besides, DAE is also monitoring the response of the farmers on existing and newly introduced varieties. BRAC also play an important role in providing advice to farmers on maize seed production. BARI also developed complete recommended production technologies for maize.

Maize consumption: Maize is much better than rice in terms of nutrients like protein, fat, minerals, fiber, phosphorus, carotene and thiamine. It is used as different types of foods for human consumption, feed for poultry and fish, fodder for livestock, and starch for industrial use. Maize is largely used for preparing poultry and fish feed. It is also consumed by human indirectly when it is mixed with wheat flour. Integrated Maize Management Project (2001) showed that the share of maize use was 8% as green cob, 3% farmer's home consumption, 2% as snacks, 9% by flour mills and processing industry, 48% as poultry feed, 9% as cattle feed, 14% as cattle fodder, 4% as starch factory, and 3% as relief and rehabilitation. The current consumption scenario is must be different form the past. Maize based poultry feed is extensively used in poultry industry where feed is consumed by 220 million chickens, 37 million ducks, and around six billion eggs annually. One kilogram of poultry feed contains 55-60% of maize. The use of maize as poultry, fish and cattle feed was increased at the rate of 9.17% per year. Use of maize in starch industries has also increased about 74% during 1991-2001 with an annual

growth rate of 9.16%. Maize in urban areas mostly consumed as green cobs and popcorn. It is intensively consumed by the ethnic people of Chittagong Hill Tract (CHT) region. In CHT regions 45% farmers cultivated maize only for own consumption and only 8.11% cultivated it for selling. In hilly regions about 91% of the people ate maize during growing season and other 9% did not consume it.

Maize output value chains: Maize market system in Bangladesh includes business environment, core market actors, and supporting functions in the process of maize marketing. The extension of knowledge through neighbouring farmers and SAAO; suppliers' of different inputs like seed, fertilizer; tillage service provider; irrigation service providers and transport facilities like rickshaw/van, tempo (three wheeler) plays an important supporting role in maize marketing system. Monitoring of DAE to ensure the availability and quality of inputs; bank's policy to provide services to the poor farmers; insecurity of land leasing; farmers bargaining power; investment in knowledge extension were the important factors to maintain business environment. Different types of marketing functions such as land leasing, financing, drying, packaging, storing, determining price, transportation, and milling/processing are prevailed in the process of maize marketing.

Maize trade in Bangladesh: The organized maize marketing system to some extent has been developed in Bangladesh since the demand and supply of maize are gradually increased over time. Different studies revealed that a number of marketing channels are prevailed in maize growing areas. Major channels were: 1. Farmer>Faria>Bepari >Arathdar-cum-wholesaler >Feed mill >Retailer >Poultry farm; 2. Farmer>Faria >Bepari >Arathdar-cum-wholesaler >Feed mill >Poultry farm; 3. Farmer >Faria>Arathdar-cum-wholesaler >Feed mill >Retailer >Poultry farm. The Char areas of Bangladesh are highly potential for maize production. The major marketing channels of *Char* areas were: Farmer (commercial) >Wholesaler >Feed mill agent >Feed mills; Farmer (Smallholder) >Faria >Wholesaler >Feed mills; and Farmer (Smallholder) >Wholesaler >Feed mills. Farmers' net shares to the consumers' price ranged from Tk 76.4% to 78.3% in different marketing channels. Again, price spread in different channels revealed that processor received the highest net profit (Tk 20-109/quintal) followed by arathdar/wholesaler (Tk 20-23.4/quintal), bepari (Tk 13-17/quintal), and faria (Tk 2-9/quintal). The important maize growing areas are Dinajpur, Rangpur, Kushtia, Bogra, Manikganj, Jessore, Rajshahi, and Comilla. Again, the important consumption areas are Gazipur, Mymensingh, Chittagong, Comilla, Bogra, Khulna, Naogaon, Narayanganj and Jessore districts because most of the feed mills and poultry farms are located in these areas. The seasonality of maize trade reveals that March-July is the pick period of domestic maize trade in Bangladesh.

The country has to import 10-25% of maize every year to fulfill its demand. The highest imports occurred during the months from August to October and the lowest in March to July. Time series data shows that the quantity of import decreased sharply during 2003-2005 due to higher domestic production and less demand from poultry farms. In 2010, Bangladesh imported about 701,356 MT of maize valuing US\$ 176.16 million from different countries particularly from India. During 1991-2010 the maize import increased with the growth rate of 56%. The per capita availability of maize increased to a great extent over the time. The overall growth rate of the availability is 36.47% over the period of 1990-2009. The average share of net import of maize to its total consumption (availability) was 38.16% during 1990-2009. Bangladesh imported huge amount of maize from three countries sharing 44% from India, 22% from Myanmar, and 33% from Thailand during 1998. In 2005, the lion's share (78.6%) of maize was imported from Thailand followed by India. Recently GoB has given permission to export maize on a conditional basis.

The study has highlighted the long term future outlook of maize with future scenario of maize area, production, yield, and consumption based on recent trends and projections.

Outlook of maize production: The 10 years of prediction on areas, production and yield of maize show increasing trends over the time. The predicted areas of maize cultivation in 2021 might be 40.3% higher than the prevailing maize area of 2011. Similarly, the predicted production and yield of maize might be 1428 thousand MT and 8.27 t/ha in 2021 which are 40.2% and 34.5% higher than that of production and yield prevailed in 2011 respectively. The highest increasing trends predicted for area, production, and yield of maize were observed in Rajshahi, Rangpur, and Chittagong division respectively. Future climate change especially temperature rise will not so much detrimental to maize production since maize is a C4 crop which can tolerate temperature up to 35°C. BARI is continuing its efforts towards developing new varieties including saline tolerant, drought tolerant, and heat tolerant maize varieties in order to mitigate current and future climate change impacts. The policy regarding maize in Bangladesh will largely be depending on demand of maize from poultry, dairy and fish farms and the type of human consumption. Future policy planning must be focused on diversified consumption of non-rice based cereal. Wheat and maize alone or together can play a vital role in cereal consumption diversification.

Outlook of maize value chains and consumption: The demand for maize as human food is increasing day by day. The major divers of this increase are population and economic growth. Future demand for maize will mostly be depended on many factors such as amount of wheat production, number of poultry and fish farms, pattern of human consumption, intensity of industrial use, price of wheat, etc. The projected requirements of maize based on demand approach are estimated to be 642.43 thousand MT and 698.49 thousand MT for the year 2015 and 2020 respectively. Future value chains of maize would be dynamic and changed due to increased demand created for its diversified use, increased number of poultry, fish & livestock farms, and food processing industries in the country.

Outlook of maize inputs, R&D and policy: Government policies toward increasing farmers' efficiency are very much important for maize production. Different studies emphasized on improving the capability of farmers to use inputs judiciously in maize production. Future policy must focused on farmers' capacity building and strengthening extension services for using inputs efficiently and obtaining and sustaining the higher yield of maize. Investment on R&D of maize was found to be encouraging in Bangladesh. Under various assumptions on R&D expenditures, the IRR ranged from 17 to 28% and BCR from 9 to 19. The amount of total foreign exchange savings due to R&D of maize was Tk. 276.06 billion. Both government and donor agencies should come forward to invest in maize R&D activities for Bangladesh.

SWOT analysis was conducted to explore the constraints and investment opportunities put behind the R&D of maize in Bangladesh. Summary of the analysis are as follows:

Strengths: The study identified several factors and divers that would obviously influence maize sub-sector in future. The identified strengths behind this sector are genetic diversity and manipulability of maize; country's land availability (potential area 2.8 million ha) and suitability; wide range of growing seasons; availability of maize based cropping patterns; availability of improved production technology (management); availability of inputs at farm level; availability of hybrid varieties; higher productivity of maize; higher relative profitability for the farmers; private sector involvement, involvement of different private organizations in importation and distribution of hybrid maize seed; employment generation capability; growing demand for feed from poultry and fish farms; availability of extension facilities; and international collaboration for maize research.

Weaknesses: The weaknesses involved in maize cultivation are related to input, production, postharvest management, market access, and enabling environment. The issues are lack of farmers' awareness regarding identification and usage of quality seeds; poor quality and higher price of seed; adulteration in fertilizers; lack of irrigation and its higher price; lack of access to financial institutions; lack of adoption of BARI varieties; lack of adequate technical know-how of the farmer; infestation of diseases and pests; damage by wild birds and animals; water logging; poor post-harvest activities; lack of storage facilities; lack of drying facilities; poor access to high price market; low price of maize; lack of floor price; lack of organized market; weak extension contact; scarcity of labour; lack of cultivable land; unrestricted import from India; and lack of *Char* friendly transportation system.

Opportunities: There are ample opportunities to develop this sub-sector to attain self-sufficiency in maize production, ensure food security for the growing population, livelihood development of the poor farmers, and economic development through open-up export markets. The opportunities are bring potential areas under cultivation; establishment of starch plant; development of water logging and saline tolerant variety; development of quality protein maize; promotion of maizebased cropping patterns; introduction of mechanized planter and bed system planting; promotion of contract farming system; hybrid seed production programme; research on diseases and pest resistance variety; provision of technical knowledge; improvement of post-harvest management practices; provide storage facilities; supply of inputs at subsidized rate; establishment of linkage between extension agents and farmers; and investment in maize based industry.

Threats: The study has also find out some issues that threaten future maize sub-sector as well as other sub-sectors of agriculture. The issues are ground water depletion; deteriorate soil health; heavy and continuous rainfall; heavy dependency on poultry and fish industries; climate variability; high dependency on importation of hybrid seed; high competition with other crops; and adulterate maize seed.

Priorities in maize sub-sector: Bangladesh has a unique opportunity to increase maize production. Different private and public organizations have been conducting research to generate suitable technologies for the farmers not only to sustain the maize production but also to enhance maize productivity by minimizing the yield gap at farm level. The research thrust should be given in the areas like varietal improvement, management practices, diseases and pest management, biotechnology, farm machinery and food processing. Besides, different research on farm economics and post-harvest management is also need to be conducted on priority basis. The private sector has minimal input into agricultural R&D in Bangladesh. The government has established programs to assist private R&D, but there is room for improvement. Collaboration with the NARS should be strengthened to foster the development of improved maize germplasm.

In order to improve the performance of maize sub-sector in Bangladesh, the following steps and measures should be taken into consideration.

- Encouraging quality seed production
- Encouraging proper fertilizers dose use
- Bring suitable land (Char, saline, drought, etc) under maize cultivation
- Provide credit facilities to the farmers for buying inputs
- Strengthening extension linkage between farmers and extension personnel
- Provide training to the farmers
- Promotion of intercropping and relay cropping
- Development of marketing and processing system
- Construction of roads and highways
- Development of storage facilities for the maize farmers
- Introduction of public sector procurement
- Involvement of mass media
- Establishment of maize based food industries in the country

- Improvement in post-harvest operation management
- Strengthening maize research
  - > Development of own hybrid maize variety programmes within the country
  - Development of short-duration, dwarf, water logging, drought, and saline tolerant maize varieties with high grain yield potential.
  - > More QPM, fortified, micro-nutrient enriched and sticky varieties of maize.
  - More research to develop low-cost drier for summer season maize.
  - Postharvest research should be strengthened for developing quality maize food and diversifying maize consumption
- Strengthening international collaboration for maize research and development
- Policy interventions: The following existing polices need to be reconsidered by the government for better result;
  - Clarity of public and private sector roles
  - Establishment of testing laboratories
  - Formulation of agricultural credit policy
  - Improvement of research and extension linkage
  - Encouraging diversified maize consumption
  - Encouraging farmers' cooperative

# Abstract 2011-2012

# ADOPTION OF BARI WINTER TOMATO VARIETY IN SELECTED AREAS OF BANGLADESH

#### M. A. Haque, M. A. Monayem Miah and S. Hossain

The study assessed the level of adoption and profitability of BARI tomato variety at farm level. Data were collected from 180 randomly selected tomato farmers from Rangpur, Comilla and Rajshahi districts. The results indicated that 13% farmers adopted Raton variety, 6% farmers BARI tomato-5 and the rest 81% farmers adopted exotic varieties Shobol, Hero and others. The adoption level of ploughing and planting time was medium and irrigation was low. The adoption level of Urea was medium and manures, TSP and MoP were low. The cost of producing BARI hybrid tomato-5 (Tk. 174266/ha) was higher than the Raton variety (Tk. 156337/ha) due to the higher cost of human labour, fertilizer and insecticides. The yield of BARI hybrid tomato-5 (42 t/ha) was higher than Raton variety (35 t/ha). The yield gap of both Raton and BARI hybrid tomato -5 were 56%. Net return of BARI hybrid tomato -5 (Tk. 335734/ha) was higher than Raton (Tk. 283696/ha) due to higher yield. The net return of Raton and BARI hybrid tomato-5 were higher than its competing crops like potato, lentil and mustard. Human labour, land preparation, seedling, Urea, TSP, MoP and irrigation had positive and significant effect on BARI tomato cultivation. Non-availability of BARI tomato variety seed in proper time, lack of technical knowledge, lack of storage facilities, and infestation of insects and diseases were the major constraints of BARI tomato cultivation.

# BASELINE SURVEY ON INTRODUCTION OF SHORT DURATION PULSES INTO RICE-BASED CROPPING SYSTEMS IN WESTERN BANGLADESH

## Q. M. S. Islam, M. A. Monayem Miah, Moniruzzaman and S. Hossain

The study was conducted in purposively selected ten pulses growing districts, namely, Rajshahi, Natore, Pabna, Kushtia, Chuadanga, Meherpur, Jhenaidah, Magura, Jessore, and Rajbari during 2011-2012. A total of 600 farmers taking 60 from each district were selected randomly. The major objectives of this study were: (i) to know the present status of different pulses production,

(ii) to generate some baseline indicators for future impact assessment of the project, and (iii) to explore the constraints to pulses production and opportunities for their further expansion. The study revealed that the farm level adoption of improved lentil variety was estimated at 86%, whereas it was 100% for mungbean variety. Improved varieties of blackgram were adopted by 35%, chickpea by 64% and field pea by only 2% farmers. The average yield of lentil, mungbean, blackgram, chickpea, grasspea and fieldpea were 1349 kg/ha, 1350 kg/ha, 924 kg/ha, 1200 kg/ha, 1326 kg/ha and 1197 kg/ha respectively. The highest net return (Tk. 22754 /ha) was found in gardenpea and BCR (2.63) was estimated in chickpea cultivation. Pulse growing farmers sold 77-87% of their products consumed 7-13% and retained 4-7% for seed purpose. A few portions (2-3%) were gifted to relatives, neighbours and needy persons. The major problems of pulses cultivation were insect infestation, high harvesting cost of mungbean, low market price, and high rainfall. The study found that there is high scope of introducing short duration pulses in the existing cropping patterns such as Boro-Fallow-T.Aman, Tobacco- Fallow-T.Aman; and Wheat-Jute-Fallow.

# IMPACT OF IPM TECHNOLOGY ON BITTER GOURD PRODUCTION IN SELECTED AREAS OF BANGLADESH

#### Q. M. S. Islam, M. S. Rahman and M. S. Hossain

The study was undertaken in Narsingdi and Jessore districts during 2011 to analyze the adoption, impacts and profitability of bitter gourd production in Bangladesh. A total of 160 farmers taking 80 (40 IPM and 40 non-IPM farmers) from each district were selected randomly. Most of the farmers adopted IPM practices and they were mostly influenced by extension personnel and IPM school. The yield of bitter gourd was found to be 19110 kg/ha and 17850 kg/ha for IPM and Non-IPM farmers respectively. The cultivation of bitter gourd was profitable since BCR were 2.13 and 1.94 for IPM and Non-IPM farmers respectively. Maximum number of farmers showed positive attitude towards bitter gourd cultivation of which 94% farmers wanted to increase its cultivation in the next year. The use of traps and other IPM practices in bitter gourd cultivation was found to be very effective in reducing insect infestation. The availability of pheromone traps and other IPM technologies must be ensured in the farmers fields.

# A FINANCIAL ANALYSIS OF WINTER VEGETABLES PRODUCTION IN SELECTED AREAS OF BANGLADESH

#### S. Khandoker, M. A. Monayem Miah, M. Khatun and S. Hossain

The study was conducted in three vegetable growing districts, namely Comilla, Jessore and Narsingdi during 2011-2012 to assess the profitability, resource use efficiency, factors affecting and constraints to vegetables production. Based on area, production and market priority, three winter vegetables such as radish, country bean, and brinjal were selected for the study. A total of 180 farmers taking 60 from each district and 20 for each vegetable were selected randomly for the study. The total cost of brinjal, country bean and radish production were Tk. 208101, Tk. 167757 and Tk. 130267 per hectare respectively. The average yield of brinjal, country bean and radish were 29.84 tonne, 16.96 tonne and 31.30 tonne per hectare respectively. The net return of brinjal, country bean and radish were Tk. 179780, Tk. 69683 and Tk. 63944 per hectare respectively. The benefit cost ratio for brinjal, country bean and radish were 1.86, 1.42 and 1.50 respectively. The total cost of human labour, land preparation, seed, TSP, experience in farming and training had positive and significant effect on country bean production. The total cost of human labour, land preparation, insecticides, education and experience had positive and significant effect on brinjal production. The total cost of land preparation, seed, Urea, education, and experience in farming had positive and significant effect on radish production. The major constraints for brinjal were insect infestation (67%) and higher price of insecticides (35%).

Insect infestation (65%) and non-availability and higher price of labour (43%) were the main constraints for country bean production. Low market price (37%) and higher cost of transportation (32%) were main constraints for radish production.

## MARKETING SYSTEM OF MAJOR WINTER VEGETABLES IN SELECTED AREAS OF BANGLADESH

#### M. S. Hoq, Tanvir. M. B. Hossain, M. A. Matin and S. Hossain

The study was conducted in two districts, namely Comilla and Jessore to find out marketing chain, estimate marketing cost and margin, and explore marketing problems in vegetable marketing. Four major winter vegetables, namely cabbage, cauliflower, tomato and brinjal were selected for the study. A total of 184 respondents consisting of 40 vegetable growers and 144 vegetables traders were selected as a sample size. Seven dominant marketing chains were identified in vegetable marketing. The chain Farmer $\rightarrow$ Local Traders (Faria)  $\rightarrow$  Bepari $\rightarrow$ Arathdar (urban)  $\rightarrow$  Retailer (urban)  $\rightarrow$  Consumer was identified as most dominant in the study areas. About 39.60% product runs through this chain. In tomato marketing, local traders Bepari, retailer (urban) and retailer (rural) incurred the highest marketing cost than other selected vegetables which were Tk. 65.75, Tk. 248.47, Tk. 205.69 and Tk. 78.21 per quintal respectively due to its perishable nature. Commission charge was the highest in the case of retailer (urban) and spoilage & damage cost was the highest in the case of retailer (rural). The marketing cost was highest in the case of Bepari which were estimated at Tk. 212.74 for cabbage, Tk. 219.87 for cauliflower, Tk. 248.47 for tomato, and Tk. 208.40 for brinjal. Again, the marketing margin was found highest in the case of retailer (urban) which were estimated Tk. 108.52 for cabbage, Tk. 130.09 for cauliflower, Tk. 397.24 for tomato, and Tk. 286.31 for brinjal. Inadequate storage facilities and dominance of intermediaries were the major marketing problem identified by the farmers. Unstable price, barrier to entry in the terminal market, delay on ferry ghat, spoilage and damage were the major marketing problem faced by the different intermediaries. The study suggested improving the storage facilities and establishment of organization to solve marketing problem of the farmers.

## IMPACT OF CLIMATE CHANGE ON CROP PRODUCTION IN SOUTHERN ZONE OF BANGLADESH

#### M. R. Karim, Moniruzzaman and S. Hossain

The study was conducted in two consecutive years 2010-2011 and 2011-2012 in eight districts, namely Patuakhali, Barguna, Bhola, Lakshmipur, Satkhira, Jhalokati, Khulna, and Pirojpur respectively under the AEZs 13, 14, 17 and 18 to analyze the climate scenario and the economic impact of climate change on crop production using the Ricardian function. Average net revenue from crop was obtained from 800 sample farmers at Tk. 56614 per hectare. Temperature and rainfall data were collected from Bangladesh meteorological department website for the period of 1975-2010. The eight major crops were considered for analysis. The twelve different cropping patterns were found in the study areas. The mean temperature was increased to 0.75°C within 36 years i.e from 1975 to 2010. It witnessed that the rise of 1°C temperature requires 45 years. The rainfall was decreasing in Rabi and Kharif-1 season except Kharif -2. But the yearly total rainfall was increased by 0.12 percent i.e. only 70 mm from 1975 to 2010. The inverse relationship was found between temperature and rainfall. The variability of rainfall was found to be irregular over the seasons as well as over the months. The highest marginal loss was estimated at Tk. 3009 million due to rise in temperature. The total loss of Tk. 7584 million was

estimated, whereas per hectare loss was estimated at Tk. 6482 due to four climatic variables in the study areas.

## FINANCIAL PROFITABILITY OF SOME BARI MANDATED CROPS

S. M. Shiblee, S. Khandaker, M. S. Hoq and S. Hossain

The study was an attempt to compile the cost and return of different BARI mandated crops which were conducted by the Agricultural Economics Division in different years (2007-2011). BCR was found to be above 2 for tuberose, brinjal, pointed gourd, cauliflower, tomato, sweet potato, ginger, turmeric, soybean, chilli and pineapple in which tuberose, sweet potato and tomato gave BCR above 3. However, it was less than 1.5 in the case of bitter gourd, okra, panikachu, mustard, mungbean and groundnut. Per hectare net return more than Tk.400000was found in tuberose and turmeric, more than Tk. 300000 in brinjal and pointed gourd, more than Tk. 200000 in tomato, ginger and pineapple, more than Tk.100000in marigold, panikachu and potato, and more than Tk.50000 in bitter gourd, cabbage, cauliflower, water melon, sweet potato, onion, garlic and chilli. It was less than Tk.50000 and above Tk.10000 in the case of okra, maize, soybean and mustard and less than 5000in mungbean and groundnut. The total cost of cultivation of brinjal, pointed gourd, okra and panikachu was taka more than Tk. 250000, tuberose more than Tk. 200000, potato and ginger more than Tk.150000, tomato, ginger, onion and pineapple more than Tk.100000, cabbage, cauliflower, watermelon, maize, garlic and chilli more than Tk.50000. It was less than Tk.50000 in the case of sweet potato, mustard, mungbean and groundnut. It was also evident that the more the cost the more the profit in the case of almost all crops except okra and bitter gourd. The crops incurring low cost (less than Tk.70000) and comparatively giving high profit (BCR more than 2 and net return more than Tk.80000) are sweet potato and cauliflower. Mustard, mungbean and groundnut incurred low cost and low profit. Last but not least, it can be inferred from the results that BCR, irrespective of crops, has been decreasing successively every year.

# ASSESSMENT OF BARI DEVELOPED UREA SUPPER GRANULE (USG) APPLICATOR IN SELECTED AREAS OF BANGLADESH

#### Moniruzzaman, M. A. Monayem Miah and S. Hossain

A socio-economic study was carried out in three districts, namely Tangail, Barisal and Comilla to assess the input use pattern and comparative profitability of using Urea Super Granule (USG) applicator and non-USG applicator in modern rice production and to determine factors affecting the adoption of USG applicator in crop production. A total of 180 farmers, taking 60 (30 USG users and 30 non-users) from each district, were selected randomly. Probit model was employed to determine factors affecting the adoption of USG applicator user in crop management in the study areas. The cultivation of rice through USG applicator produced comparatively higher yield, as well as higher income and less cost of production over the non-USG applicator farmers. The benefit cost ratio of USG applicator farmers was found to be higher compared to non-USG applicator farmers. Analysis also indicated that the sample farmers were able to achieve additional yield of 0.28 t/ha by using USG applicator and this yield gain further resulted in additional benefit of Tk. 4263/ha. The probability of adopting this technology was significantly influenced by extension contact, number of training, and household's experience. Forty nine percent of the respondents were willing to adopt USG applicator in the future. Clogging of USG applicator in muddy soil due to heavy weight, USG applicator is not available timely, number of missing hill by USG applicator, required labour, USG is not proper time, and need frequent washing were the problems faced by the USG applicators in the study areas.

#### ASSESSMENT OF POST HARVEST LOSSES OF TOMATO IN SELECTED AREAS OF BANGLADESH

#### M. Khatun, M. A. Haque, M. R. Karim, S. Khandoker and S. Hossain

The study was conducted in Dinajpur, Jessore and Comilla districts to identify and estimate the post harvest practices and losses of tomato at farmers' and intermediaries' level. In total of 180 tomato growing farmers and traders, out of which 30 farmers and 30 traders from each three district were selected randomly. The major post harvest activities practised by the farmers and intermediaries were harvesting, grading, clearing, storing, packaging and transporting. The average post harvest losses were estimated to be 15.37 percent and 10 percent at the farmers' and intermediaries' level respectively. The harvesting loss was found to be the highest (6%) as compared to grading, packaging, storing and transporting. On the other hand, the losses of tomato were found to be the highest for beparies (6.3%) followed by paikers (2%) and retailers (1.5%)due to transportation and selling. Monetary loss at farmers' level was estimated at Tk.78540 per hectare and Tk. 128258 per season was at traders' level. At national level monetary loss was recorded about Tk. 52.31 crore during 2009-2010. Important factors leading harvesting losses were early and delayed harvesting, and insect infestation. Product price, farming experience, and suitable packaging materials had negative and total production and rainfall had positive and significant relationship with total post harvest losses. Lack of storage facility, low price of tomato, and unfavorable transportation system were the major problems at the farmers' and traders' level. Provision of improved mode of transportation and storage and price support to the farmers is thereby recommended to minimize losses in tomatoes.

# IMPACT OF AGRICULTURAL KIND SUPPORT SYSTEM ON THE RURAL FARM ECONOMY OF BANGLADESH

#### T. M. B. Hossain, M. A. Monayem Miah, and S. Hossain

The study evaluated the overall kind support system and its impact on crop production in Bangladesh. Dinajpur, Rajshshi, Jessore, Mymensingh, Comilla and Patuakhali districts and total 600 sample farmers were selected. In this system a farmer was given 20kg Urea, 10kg TSP, and 10kg MoP for Aus production. The average value of this kind support was Tk. 766 only. The study revealed that 79% of farmer opined that Aus rice production was stimulated due to providing fertilizer support. The value of fertilizer package shared 15% of the fertilizer cost and 2.59% of the Total Variable Cash Cost (TVCC) and 1.47% of the without support total cost (WS-TC) which was incurred to produce per hectare Aus rice by the farmer. The amount of the Urea fertilizer provided as support was 20% of the total Urea applied, the amount of TSP was 13% of the total TSP applied, and the amount of MoP was 14% of the total MoP applied by the farmer. According to farmers' opinion, 54% of the farmers mentioned that the amount of the fertilizer given was not enough, they advised to provide 43 kg urea, 26 kg TSP and 23 kg of MoP to each of the farmer. In comparison of the cash support for irrigation and kind support for fertilizer, the highest percentage of the sample farmer (74%) supported that direct fertilizer support was better than cash support. The BCR of Aus rice production by the supported farmer was higher compared to non-supported farmers. Although the performance of kind support system was opined to be very good, but still there are scopes for making the system more efficient. The study suggested increasing the amount of kind support and number of farmer.

#### Abstract 2010-2011

## ASSESSMENT OF ROSE AND MARIGOLD CULTIVATION IN SELECTEDAREAS OF BANGLADESH

#### M. A. Haque, M. A. Monayem Miah and S. Hossain

The study was conducted in two major rose and marigold growing districts, namely Jessore and Jhenaidaha during 2010-2011 to analyze the profitability of rose and marigold cultivation. In total of 50 rose and 100 marigold farmers were randomly selected for the study. The results indicated that 100% farmers used Lincoln variety of rose and 95% farmers used T-004 promising line for marigold. The yields of rose and marigold flowers were 540107 and 2650447 flowers per hectare respectively. The net returns from rose and marigold cultivation were Tk. 244356 and Tk. 117812 per hectare respectively. The benefit cost ratios were 1.63 and 1.80 for rose and marigold cultivation. The highest profit was obtained from rose and marigold cultivation compared to its competitive crops. Human labor, land preparation cost, seedling, Urea, TSP, MoP, and irrigation had positive effect on the yield of rose and marigold. Lack of technical knowledge, high yielding variety, infestation of insects and diseases, and efficient transport facility were major problems found in rose and marigold cultivation.

#### PANIKACHU CULTIVATION IN SELECTED AREAS OF BANGLADESH: AN AGRO-ECONOMIC PROFILE

#### M. A. Haque, M. A. Monayem Miah and S. Hossain

The study was conducted in two major panikachu growing districts, namely Joypurhat and Jessore during 2010-2011 to know the profitability of panikachu cultivation. A total of 100 panikachu farmers were randomly selected from Joypurhat and Jessore districts to collect primary data. The results indicated that the planting time of panikachu was started from February and continued up to March. The harvesting time of stolen was started from May and continued up to November. The harvesting time of rhizome was started in November and continued up to December. The costs of panikachu cultivation were Tk. 267726 and Tk. 184530 per hectare on total cost and variable cost basis respectively. The major share of total cost was for human labour (45%), land use (17%) and fertilizer (15%). The yield for rhizome and stolen were 24.94 t/ha and 23.29 t/ha. The gross margin was Tk. 206058 per hectare. The benefit cost ratio was 1.46. Human labour, manure, Urea, TSP, MoP, insecticides, and irrigation had positive effect on the yield of panikachu. Lack of technical knowledge, high yielding variety, infestation of insects and diseases, and low price of product were major problems found in panikachu cultivation.

#### ADOPTION OF MUNGBEAN VARIETIES AND ITS CONSTRAINTS TO HIGHER PRODUCTION IN SOUTHERN REGION OF BANGLADESH

#### Q. M. S. Islam, M. A. Monayem Miah, M. S. Rahman and M. S. Hossain

The study was conducted in three mungbean growing districts, namely Barisal, Patuakhali and Noakhali of Bangladesh during 2010-2011 to assess the extent of technology adoption, profitability, farmers' attitude, and constraints to HYV mungbean cultivation. A total of 150 farmers taking 50 from each district were selected randomly. The study revealed that the level of technology adoption in terms of input use and agronomic practices follow by most of the farmers were close to the recommendation which was very encouraging. All the farmers adopted BARI released HYV mung varieties and was mostly influenced by DAE personnel and neighboring farmers. The average yield of mungbean was found 824 kg/ha, which was similar to the national average of 820 kg/ha. The cultivation of HYV mungbean was profitable since the net profit and

BCR were Tk. 38850 and 1.62 respectively. Most of the farmers (67%) showed positive attitude towards mungbean cultivation in the next year. The major constraints to mungbean cultivation were high price of insecticides, lack of labour, and disease and insect infestation.

# IMPACT OF IPM PRACTICES IN VEGETABLE CROPS IN SELECTED AREAS OF BANGLADESH

#### Q. M. S. Islam, M. S. Rahman, M. Akter and S. Hossain

The study was undertaken to assess the present status and effect of IPM-CRSP interventions as an initial measure. The study was conducted in three districts of Bangladesh, namely Jessore, Bogra and Narsingdi during 2010. A total of 300 sample taking 100 from each districts were selected randomly for the study. The findings of the study indicated that average farm size was higher for non IPM farmers (1.14 ha) compared to IPM farmers (0.74 ha). Average annual income and expenditure for IPM farmers was found to be Tk. 137726 and 108721 respectively, while it was Tk. 151367 and 111229 for non IPM farmers. Around 58% of the IPM farmers involved in IPM school/club. Thirty three percent of the total respondent adopted IPM practices in the study areas. Per hectare yield and profitability of most of the vegetables were higher for IPM farmers compared to non IPM farmers. Most of the IPM and non IPM farmers used their own seed for vegetables cultivation. All the farmers used Shallow tube well for irrigation. Farmers sold about 98% of their total vegetable production. Insects like BSFB, fruit borer, fruit fly, red pumpkin beetle etc. and diseases like mosaic, powdery mildew, anthracnose etc. attacked the vegetable field of both IPM and non IPM farmers. Non IPM farmers applied various insecticides and fungicides to control the insects and diseases. On the other hand, IPM farmers adopted pheromone trap, soil amendment along with some other IPM practices to control the insects and diseases. Fifty percent of the IPM farmers collected information on IPM use from IPM school/club, whereas 65% of the non IPM farmers collected information on pesticide use from pesticide dealers. About 76% of the respondents willing to adopt IPM practices in future. Women in the study areas mostly involved in using IPM practices and harvesting of vegetables. More training on IPM practices, demonstrations, availability of pheromone traps, development of IPM packages for vegetables like beans, cauliflower may be useful to enhance the adoption of IPM technologies in the study areas.

# IMPACT OF RAISED BED TECHNOLOGY IN RAJSHAHI DISTRICT OF BANGLADESH

M. A. Monayem Miah, S. Hossain, Moniruzzaman, J. M. Duxbury and J. G. Lauren

The study evaluated the adoption and farmers' practice of raised bed technology at farm level since the close of the Soil Management Collaborative Research Support Program (SMCRSP) through a follow-up survey conducted at Durgapur Upazila of Rajshahi district. Data for the study were collected from 195 adopters and 65 non-adopters through a pre-tested interview schedule during May-June, 2011. The survey findings showed that the raised bed technology had a strong demonstration effect and were adopted (56%) well by the respondent farmers. The probability of adopting this technology was significantly influenced by extension contact, societal membership, and number of male member in the household. Due to lack of machine, most farmers prepared raised bed by hand (82.7%) without maintaining recommended bed size. The most cultivated crops on bed were wheat (cultivated by 97.95% farmers), maize (27.69%), onion (16.41%), and mungbean (12.31%). Respondent farmers mentioned various positive benefits of bed technology and willing to continue this practice in future with increased acreage of land. Finally, this emerging technology increased farmers' food security by 21.84%, income by 13.5%, and livelihoods to some extent.

#### AGRO-ECONOMIC PERFORMANCES OF POTATO SEED PRODUCTION UNDER CONTRACT FARMING IN BANGLADESH

Moniruzzaman, M. S. Rahman and S. Hossain

The study was undertaken in Rajshahi, Rangpur and Thakurgaon district during 2010-2011 to estimate the relative profitability and recourse use efficiency of potato seed production under contract growing system. Data were collected from 90 contract growers and 90 non-contact growers of the selected three districts. The study revealed that there was significant difference between the cost of potato seed cultivation under contract and non-contract growers. The yield of potato seed under contract growing system was significantly higher than that of non-contract growing system. The gross return (Tk. 380360), gross margin (Tk. 247411), and net return (Tk. 212165) were significantly higher for contract growers compared to the non-contract growers. The benefit-cost ratio was almost higher under contract farms compared to that in non-contract farms. The result also revealed that farmers were not efficient in terms of resource allocation. Higher price of quality seed, lack of storage facilities, lack of technical knowledge, infestation of insects and diseases, and lack of capital were the main problems that the contract and non-contract farmers faced in the study areas.

# ADOPTION AND SEED STORAGE TECHNOLOGY OF WHEAT IN NORTHERN PART OF BANGLADESH

#### M. S. Rahman, Moniruzzaman, M. Akter and S. Hossain

The study was conducted in two major wheat growing district, namely Dinajpur and Thakurgaon of Bangladesh to determine the adoption level and factors affecting the adoption of wheat production practices in the study areas. A total of 110 farmers taking 55 from each district were selected randomly. The results revealed that most of the farmers (60.91%) in the study areas were cultivating Shatabdi variety of wheat. Adoption level of seed rate, TSP and MoP application were found to be very low. On the other hand, production practices like time of wheat sowing and number of irrigation were highly adopted by the farmers. Most of the farmers (69.09%) applied TSP below the recommended dose, while 81.82% of the farmers applied MoP over the recommended dose. Farmers faced economic losses due to excess use of seed and fertilizer in the study areas. The study also revealed that there was a positive and significant relationship between adoption and the variables like education, experience and extension contact. Farmers also faced some problems like lack of proper information and technical knowledge that hinder the adoption. About 41% wheat farmers stored wheat seed for next year use. 30 % farmers used Polythin bag to store wheat seed, 12.73% farmers used drum, and 1.82% used cement bag. Adoption gaps are needed to be eliminated to enhance the productivity as well as net return of wheat cultivation.

# ROLE OF OFF-FARM INCOME ON CROP DIVERSIFICATION IN SELECTED AREAS OF BANGLADESH

#### M. S. Rahman, M. A. Monayem Miah and S. Hossain

The study was conducted in Jessore and Rangpur districts of Bangladesh to determine the factors affecting the participation in off-farm income and crop diversification. A total of 150 sample farmers were selected for interviewing through random sampling technique. Analysis was done using Probit model, Simpson index of diversity, and multiple regression technique. The results showed that the average annual income was higher for service holders (Tk. 183696) compared to business (Tk. 169215) and off-farm labour activities (Tk. 109373). Participation in activities like business and services were positively influenced by the farm size and education respectively. On

the other hand, farm size and education were inversely related with participation in off farm labour activities. The respondents of business category spent 25% of their off-farm income for different crop production. Crop diversification index was found similar for business and service holders (0.40). Income from service sector and experience in farming had positive and significant effect on crop diversification, while distance of field from market and highway were negatively related with crop diversification. Farmers in the study areas also faced some problems for crop diversification like low level of income and lack of credit facilities. Construction of roads and highways, marketing, and credit facilities can improve the status of crop diversification in the study areas.

## ASSESSMENT OF FARMERS' PERCEPTIONS ON POTATO VARIETIES AND THEIR ABIOTIC STRESSES IN SELECTED AREAS OF BANGLADESH

M. A. Monayem Mia, S. Hossain, T. M. B. Hossain, M. S. Rahman, M. M. Hassan, M. Hossain, B. C. Kundu, M. S. Kadian, N. Sharma, S. Araya and Z. Ibragimov

The study assessed farmers' perceptions on variety development and abiotic stresses regarding potato in Bangladesh. Primary data were collected from 240 potato farmers of Bogra (drought areas) and Chittagong districts (saline and heat areas). The study revealed that the highly used potato varieties were Granula, Cardinal and Lalpakri in Bogra, whereas Diamant and Dohazari were in Chittagong areas. The potato yields were ranged from 21.50 to 22.67 t/ha for HYV and 15.31 to 16.74 t/ha for local variety. Most of the farmers (68.8%) believed that the current potato yield can be further increased through introducing new high yielding varieties followed by drought resistant varieties (64.2%), training on potato cultivation (59.6%), availability of adequate fund (57.9%), and proper late blight control (57.5%). The most desirable varietal characters were opined to be high yield (92.1%), early maturity (61.5%) and good demand (44.5%) for HYV potatoes, whereas good test (81.7%), higher price (69.6%), and good storability (65.2%) were reported for local variety. Low yield, susceptible to diseases, late maturity, and low demand were the reasons for abandoning some potato varieties in the past. Drought and heat were two important limiting factors towards achieving the higher levels of potato yield. Dohazari variety for Chittagong and Lalpakri for Bogra has higher levels of tolerance against abiotic stresses. Finally, early maturity followed by drought tolerance, heat tolerance and salinity tolerance were important attributes farmers wanted in new potato varieties.

# ROLE OF RURAL WOMEN IN AGRICULTURE AND THEIR INVOLVEMENT IN DECISION MAKING PROCESS IN SELECTED AREAS OF BANGLADESH

## M. Akter, M. A. Monayem Mia, M. S. Rahman, and S. Hossain

The study was conducted at Jamalpur and Bogra district to assess the contribution of rural women in agriculture, participation on decision making process, and identify the factors influencing the decision making process in farm management. A total of 100 rural women were interviewed for the study during February-March 2011. Results showed that among the agricultural activities rural women's participation were relatively high in various post harvest, livestock, and poultry management than other agricultural activities. Very little participation was observed in fish culture activities and some selected non agricultural activities like tailoring and kantha making. Most of the women spent maximum time in household activities (7.28 hours/day) and post harvest activities (more than 6 hours/day) in specific cropping seasons. It was also found that in most cases women's participation in farm management decision making was lower than their male counterpart. Ordered probit model estimation showed that the probability of women's decision making power may increase by increasing their age, education, training, and participation in social organizations.

## Abstract 2009-2010

## PINEAPPLE PRODUCTION IN MAJOR UP LAND AND PLAIN LANDS OF BANGLADESH

#### M. A. Hossain, M. S. Rahman and S. Hossain

A study was conducted in two intensive pineapple growing districts, namely Madhupur and Sylhet during 2009-2010 representing hilly and plain land occupying about 53% of area and 56% of total production of pineapple in Bangladesh. A total of 100 farmers taking 50 from each district were selected randomly. The average yield of pineapple per year were 48.06 t/ha and 33.67 t/ha for Madhupur and Sylhet respectively. Total cost of production of pineapple per year was Tk. 134394/ha, whereas gross margin was Tk. 256445/ha. Different types of crops like turmeric, ginger, aroid, lemon, papaya, banana, etc. were intercropped with pineapple and were found to be common practice in the study areas. Most of the coefficients of input variables were found to be less significant. The ratio of MVP and MFC was higher than unity implied more scope of using these inputs to increase the yield of pineapple. Selection of improved crop varieties suitable for hilly areas, improved management practices, establishment of storage, and marketing facilities were some of the potentials for future researchable issues. In addition, providing micro-credit to the poorer section of hilly people for increasing production and income of the farmers are essential.

## IMPACT ASSESSMENT OF TRICO-COMPOST FOR VEGETABLE PRODUCTION

# M. A. Hossain, M. A. Matin, A. N. M. R. Karim and G. W. Norton

The study was conducted in two Upazilas of Bogra district to investigate the performance and to assess the impact of trico-compost on different vegetables production at farm level during 2009-2010. A total of 120 farmers taking 60 trico-compost users and 60 trico-compost non-users were selected. The farmers who used trico-compost for vegetables cultivation received 5%, 21%, 14% and 18 % higher yield for yard long bean, okra, cucumber and eggplant respectively than those of the non-user farmers. Return to scale was found more than one which further indicated that more profit can be earned by increasing the use of the inputs in vegetables production. For using trico-compost, gross margin was increased from 16 to 46% for selected vegetables over the control farmers. The farmers were very much impressed to observe the vigor growth of the plants and their fruit quality, attractive colour, size, and prolonged harvesting period. Farmers were also highly satisfied for its market demand and price of the product.

## ECONOMIC ASSESSMENT OF TUBEROSE PRODUCTION IN SELECTED AREAS OF BANGLADESH

#### M. A. Haque, M. A. Monayem Miah, S. Hossain and S. M. Sharifuzzaman

The study was conducted for the economic assessment of tuberose cultivation in Bangladesh. Primary data were collected from 100 randomly selected farmers from Jessore and Chuadanga districts in 2010. The results indicated that the costs of tuberose cultivation were Tk. 201137 and Tk. 129659 per hectare on full cost and variable cost basis respectively. The major share of total cost was for human labour (30%), land use (23%), fertilizer (17%), and irrigation (12%). The yield of tuberose was 454425 sticks per hectare. The gross margin was Tk. 551978 and Tk. 561582 per hectare on variable cost and cash cost basis respectively. The net return from tuberose cultivation was Tk. 480500 per hectare. The benefit cost ratio was 3.39. The total cost of production of tuberose was 26%, 12%, and 28% higher than its competitive crops like banana, papaya, and Jute + T. Aman respectively. The net return of tuberose cultivation was

65% higher than banana, 71% higher than papaya, and 91% higher than Jute + T.Aman cultivation. Production function revealed that human labour, seedling and irrigation had positive effect on tuberose cultivation. Lack of scientific knowledge, high yielding varieties, and efficient transport facility were major problems found in tuberose cultivation.

# ADOPTION OF BARI RELEASED POTATO VARIETIES AT FARM LEVEL IN SELECTED AREAS OF BANGLADESH

#### M. A. Haque, M. A. Monayem Miah and S. Hossain

The study assessed the level of adoption and profitability of BARI released potato varieties at farm level during 2009-2011. Data were collected from 150 randomly selected potato farmers from Munshiganj, Bogra and Comilla districts. The results indicated that 48% potato areas were covered by diamand variety, 16% by cardinal, 22% by granola, and the rest 14% areas were devoted to binella, asterix, provento, felsina, multa and hira varieties. The cost of BARI released potato variety cultivation was Tk. 210629 and Tk. 184135 per hectare on full cost and variable cost basis. The major share of total cost for seed (42%) followed by fertilizer (21%) and human labour (14%). The average yield of potato was 26 ton with gross margin of Tk. 151003 per hectare. The net return of potato cultivation was Tk. 124509 per hectare. The benefit cost ratio was 1.59. Human labour, land preparation, seed, and irrigation had positive and significant effect on potato production. Non-availability of HYV seed at proper time, lack of technical knowledge, high price of seed and fertilizer, infestation of insect and diseases, and lack of storage facilities were the major problems of potato production.

# COST AND RETURN OF SELECTED CROPS AT FARM LEVEL

M. R. Karim, Q. M. S. Islam, Moniruzzaman, M. S. Rahman and S. Hossain

A survey was conducted to estimate the cost and return of BARI mandated crops at farm level in 2009-2010. Seven different crops were included in the study. A total 700 farmers taking 100 from each crop were selected randomly. The intensive growing area of each crop was purposively selected for conducting the survey. The study covered 14 upazilas from 10 districts. The net return of seven different crops were found to be Tk. 440567, Tk. 352052, Tk. 142294, Tk. 304202, Tk. 59425, Tk. 135 and Tk. 15241 per hectare for summer brinjal, winter brinjal, winter tomato, trellis pointed gourd, winter bitter gourd, wheat and maize respectively. The benefit cost ratios were 2.17, 2.20, 1.88, 22.03, 1.27, 1.00 and 1.21 respectively for summer brinjal, winter brinjal, winter brinjal, winter tomato, trellis pointed gourd, trellis pointed gourd, winter bitter gourd, wheat and maize.

# REQUIREMENT AND AVAILABILITY OF FERTILIZER AT FARM LEVEL AND ITS IMPACT ON MAJOR CROP PRODUCTION IN SELECTED DISTRICTS OF BANGLADESH

# M. R. Karim and S. Hossain

A survey was conducted in Bogra and Jessore districts in 2008-2009. A total of 53 different crops were found in the study area. All the crop species were categorized into 12 different subgroups. Five major crops like modern variety rice, wheat, maize, potato and vegetable covered about 816.64 (82.85%) thousand hectares of land. The total fertilizer requirement was estimated to be 436.95 thousand metric tons, while actual quantity available to the farm level amounted to 289.8 thousand metric tons. The deficit was 147.15 thousand metric tonns (33.68%). Based on average fertilizer doses of five major crops, total requirement was 957 kg/ha, while farmers used 752 kg/ha. The deficit was 205 kg/ha which represented 21% less as per the recommendation. In addition, farmers applied compost/manures to their crop for supplementing about 5 to 10% of Urea, TSP and MoP. However, due to the shortage of fertilizer, farmers incurred yield loss 1.88 ton, 1.52 ton, 0.80 ton, 0.71 ton and 0.13 ton of vegetable, potato, rice, maize and wheat respectively for less amount of nutrient use per hectare. As a result, farmers incurred monetary loss of Tk.10.35 million. The present system of import and distribution of all kinds of fertilizers under the control of government should be continued. Distribution channel should be shortened as far as possible. In order to create awareness about balanced fertilization, training and field demonstration must be arranged through DAE.

# ECONOMIC PERFORMANCE OF GINGER PRODUCTION IN HILLY AREAS AND PLAIN LAND OF BANGLADESH

#### Q. M. S. Islam, M. A. Matin, S. Hossain

The study was conducted in two ginger growing districts, namely Nilphamari and Khagrachhari of Bangladesh during 2009-2010 to estimate the technical efficiency of ginger growers. A total 100 farmers taking 50 from each district were selected randomly. The study revealed that ginger production was profitable and the average Benefit Cost Ratio (BCR) was found to be 2.17. The estimated results showed that the average level of technical efficiency among the sample farmers was 85%. This implied that given the existing technology and level of inputs, the output could be increased by 15%. In inefficiency model, the coefficient of farmers education and experience in ginger cultivation was negative and significant. Sixty eight percent farmers produced outputs to the maximum frontier output level (81-95%). Farmers in the study areas also mentioned some problems like incidence of root rot disease, high price of seed, insect infestation etc. to its production.

# ASSESSMENT OF MUSTARD CULTIVATION UNDER BLOCK DEMONSTRATION IN SELECTED AREAS OF BANGLADESH

#### M. Akter, M. A. Monayem Miah, M. S. Rahman and S. Hossain

The study was conducted at Pabna, Tangail and Jamalpur districts to assess the adoption status, impact of block demonstration activity, and explore constraints to higher adoption of BARI released HYV mustard cultivation. A total of 138 farmers were interviewed for the study during 2010. The study showed that 85, 53 and 43% of post block farmers adopted improved mustard varieties in Pabna, Tangail and Jamalpur districts respectively. Highest 40% of the farmers adopted BARI Sarisha-11 followed by BARI Sarisha 15 (35%) in Pabna. Thirty five and 29% of the farmers adopted BARI Sarisha- 9 and BARI Sarisha- 8 in Tangail and Jamalpur district respectively. The 15, 20 and 35% farmers of non-block adopted HYV mustard variety in Tangail, Jamalpur and Pabna districts respectively. Probit model revealed that farmers' age, block demonstration, influence of neighboring farmers, and extension contact played an important role in adopting HYV mustard cultivation at farm level. Block farmers used higher level of all inputs compared to Post block and Non block farmers except seed. The cost of production was higher for Block farmers compared to Post block and Non block farmers. The average yield was higher in Block (1.55 t/ha) and Post block (1.39 t/ha) compared to Non-block (0.99 t/ha) who cultivate local variety of mustard. The total return and gross margin was also found to be higher in Block and Post-block farmers. Net return was found to be Tk. 18799/ha and Tk.16556/ha in Block and Post block respectively, whereas it was Tk. 2212/ha in Non block. About 74% farmers of Block and Post block showed interest to continuing HYV BARI mustard cultivation in the next year. Although HYV BARI mustard was a profitable crop but various setbacks hinders the expansion of this technology. These are non availability of HYV seed, lack of knowledge about inclusion of mustard with T. Aman and Boro cropping pattern, risk of yield, higher cost in HYV mustard cultivation, lack of credit facilities etc.

# IMPACT OF FARM MECHANIZATION ON PROFITABILITY AND LABOUR USE FOR WHEAT CULTIVATION IN NORTHERN PART OF BANGLADESH

#### M. S. Rahman, M. A. Monayem Miah, Moniruzzaman and S. Hossain

The study was conducted in three northern districts, namely Thakurgaon, Panchagarh and Dinajpur of Bangladesh during 2009-2010 to find out the effect of mechanization on productivity and labour use in wheat cultivation. A total 150 farmers taking 50 from each district were selected randomly. The findings revealed that the yield of wheat under mechanization (2.65 t/ha) is higher than that of traditional farms (2.57 t/ha). Total cost of production was significantly higher for traditional farms. Gross margin was found to be higher for mechanized farm (Tk. 14,168) compared to traditional farm (Tk. 10,102). Fewer numbers of labours per hectare were required to complete the production process by mechanized farm compared to traditional farm. Family labour was mostly affected by the mechanization. Animal power and output had positive effect on labour requirement, while power tiller and input costs had adverse effect on labour requirement for wheat cultivation. High price of power tiller parts was mentioned as a major problem of mechanization in the study areas.

## ANALYSIS OF POST-HARVEST LOSSES IN FOOD GRAINS FOR ACHIEVING FOOD SECURITY IN NORTHERN REGIONS OF BANGLADESH

#### M. E. Begum, M. A. Monayem Miah, Moniruzzaman, M. S. Rahman and S. Hossain

The post-harvest losses were estimated at farm level in two major food grains, viz. rice and wheat in Rangpur and Dinajpur districts. It was estimated that using the survey data collected from 72 rice growing and 76 wheat growing households in two districts for the year 2008-2009. The Logit regression model was used to identify the determinants of food security among households. The post harvest losses were estimated to be 4.93 kg/quintal in Aman, 4.03 kg/quintal in Boro, and 2.35 kg/quintal in wheat at the farm level. These losses were maximum due to harvesting (1.95 kg/quintal in Aman, 1.66 kg/quintal in Boro and 0.96 kg/quintal in wheat) in both the crops. Important factor leading losses was due to delayed harvesting. It followed by storage losses (16.24% for Aman and 15.14% for Boro). Storage losses were mainly due to presence of rodent and insects. The study also showed that majority of the households in the study area was food-secured. The household size and post-harvest loss of the farmers in both districts had negative and significant relationships with their probability of food security. The probability of food security will be increased by 10% for Rangpur and 2% for Dinajpur district for a one hectare increase in farm size. Each additional post-harvest loss of the household decreases the probability of food security by 3% for Rangpur and 2% for Dinajpur district.

# COMPARATIVE STUDY OF MAJOR RABI CROPS IN TWO SELECTED COASTAL AREAS OF BANGLADESH

#### Moniruzzaman, M. S. Rahman and S. Hossain

The study was conducted in two coastal districts, namely Noakhali and Patuakhali of Bangladesh during 2009-2010 to determine the costs, returns, and relative profitability of mungbean, groundnut and watermelon cultivation. A total of 180 farmers taking 90 farmers from each location were interviewed to achieve the objectives of the study. The study revealed that the watermelon cultivation was required more inputs than that of groundnut and mungbean. Farmers gained higher profit from watermelon (Tk. 73751/ha) compared to mungbean (Tk. 3318/ha) and groundnut (Tk. 3863/ha). Benefit cost ratio was higher for watermelon (1.96) than that of mungbean (1.14) and groundnut (1.08). Untimely rainfall, lack of irrigation facilities, and high price of quality seed were identified as major problems of mungbean, groundnut and watermelon cultivation in the study areas.

# HOUSEHOLD FOOD SECURITY AMONG INDIGENOUS HILL PEOPLE IN KHAGRACHHARI DISTRICT OF BANGLADESH

#### M. A. Monayem Miah, Q. M. Alam, M. M. Ullah and M. S. Hossain

The study focused on the status of food security and its determinants among indigenous people in Khagrachhari hill district during 2009-2010. It also identified their livelihood risks and coping strategies during stress situation. The study based on a sample of 200 indigenous households revealed that most households (58%) were food secured whose calorie intake (2965 kcal/capita/day) was much higher than the national average (2239 kcal/capita/day). Among various food items, rice supplied 78.11% of the total daily calorie intake of food secured households followed by vegetables (5.18%), edible oil (3.35%), fish (3.22%), and spices (1.85%). Logit model revealed that farm size, off-farm income and household crop production had positive and significant impact in attaining food security of the indigenous households. Besides, small households and the households with more earning member were more foodsecured than large ones. Lack of modern technology, higher price of inputs, lack of organized output market, undefined land ownership, crop damage by wild pig and rat, reduction of land productivity, and natural calamities were found to be livelihood risks for the indigenous households. They sold wage labour, used previous savings, borrowed money from NGOs and neighbor, and sold livestock, poultry, fruits, bamboo, fire wood, and timber during stress situation.

## SUPPLY CHAIN ANALYSIS OF MAJOR SPICES MARKET IN SELECTED AREAS OF BANGLADESH

## M. A. Matin, M. A. Hossain, Q. M. S. Islam, S. Hossain and S. A. Mallik

The study analyzed the supply chain of ginger and turmeric marketing in Khagrachhari and Rangpur districts. A total of 120 farmers taking 30 from each area for each crop were selected randomly. Eight input suppliers, 12 local traders (farias), 20 beparies, 12 arathdars, 10 wholesalers (paikers), 18 retailers, 04 millers/ processors and 02 spices companies were selected. It examined value addition at different levels, post harvest losses, seasonal price variations, instability, and price fluctuations. Both primary and time series data were used for this study. Time series data for the period from 1990-1991 to 2005-2006 and primary data from July, 2009 to June, 2010 were considered. Nerlovian Partial Adjustment Model was used to measure area supply response. The result revealed that both ginger and turmeric cultivation was profitable since the BCR of ginger and turmeric cultivation was 2.30 and 4.08 respectively. The per quintal marketing cost of ginger in different intermediaries like local traders, beparies, arathdars, wholesalers, and retailers were Tk. 79.92, Tk. 302.40, Tk. 31.67, Tk. 76.31, and Tk. 33.38 respectively. Average value additions by local trader, bepari, wholesaler and retailer were Tk. 211.08, Tk. 1744.60, Tk. 875.69 and Tk. 1200.12 per quintal respectively. For turmeric, average value additions by local trader, bepari, wholesaler, retailer (dry), processor-cum retailer and company were Tk. 1065.44, Tk. 2471.24, Tk. 1547.30, Tk. 1289.12, Tk. 4651.60 and Tk. 22051.37 per quintal respectively. In supply chain, some actors added high value in ginger and turmeric marketing due to market control by fixed traders/syndicate. The growth rates of the area of ginger and turmeric in Khagrachhari district significantly increased, but this scenario was negative for Rangpur district due to shifting of lands to other crops like tobacco, potato and Boro cultivation. For the country as a whole, the lagged area and real prices played a dominant role in determining current year area allocation under turmeric cultivation. Farmers of Bangladesh appeared to be yield risk lover and would allocate more area to turmeric. Lack of improved and high yielding varieties, lack of latest technical know-how, and price instability were the major problems for the production of ginger and turmeric in the study areas.

#### Abstract 2008-2009

## LAND UTILIZATION AND LIVELIHOOD PATTERN OF THE FARMERS IN SELECTED CHAR AREAS OF BANGLADESH

#### M. A. Hossain and S. Hossain

A study was conducted in different char areas of Kurigram and Noakhali districts during 2008-2009 with a view to know the existing land use pattern along with other livelihood components of the farmers. A total of 80 farm households, taking 40 from each district, were selected randomly. The study revealed that the major crops like maize, jute, kaon and rice were grown in Kharif-1 season while wheat, blackgram, onion, grasspea, groundnut, soybean, sweet potato and winter vegetables were grown in Rabi season mostly in high and medium high land. The most common patterns in high, medium high and medium low lands were Maize-T. Aman-Boro, Jute-T.Aman- Wheat, Kaon-Fallow-Black gram which covered about 28%, 24% and 20% of the total area respectively. Farmers had the limited scope for earning rather than agricultural activities. Due to the special environment, land remain under water due to flood, and farmers remained unemployed from June to October about 1/3 of the year. The cropping intensity was low (180% at Kurigram and 194% at Noakhali). Farmers mostly used local varieties of crops and their yield performance was not satisfactory. Considering the total annual and per capita income, poor standard of living of the farmers was found in char areas. Selection of improved crop varieties suitable for flooded condition, improved management practices were some of the land use potentials for future researchable issues. In addition, providing micro-credit loan is necessary to the poorer section of people for accelerating income generation activities in reducing poverty as well as for improving livelihoods of the farmers in char areas.

# ECONOMIC ASSESSMENT OF ONION AND GARLIC CULTIVATION UNDER ZERO TILLAGE AND TRADITIONAL METHODS IN BANGLADESH

#### M. A. Haque, M. A. Monayem Miah and S. Hossain

The study was conducted in four major onion and garlic growing districts, namely Magura, Faridpur, Rajshahi and Natore during 2008-2009 to estimate the profitability of onion and garlic cultivation. A total of 150 onion farmers and 150 garlic farmers, taking 90 farmers for each crop from each area, were selected by random sampling technique for the study. The cost of onion cultivation was Tk. 93517, Tk. 87696 and Tk. 72001 per hectare on full cost, variable cost and cash cost basis. The major share of gross cost of onion cultivation was seed (41%) and human labour (24%). The yield of onion was 9.86 metric ton per hectare. The gross margin was Tk. 70057 and Tk. 85752 per hectare on variable cost and cash cost basis. The net return of onion cultivation was Tk. 64236 per hectare. The benefit cost ratio was 1.68. The cost of garlic cultivation with tillage was Tk. 65416, Tk. 59803 and Tk. 44768 per hectare and without tillage it was 7.64 metric ton per hectare. The yield of garlic with tillage was 6.15 metric ton and without tillage it was 7.64 metric ton per hectare. The gross margin of garlic with tillage was Tk. 62604 and Tk. 77639 per hectare

and gross margin without tillage was Tk. 105070 and Tk. 123020 per hectare on variable cost and cash cost basis. The net return with tillage was Tk. 56991 and net return without tillage was Tk. 100080 per hectare. Human labour, seed/seedling, manures, Urea, TSP, irrigation, and insecticides for onion and garlic had positive effect on yield. The highest profit was obtained from onion and garlic cultivation than the competitive crops like mustard, groundnut and cabbage. Non-availability of HYV seed at proper time, lack of technical knowledge, high price and non-availability of fertilizer in time, infestation of insects and diseases, low market price, and lack of appropriate storage facility were the major problems of onion and garlic cultivation.

#### AN ECONOMIC ANALYSIS OF MANGO CULTIVATION IN CHAPAI NAWABGANJ AND DINAJPUR DISTRICTS OF BANGLADESH

#### M. A. Matin, M. S. Rahman, M. R. Karim, and S. Hossain

The study was conducted in two mango growing areas, namely Chapai Nawabganj and Dinajpur districts during 2008-2009. A total 60 farmers, taking 30 from each district, were selected randomly. The findings of the study revealed that mango cultivation was profitable in the study areas although return was negative during first four years of cultivation. Yield received by the farmers of Dinajpur was found to be higher than Chapai Nawabganj district. The BCR was found to be 2.23 and 2.54 for Chapai Nawabganj and Dinajpur districts respectively. IRR was found to be 20% for Chapai Nawabganj and 19% for Dinajpur district. Farmers in the study areas faced different problems like lack of good seedling, insecticides, natural disasters etc. during mango cultivation.

# TECHNICAL EFFICIENCY OF MUNGBEAN GROWERS IN SELECTED COASTAL AREAS OF BANGLADESH

#### Q. M. S. Islam, M. S. Rahman and M. S. Hossain

The study was conducted in two coastal mungbean growing districts, namely Noakhali and Patuakhali of Bangladesh during the period of 2008-2009 to estimate the technical efficiency of mungbean growers. A total 100 farmers taking 50 from each district were selected randomly. The study revealed that mungbean production was profitable and the average Benefit Cost Ratio (BCR) was found to be 2.22. The estimated results showed that the average level of technical efficiency among the sample farmers was 89%. This implies that given the existing technology and level of inputs, the output could be increased by 11%. In inefficiency model, the coefficient of farmers' education and experience in mungbean cultivation had positive significant effect on mungbean production. Eighty two percent farmers produced outputs to the maximum frontier output level (82-99%). Farmers in the study areas also mentioned some problems like high price of fertilizer, insecticides, and severe attack of insects etc to its production.

#### IMPACT OF POWER TILLER OPERATED SEEDER IN BANGLADESH

M. A. Monayem Miah, M. E. Haque, M. A. Wohab, Q. M. Alam, M. I. Hossain and M. E. Baksh

The study was conducted in Rajbari and Dinajpur districts of Bangladesh in 2008-2009 to assess the impacts of Power Tiller Operated Seeder (PTOS) adoption on crop cultivation, service providers' livelihoods, and environment. A total of 410 PTOS users and 53 service providers were interviewed for this study. The study revealed that PTOS was largely used for land preparation and seed sowing of various crops. The peak period of PTOS use was ranged from mid-October to mid-January and the lean period was mid-August to mid-October. Scientists, extension personnel, neighboring farmers, and family members played an important role in adopting PTOS. The use of PTOS has created a tremendous impact on farmers' income through crop cultivation. It ensured 16%, 15%, 18% and 18% higher yield for wheat, jute, onion and mungbean respectively compared to conventional system (PT). This also increased farmers' net income about 30%, 23%, 46%, and 45% for aforesaid crops respectively. It saved land preparation costs ranged from 16.98 to 30.67% and seed cost 15.06 to 25.37%. Farmers those used PTOS technology received 17.9% higher gross return than PT using farmers. Due to its multipurpose use, 88% adopters wanted to increase the use of PTOS in future. Providing PTOS service at farm level was found to be highly profitable as its owner earned average net income of Tk. 81003 per year. The service providers gained a considerable increase in their land holdings (9.7%), annual income (31.34%), livestock resources (24%), farm equipments (70.53%), household assets (21% to 78%), and dwelling houses (58.75%). It was also found that PTOS is environment friendly since it could save 40% of fuel per hectare and emission of 43% less CO<sub>2</sub> into the atmosphere.

# IMPACT OF NEW PAYMENT SYSTEM OF IRRIGATION ON SELECTED CROP PRODUCTION IN BARIND REGION OF BANGLADESH

#### Moniruzzaman, M. S. Rahman and S. Hossain

The study was conducted in three Barind areas, namely Rajshahi, Chapai Nawabganj and Naogaon districts during 2008-2009 to determine the economic profitability, potentiality of incom,e and employment generation under innovative irrigation management system. A total of 150 farmers taking 50 from each district were interviewed. The findings of the study revealed that maize and wheat cultivation were profitable in the study areas. The yield received by the farmers of Naogaon was found to be high compared to Rajshahi and Chapai Nawabganj for both maize and wheat crops. The benefit cost ratios were 1.56 and 1.92 for maize and wheat respectively. Overall, new payment system of irrigation reduced labour requirement in crop production and had positive impact on income generation. The cost of human labour and irrigation management system. Farmers in the study areas mentioned no scope of irrigation without pre-paid card, scarcity of electricity for irrigation in peak season, lack of credit facilities for irrigation management as problem of innovative irrigation system.

# ADOPTION AND RELATIVE PROFITABILITY OF HYV GROUNDNUT CULTIVATION IN CHAR AREAS OF BANGLADESH

#### M. Akter, M. A. Monayem Mia, M. S. Rahman and S. Hossain

The study was conducted to assess the extent of adoption and profitability of groundnut cultivation in 2008-2009. Primary data were collected from 80 randomly selected farmers from two districts, namely Noakhali and Kishoreganj. The results of the study indicated that only 20% of the farmers adopted BARI released HYV groundnut variety. The level of technology employed on HYV groundnut cultivation is not much encouraging in the farmer's field. Training and extension contact play an important role for the adoption of HYV groundnut cultivation. Net return from groundout cultivation was higher for HYV variety (Tk. 18321/ha) compared to local variety (Tk. 3981/ha). The study further indicated that inputs like labour, Urea, TSP and MP were significantly related with groundnut production. Sample farmers were not efficient in terms of resource allocation. Farmers had adequate scope to increase return by efficient utilization of all required inputs for groundnut production. Farmers in the study areas mentioned lack of quality seed, high price of seed and fertilizer, lack of capital, and scientific knowledge about modern cultivation as problems of groundnut production. These problems may be overcome by increasing dissemination activity such as training, extension contact etc.

#### STUDY ON INTEGRATED AND NON- INTEGRATED PEST MANAGEMENT OF VEGETABLE PRODUCTION IN TWO DISTRICTS OF BANGLADESH

## M. R. Karim, Moniruzzaman, M. A. Hossain and S. Hossain

The study was carried out to investigate the socio-economic characteristics of IPM and non-IPM farmers in two intensively eggplant and sweet gourd growing districts of Jessore and Comilla during 2008-2009. A total 120 farmers taking 60 (30 IPM and 30 non-IPM) from each district were selected randomly. The IPM technologies on yields, gross returns and gross margins were found to be positive. The IPM farmers produced higher benefits compared to the non-IPM farmers. The benefit cost ratio of IPM farmers was found to be higher compared to non-IPM farmers for both eggplant and sweet gourd production. The use of insecticide affects the human health and creates environmental pollution. By considering the relative advantages of IPM technologies for controlling disease and pest, farmers showed keen interest for the adoption of these technologies in near future. The study also suggested some necessary recommendations for sustaining the IPM technologies for greater expansion and dissemination at farm level through field demonstration, training, awareness creation about market demand, and higher price for pesticide free vegetables.

# MARKETING AND PRICE STRUCTURE OF POTATO IN SELECTED AREAS OF BANGLADESH

#### M. A. Matin and S. Hossain

The study was undertaken to analyze the marketing and price structure of potato in selected areas, namely Bogra, Comilla, Dhaka and Dinajpur in terms of marketing, growth, instability, and fluctuation of prices. Both primary and time series data were used for this study. A total of 120 farmers and 84 intermrdiaries were selected randomly. For area response, Nerlovian Partial Adjustment model was used. Spatial price integration has been assessed by one to one correlation matrix and by Augmented Dickey-Fuller Co-integration test. Time series data for the period 1990/91 to 2004/05 and primary data from July 2008 to June 2009 were used. Six performance indicators were used for measuring marketing efficiency. The performance indicators revealed that the marketing chain I (Farmer –Piker-Retailer- Consumer) was the most efficient chain in the selected areas. Chain III and chain IV were not relatively efficient in the agricultural marketing sector in potato producing regions. It was due to low price received by the farmers in the chain III and IV as compared to other chains. Growth rate of real prices increased over the period due to increase people's demand. Price flexibility analysis revealed that harvested amount and the post harvest prices had negative relationship for potato in Bangladesh. Seasonal price variation of potato was reported to be the highest in Bogra and the lowest in Comilla. Price remained the lowest in February and the highest in December. For the country as a whole the lagged area and real prices played a dominant role in determining current year area allocation for potato. The district result showed that last year real price was important for determining variable in area response function, particularly for Dinajpur district. Yield risk was found significant with positive sign in Comilla, Dhaka and Dinajpur. About 80% farmers stated that low price of harvest period and inadequate cold storage facilities were the major problems in the study areas.

#### FOOD GRAIN AVAILABILITY AND REQUIREMENT IN BANGLADESH

#### M. S. Rahman and S. Hossain

The main focus of the study was to examine the food availability and requirement status in the national perspective. The study was done using time series data on food grain during 2008-2009. The study revealed that aggregate domestic production and per capita intake of the food grain increased in the country over the past decades. Growth rates in production and area of food grain

showed positive trend for the study period of 1976-1977 to 2006-2007. The growth rate of production of other crops such as, pulses and oilseeds was also showed positive and significant trend for the whole period. Production of food grain could be changed due to total cropped area, irrigation, and area under modern varieties. Flood and government's overall policy were other important factors, which affected the food grain production. The findings further revealed that replacing area under local varieties by modern varieties, the production of different crops could be increased to some extent.

#### Abstract 2007-2008

# BARI TECHNOLOGY VILLAGE: PROGRESS AND WEAKNESS

## M. Nazrul Islam, M. A. Monayem Miah and Q. M. Alam

In the study, an attempt was taken during the period of 2007-2008 to see the progress and pitfall of the project- "*BARI Technology Village*" in selected three locations such as Rangpur, Pabna and Jessore. A total of 60 recipient farmers in each location were interviewed. The results showed that the average adoption of BARI crops were between "High" and "Medium" level. Dissatisfactory achievement was observed on the self sufficiency in seed of the farmers in the technology villages. Based on the selected indicators, overall progress of the project was under level "Poor". Study also recorded some pitfalls of the project, the main were: lack of supply of seeds in proper time, lack of monitoring and coordination, lack of responsibility, and accountability of the respective authority.

# ECONOMIC ANALYSIS OF TOMATO AND FODDERS GROWN IN SALINE SOILS AT SHATKHIRA

# M. Nazrul Islam

The study was carried out to evaluate the economic performances of tomato and two fodders (cowpea and barley) which were grown under saline soils at different management sequences in Shatkhira during 2007-2008. Three farmers were selected from three villages namely Daulatpur and Bolarhati under Sadar upazila and remaining one is from kulia under Debhata upazula of Satkhira district for established the experiment in their field during the rabi season of 2007-2008. The study revealed that the cultivation of tomato by the management of drip irrigation in raised bed with mulch received the highest yield and gross return while by the management of pipe irrigation in raised bed with mulch received the highest net return, benefit cost ratio and marginal rate of return. For the cultivation of fodders (cowpea and barley) by the management of pipe irrigation from STW in raised bed at 7 days interval received the highest yield, gross return and net return but by the management of pipe irrigation from STW in flat land at 7 days interval received the highest benefit cost ratio and marginal rate of return.

# VEGETABLES PRODUCTION AND ITS DISTRIBUTION PATTERN IN BANGLADESH

M. A. Baset, M. S. Rahman, R. Islam and Q. M. Alam

The study was conducted in Rajshahi, Khulna and Sylhet division covering all districts and some districts of Chittagong and Dhaka division during 2006-2007 and 2007-2008 to identify the vegetables production and distribution pattern. Secondary data were used in this study and collected from DD and DAE offices. Among the districts, Jessore district was treated as the pocket area of vegetable production and produced surpluses. On the other hand, Dhaka district was the most deficit area for vegetable production. Jessore district was the highest production area (549078 m. tons) among the districts of Chittagong division were found to be deficit in production when compared with recommended daily consumption level. Effective marketing system and development of communication network at grass root level can reduce the gap between demand and supply situation throughout the country.

## PROFITABILITY OF SOME BARI CROPS IN SELECTED AREAS OF BANGLADESH

#### M. N. Islam, M. E. A. Begum and Q. M. Alam

An attempt was made during 2007-2008 to assess the cost and return from the cultivation of selected BARI crops in different locations. The study was conducted in Lalmonirhat for maize, Comilla for groundnut, Lakshmipur for mungbean and sweet potato, Jessore district for cabbage and cauliflower and Chittagong district for Okra. 50 farmers from each crop were selected randomly. The study revealed that per hectare total costs were Tk. 51341, Tk. 32275, Tk. 20983, Tk. 27819, Tk. 63012, Tk. 61928, Tk. 87828, Tk. 65163, and Tk. 57775 for the cultivation of maize, groundnut, mungbean, sweet potato, cabbage, cauliflower, tomato, cucumber, and okra respectively. Sample farmers received Tk. 31280, Tk. 23221, Tk. 12957, Tk. 70981, Tk. 56546, Tk. 72820, Tk. 247076, Tk. 61437, and Tk. 94822 as per hectare net returns from the cultivation of maize, groundnut, mungbean, sweet potato, cabbage, cauliflower, tomato, cucumber and okra respectively. The benefit-cost ratio over total cost were 1.61, 1.72, 1.62, 3.55, 1.90, 2.17, 3.72, 1.94 and 2.64 for the cultivation of maize, groundnut, mungbe and okra respectively. High costs of fertilizers and insecticides were the major constraints to higher production for most of the studied crops.

# ADOPTION AND PROFITABILITY OF MUSTARD PRODUCTION IN BANGLADESH

#### M. A. Monayem Miah and Q. M. Alam

The study was conducted in four mustard growing districts like Jessore, Kushtia, Pabna and Tangail to assess the extent of technology adoption, relative profitability, and farmers' attitude toward BARI released mustard variety cultivation during April, 2008. A total of 220 BARI Sharisha cultivating farmers and 120 local mustard farmers were selected. The study showed that most of the farmers used inputs and followed agronomic practices close to the recommendation. The variety adoption scenario was discouraging since only 22% of the farmers cultivated improved mustard varieties. The yield of BARI Sarisha (149 kg/ha) was significantly higher than that of local variety (970 kg/ha), but much lower than its potential yields (2250kg/ha). The production of BARI Sarisha was found to be profitable, since the net profit and BCR were Tk. 35676/ha and 2.23 respectively. The farmers who cultivated BARI Sarisha received 58% higher net profit than local variety (Tori- 7). Mustard production has comparative advantage rather than import, as DRC value was 0.389. Farmers' showed positive attitude toward mustard production

since nearly 78% of the adopters wanted to increase BARI Sarisha cultivation in the coming year. The farmers experienced different constraints to mustard production such as scarcity of fertilizers with its peak price, infestation of insects and natural calamities. Lack of HYV seed availability was also found to be a barrier to the adoption of improved mustard technologies.

# FEASIBILITY OF SOYBEAN PRODUCTION IN NOAKHALI AND LAKSHMIPUR DISTRICTS

#### M. Akter, M. R. Karim, M. S. Rahman and Q. M. Alam

The study was conducted in two soybean growing areas, namely Noakhali and Lakshmipur districts of Bangladesh during 2007-2008. A total of 100 farmers taking 50 from each district were selected randomly. The results of the study indicated that soybean cultivation was profitable in both the areas. BCR was found to be 2.23. Soybean production had comparative advantage rather than import. Input like human labour, seed, TSP, insecticides had significant impact on the yield of soybean. The level of technology adoption varied from low to over use. The study also revealed that among the competitive crops soybean was the second most profitable crop in the study areas. Soybean was high yielding and low cost crop. In the study areas farmers of low income group can be suggested to cultivate this crop for obtaining higher benefit. If modern inputs and technology is adopted in the farmers' field, yields and income would increase. Therefore, proper training and regular monitoring was essential to increase soybean production in study areas of Bangladesh.

# POTATO FOR FOOD SECURITY IN BANGLADESH

#### M. Azimuddin and Q. M. Alam

The purpose of this study was to assess the potato crop for food security in Bangladesh. Primary data were collected from Comilla and Munshiganj district. Total sample size was 60. The study was conducted during 2007-2008. Both primary and secondary data were used in this study. The area and production of potato have been increasing rapidly compared to cereal crops like rice, wheat and maize. Per hectare average yield of potato was 22 ton and CV was 21.6%. Per kg average production cost and selling price was Tk. 7 and Tk. 11 respectively. Benefit cost ratio was 1.58. The production of potato is an efficient food crop. Potato would be better by far than any other major food crops available today from the view point of food value. Percentage of potato consumption should be increased. The pressure on rice would be reduced. Hence potato is appropriate for food security in Bangladesh.

# A STUDY OF INSECTICIDE USE ON VEGETABLES CULTIVATION AT FARM LEVEL IN SELECTED AREAS OF CHITTAGONG DISTRICT

# M. Mohiuddin, M. A. Baset, A. K. M. M. Rahman and Q. M. Alam

The study was conducted in Satkania, Patiya and Hathazari Upazila of Chittagong district during 2007-2008 to identify different pest problems and practices, inputs use and economic returns at farmers' levels. A total of 90 farmers were selected randomly taking 30 from each crop and from each study area. It was found that brinjal shoot and fruit borer for brinjal, aphid, bean borer and white fly for country bean and pod borer for long yard bean were the key insect pests in the study areas. About 95% of the farmers relied on the application of insecticides to control insect and pests and they said that the insecticides use was profitable. Majority of the farmers of Patiya were sprayed insecticides more than 40 times for brinjal cultivation. For other selected vegetables, farmers sprayed insecticide more than 15 times a season. Especially for Satkania, majority of the farmers sprayed every alternate day while in the winter, the spraying frequency was reduced once a week. Thirty nine percent of the respondents did not use any safety measures

while 21% of the vegetables growers covered body and face. Eight percent covered their face and 32% covered their body at the time of spraying. On an average 61% believed that pesticide application was harmful to farm labour, 40% farmers expressed their views that pesticide application pollute water and air. This study reflected the irrational use of pesticides for vegetables cultivation that had serious consequences to human health and environment.

# RETURNS TO INVESTMENT IN MODERN VARIETY POTATO RESEARCH IN HIGH DENSITY REGION (HDR) OF BANGLADESH

M. A Baset, M. R. Karim and Q. M. Alam

The study attempts to quantify the returns to investment in potato research in a High Density Region (HDR) of Bangladesh and their distribution between the producers and consumers based on the economic surplus model. Dhaka, Comilla, Bogra and Dinajpur district are included in this category. Several discounting techniques were used to assess the efficiency of potato research. The Internal Rate of Return (IRR) in HDR of Bangladesh was found 89%. The Benefit Cost Ratio (BCR) was estimated to be 9.33 and Net Present Value (NPV) was found Tk. 11492.42 million. The results showed that the consumers were more beneficiaries and the producers were fewer beneficiaries from the modern variety potato cultivation in HDR of Bangladesh at the initial stage and after then the situation was found reverse. It means that the producers were going to harvest higher benefit from research. The results indicated that the funding for modern variety potato cultivation in HDR of Bangladesh was a good investment.

#### HYBRID MAIZE SEED PRODUCTION AND ITS POLICY IN BANGLADESH

M. A. Haque, Moniruzzaman, M. S. Rahman and Q. M. Alam

The study was conducted at Dattanagar and Tabunia BADC farms at Jhenaidaha and Pabna respectively. Again, LAL TEER Seed Company at Lalmonirhat as private company and BRAC farm in Bogra district as NGO were selected for this study during 2007-2008 to know the present status and profitability of hybrid maize seed production. A total of 60 hybrid maize seed contract growers were selected purposively and 120 maize (Non-seed) growers were selected randomly for the study. The yield of hybrid maize seed production of contract growers under NGO was highest compared to the public agency and private company. The cost of hybrid maize seed production under NGO was highest compared to the public agency and private company. Gross margin, net return, and benefit cost ratio of hybrid maize seed cultivation were highest under public agency compared to the private company and NGO. Net return of hybrid maize seed cultivation was 50 percent higher than hybrid maize non-seed cultivation. High price of seed and lack of technical knowledge were the major constraints of hybrid maize seed production. More emphasis should be given by the research Institutes like BARI to develop improved variety hybrid maize inbreed seeds/lines and supply those seeds to the contract growers through government organization, other non-government organization, and private seed companies at reasonable price. Technical and financial support should be provided to the contract growers through government and non-government organization for producing good quality hybrid maize seed.

# CONTRIBUTION OF BARI VEGETABLE CROPS TO THE NATIONAL GDP OF BANGLADESH

## M. R. Karim, M. A. Baset , M. Akter and Q. M. Alam

The study was conducted to estimate the contribution made by BARI vegetable crops to GDP in the national economy of Bangladesh during 2005-2006 at constant market price of 1999-2000. For the purpose of GDP calculation, both primary and secondary data were collected from the

concerned scientists of BARI, BBS and DAM. The total area of vegetable crops was found to be 574.39 thousand hectares and produced 13725.06 thousand metric tons of vegetables. The total export quantity was found to be 6046 metric tons of 54 different vegetables. Total foreign exchange earnings were estimated to be Tk. 1120 million through exporting 0.00044 percent of total vegetable production. Bangladesh produced total goods and services whose valuation at constant market price of Tk. 3150370.14 million in 2005-2006 where the contribution of agriculture and forestry was found to be Tk. 467436.18 million (14.84%). The value added price of total vegetable crops was estimated at Tk. 72060.16 million in 2005-2006, while BARI vegetables contributed Tk. 36617.80 million to the national GDP of Bangladesh. The contribution of total vegetable was estimated 15.42 percent, while BARI vegetable technologies contributed 7.83 percent of agriculture and forestry to the national GDP.

# TECHNICAL EFFICIENCY OF BRINJAL GROWERS IN SELECTED AREAS OF BANGLADESH

Q. M. S. Islam, M. S. Rahman, Moniruzzaman and Q. M. Alam

The study was conducted in two brinjal growing districts, namely Rangpur and Chittagong during 2007-2008 to estimate the technical efficiency of brinjal growers. Total sample size was 120. The study revealed that brinjal production was profitable and the average Benefit Cost Ratio (BCR) was found to be 3.92. The average level of technical efficiency among the sample farmers was 90. This implied that with the existing technology and level of inputs the output could be increased by 10 percent. On the inefficiency model, the coefficient of farmers' education was positive and significant on brinjal production. Eighty two percent farmers also mentioned some problems like high price of fertilizers, insecticides, and severe attack of insects etc to its production.

#### ECONOMICS OF INDIGENOUS VEGETABLES FOR ENHANCING FOOD SECURITY IN HILLY COMMUNITIES IN BANGLADESH

#### Moniruzzaman, R. Islam and Q. M. Alam

The study was conducted in two hill districts, namely Bandarban and Khagrachhari areas during 2007-2008. Total sample size was 58. Agriculture was the main occupation of the sample farmers in both the areas. Bandarban farmers' had higher units of land than that of Khagrachhari. Various types of vegetables like potato, tomato, bottle gourd, cucumber, radish, etc. were cultivated along with hilly vegetables. Respondent farmers cultivated vegetables for consumption, and also for sell. They faced some problems to cultivate and consume both the hilly and local vegetables. Inadequacy of capital investment was the main constraint for vegetables cultivation in the study areas.

## MARKET EXPANSION AND TRADE LIBERALIZATION OPPORTUNITIES THROUGH PRODUCTION AND EXCHANGE OF SELECTED VEGETABLES IN BANGLADESH

#### M. R. Karim, Q. M. Alam, and M. A. Rashid

The study was undertaken with a view to intensify the vegetable export market expansion and trade liberalization policy in 2007-2008. Fifty four kinds of different vegetables were exported from Bangladesh. The importing countries were mostly in the Middle East. The demand for summer vegetables was found to be higher than those of winter vegetables. Total export quantity was found to be 6046 metric tons of vegetables and earned foreign exchange in terms of Tk. 1120 million which was only 0.0118 percent of the total vegetable production in Bangladesh. Among the vegetable export marketing cost items, air freights charges was found to be the highest. For all the vegetables, Domestic Resource Costs (DRCs) were observed to be less than

unity implying that Bangladesh had comparative advantage in vegetable production. On an average, DRC was found far below (0.35) the accepted level up to 1.

# MAIZE MARKETING AND PROCESSING IN SELECTED AREAS OF BANGLADESH

M. A. Matin, M. A. Hossain, M. S. Rahman and Q. M.Alam

The study was conducted in Bogra, Dinajpur, Kushtia, Rangpur and Bangladesh as a whole with a view to know the growth, instability, price fluctuation, supply response, marketing costs, margins, and price spreads at different levels of marketing channels of maize. For supply response, Nerlovian Partial Adjustment model was used. Time series data for the period of 1994-1995 to 2004-2005 and primary data from July/2007 to June/2008 were employed for this study. Real price of maize was found to increase over the period of 1994-1995 to 2004-2005 due to higher demand of maize in poultry and livestock sector of Bangladesh. Area instability of maize were found in Bogra, Dinajpur, Kushtia, and Rangpur and Bangladesh as a whole were 3883, 3485, 3890, 2175 and 3176 respectively in terms of instability index. For the country as a whole, the last year area played a dominant role in determining current year allocation under maize. Yield risk was found significant at 10 percent level with positive sign. Therefore, the farmers of Bangladesh appeared to be yield risk lover and would allocate more area to maize. According to the volume of maize, five major channels were identified as the dominant in the study areas of which Farmer - Faria-Bepari - Arathdar-Cum - Wholesaler- Feed Mill/Processor -Poultry Farm ranked first. Price spreads and producers share of consumers price in the case of three marketing channels were identified. In channel-I, producers' gross share was 68.49 percent and net share was 67.06 percent per quintal of maize. Similarly, in channel -III, the farmers' gross share and net share were 77.25 and 75.64 percent of consumers' price respectively. The results reflect that the farmers share increased with the decrease of intermediaries of the channel. If the farmers sell their maize directly to the feed millers/feed processing units, they get more benefits, otherwise they loss benefits. In this respect entrepreneurs should be encouraged to establish feed mill adjacent to maize growing zones. Provision of loans may be made through the nationalized bank to the private sector for expansion of feed mills in rural areas. The major problems of maize marketing were the dominance of intermediaries, lack of drying facilities, lack of adequate market information, high storage charge, and load shedding of electricity.

## MARKETING AND PRICE BEHAVIOUR OF MAJOR PULSES IN BANGLADESH

# M. A. Hossain, M. A. Matin, Q. M. S. Islam, and Q. M. Alam

The study was confined in two lentil producing districts, namely Pabna and Jessore during the period 2008-2009. A total of 60 farmers were selected by using simple random sampling technique, while 40 traders were selected as samples from each group by using proportionate random sampling technique. Six performance indicators were used for measuring marketing efficiency. Time series data were used for estimating fluctuation and extent of price cycle. On the basis of quantity, about 67% of lentil was marketed in the secondary market while it was only 33% in the primary market. Among the selected three major channels, the producers' share was the highest in Producer-Miller-Retailer-Consumer which was considered as an efficient marketing channel. The extent of annual fluctuation of price, area, production, and yield increased in the recent years in both the locations and Bangladesh as a whole. Increase in domestic production, inter-cropping of lentil with other crops, storage facilities, efficient cooperative marketing system, fixation of minimum support price, and effective price policy measures were some of the major alternatives to achieve higher production to meet shortfall of demand for lentil in Bangladesh.

## VEGETABLE SEED MARKETING SYSTEM IN SELECTED AREAS OF BANGLADESH

## M. A. Matin, Q. M. S. Islam, and Q. M. Alam

The study was undertaken in 2007-2008 to investigate the vegetable seed marketing system of tomato and radish in Jessore and Rangpur district. BADC is the sole producer of the public sector. The study was based on both primary and secondary data. Sixty farmers and 20 traders were selected from private sector for this study. Moreover, 5 types of respondents' viz. contract growers, seed multiplication farm, seed processing centers, registered dealers, and BADC seed using farmers were also selected from public sector (BADC) for this study. Farmers collected seeds from different sources. On an average, only 14 percent farmers used their own seed, 35 percent procured from local market, and 20 percent from neighbor farmers. Farmers were getting about 9 percent seed from institutional sources in the study areas. Among the institutional sources, BADC plays a vital role in supplying vegetable seeds to the farmers. Low germination of seed, adulteration of seed, cheating by the traders, supplying low quality seed by new traders and high price of seed were the major problems faced by the farmers. Only 5-10 percent of the total vegetable seed requirements of the country is supplied by BADC and remaining 90 percent by the vegetable farmers who had no knowledge to produce and process good quality seed. Therefore, it is essential to develop and introduce a reliable and effective distribution system of vegetable seeds in the market.

#### Abstract 2006-2007

# ECONOMIC ANALYSIS OF SELECTED CROPS GROWN IN SALINE SOILS AT CHARMAJID, NOAKHALI

#### M. Nazrul Islam

An experiment was carried out to evaluate the performance of tomato, watermelon and chilli under different planting and irrigation techniques in the saline soils of Charmajid, Noakhali during the Rabi season of 2006-2007. Simultaneously, promising treatments were demonstrated at farmers' field for the cultivation of tomato and watermelon in same location under saline soil. A total of 20 farmers, 5 for each crop were interviewed through pre-designed questionnaire. Besides, a survey was conducted adjacent to the project site during the same period to estimate the economic return from the cultivation of tomato, watermelon and chilli. Considering yield, gross return, net return and benefit cost ratio, tomato and watermelon performed better in experimental plots through the treatments of drip irrigation in raised bed with mulch. In similar way, chilli performed better in experimental plots through the treatments of irrigation by manual pump in raised bed with mulch and irrigation by cane in raised bed with mulch. Considering marginal rate of return, irrigation by manual pump in raised bed with mulch performed better for the cultivation of all the selected crops in experiment. In demonstration, all the treatments received reasonable economic return, although drip irrigation in raised bed with mulch performed better compared to others. In adjacent to the project site, farmers also received a good economic return from the cultivation of tomato, watermelon and chilli with minimum investment as salinity was not a problem for crop production in their field. Farmers opined that late planting of Aman rice due to poor drainage system resulted in delayed planting of Rabi crops was the major problem. Seed of tomato as demonstrated were not available in the local market. Cultivation of selected crops through drip irrigation performed better but irrigation by manual pump in raised bed with mulch was suitable for adoption as it was less costly.

## ECONOMICS OF HYBRID MAIZE PRODUCTION IN SOME SELECTED AREAS OF BANGLADESH

#### M. R. Karim, Moniruzzaman and Q. M. Alam

The study was an attempt to assess the existing agronomic practices of hybrid maize cultivation, its profitability, constraints, and factors affecting production in 2007. Data were collected from four districts, namely Rangpur, Dinajpur, Bogra and Kushtia. Total sample size was 120 farmers and 30 farmers from each district. The highest percent of the total farmers sowed seeds during the first week of December. The average seed rate was found to be 20.94 kg per hectare. About 16 varieties were found to cultivate by the sample farmers of which maximum percentage of farmers used NK-40 followed by Pacific-11. All kinds of fertilizers used by the farmers were below optimum level of recommendation. Of the total variable cost of maize cultivation, about 33 and 28 percent incurred by human labour and chemical fertilizer respectively. The average yield of hybrid maize was found higher than the national average. The average gross margin was observed to be Tk. 28456 on full cost and Tk. 32659 on cash cost basis. The cost per kilogram of maize cultivation was Tk. 4.12 and return from one kilogram of maize was Tk. 7.80. The magnitudes of the coefficient imply that human labour, land preparation, irrigation, Urea, and borax have significant effect on gross return. Non availability of seeds in time, high price of fertilizer, low price of maize, etc. were the major problems for hybrid maize production. Farmers' intention to grow hybrid maize was for higher yield, higher income and easy to grow, which encourage them for continuing maize cultivation.

#### IMPACT OF ASTERIX VARIETY OF POTATO RESEARCH IN BANGLADESH

#### M. A. Baset, Q. M. Alam and M. R. Karim

Impact study on Asterix varity of potato research was undertaken to quantify the future benefit from the variety which was approved by the National Seed Board (NSB) and released by the Tuber Crops Research Centre (TCRC) of Bangladesh Agricultural Research Institute (BARI) and recommended for cultivation through out the country in 2005. The model used for this study was Akino and Hayami (1975) economic surplus approach. Internal Rate of Return (IRR) to the total investment in Asterix variety of potato was calculated. The result indicated that for each taka invested returns Tk. 0.44 per year from Asterix variety of potato research would be a good investment.

## ANALYSIS OF TOTAL FACTOR PRODUCTIVITY OF MODERN VARIETY POTATO IN BANGLADESH

#### M. A. Baset, M. R. Karim, M. Akter and Q. M. Alam

The study was conducted to document the scenario of modern variety potato production in Bangladesh covering the period from 1980-1981 to 2005-2006. The primary objective was to estimate the extent of shift of production function or the supply curve of modern variety of potato in Bangladesh. The total factor productivity index was estimated using the Tornqvist-Theil index formula. The growth rate of area, production and yield were found to be increasing steadily from the year 1980-1981. A substantial change has been started occurring from the year 1998-1999. The trend of inputs used was found increasing. Almost all the partial as well as the

input, output, and total factor productivity indices were also found increasing. In order to sustain the present growth of modern variety potato production needs to develop new varieties of potato and extensive extension work.

#### ANALYSIS OF TOTAL FACTOR PRODUCTIVITY OF WHEAT IN BANGLADESH

#### M. R. Karim, M. A. Baset, M. Akter and Q. M. Alam

The study dealt with the total factor productivity of wheat in Bangladesh covering the period from 1980-1981 to 2005-2006. The wheat production period was divided into three consecutive sub periods like a) 1980-1981 to 1989-1990, b) 1990-1991 to 1999-2000, and c) 2001-2002 to 2005-2006. The analysis was done following the Tornqvist-Theil index formulation popularly known as total factor productivity index. The study revealed that technological breakthrough was started from the mid of the 1<sup>st</sup> period. The growth rates of inputs used were higher in the 2<sup>nd</sup> period than that of 1<sup>st</sup> period. The growth parameter of output price was found always lower than that of input prices. The 28 years' (1972-1973 to 1999-2000) mean rainfall and temperature did not favour the farmers to produce wheat. In aggregate sense the wheat production in the 2<sup>nd</sup> period was the most cost effective. The alarming yield growth rate was found only 0.74 percent annually during the study period. Of the period, it can be seen that only 2<sup>nd</sup> period was considered as the golden revolutionary period in the wheat history of Bangladesh.

# CONTRIBUTION OF BARI CEREAL CROPS TO THE NATIONAL GDP OF BANGLADESH

#### M. R. Karim, M. A. Baset and Q. M. Alam

The study was conducted to determine the contribution of BARI cereal crops to GDP in the national economy of Bangladesh during 2005-2006. For the purpose of calculating the contribution of BARI cereal crops to GDP, both primary and secondary data were collected from the concerned scientists of BARI, BBS and DAM. The market price for the year 1999-2000 was considered as a base year to estimate the GDP for the year 2005-2006. Bangladesh has produced goods and services whose valuation at constant market price of Tk. 3150370.14 million in the financial year 2005-2006, whereas the contribution of agriculture and forestry was found to be 14.84 percent (Tk. 467436.18 million). The value added price of the goods and services of BARI cereal crops were found at constant market price of Tk. 31434.75 million comes as GDP valuation to the national economy. Finally the contribution of BARI cereal crops to the GDP was worked out at 6.72 percent out of which the highest contribution was earned by poultry feed (36.11%) followed by biscuit (26.95%), flour (19.78%), bread (6.27%), others (5.30%), wheat straw (2.23%) cattle feed (1.34%), fodder (1.32%), seed (0.37%) and maize fuel (0.33%), respectively. On the other hand, contribution to GDP of BARI cereal crop technologies was found to be the highest in biscuit production (40.83%) followed by flour (29.96%), bread (9.50%), poultry feed (5.47%), wheat straw (3.38%), cattle feed (2.03%), seed (0.56%), fodder (0.20%), and maize fuel (0.05%).

# SOCIO-ECONOMIC IMPACTS OF PULSE RESEARCH AND EXTENSION IN BANGLADESH

#### M. A. Monayem Miah and Q. M. Alam

The study estimated the socio-economic impacts of pulses improved technologies in Bangladesh at farm level during the period of 2006-2007. An ex-ante analysis through economic surplus model was used to estimate economic returns to investment. The adoption of improved pulses technologies increased yield by 40.5%, per capita consumption by 15.4%, livestock feed production by Tk.19.6 million, and gross income by 47-49% in the country. A total of 27.6 million man-days of additional employment valued Tk. 2070 million were generated due to adoption of improved pulse crops. The higher adoption of improved pulses technologies also improved soil health through incorporation of nitrogenous fertilizers that was equivalent to Tk. 169.6 million. The estimated Internal Rate of Return (63.1%), External Rate of Return (3021%), and Net Present Value (Tk. 3.3 billion) were much higher compared to other rate of returns estimated for cereal, fibre, vegetables and other crops in Bangladesh. The increased production of pulses attributed to research and development, saved foreign exchange approximating Tk. 30.66 billion. This study indicated that the investments made for the pulses research and development programme were realistic and justified.

## PRODUCTIVITY AND PROFITABILITY OF MUNGBEAN CULTIVATION IN SELECTED AREAS OF BANGLADESH

#### Q. M. S. Islam, M. A. Monayem Miah and Q. M. Alam

The study was conducted at Barisal and Jhalokati districts during 2007 to estimate the profitability and resource use efficiency of mungbean production. The study was confined to randomly select 60 farmers. It revealed that mungbean production was profitable to the farmer. The mungbean farmers obtained 928 kg yield per hectare. The gross margin was estimated to be Tk. 24236 per hectare. Benefit cost ratio was estimated at 2.53. The net benefit per kilogram of mungbean was Tk. 26.45. Functional analysis showed that human labour, Urea, and insecticides had positive significant contribution to mungbean production. Mungbean farmers encountered various problems like untimely rainfall, lacking of quality seed, and disease and insect infestation, etc.

# ECONOMIC ANALYSIS OF LENTIL AND MUSTARD CULTIVATION IN SELECTED AREAS OF BANGLADESH

#### Q. M. S. Islam, M. A. Monayem Miah and Q. M. Alam

The study was conducted in Pabna and Jessore districts to know the farm level input use pattern and profitability of lentil and mustard cultivation during 2006-2007. A total of 140 farmers taking 70 farmers for each crop were interviewed. The study revealed that the uses of manure, Urea, TSP, MoP and irrigation in mustard cultivation were significantly higher than that of lentil cultivation. The lentil farmer received significantly higher gross margin (Tk. 26616/ha) than that of mustard farmers (Tk. 18452/ha). The benefit cost ratio of lentil and mustard cultivation were 3.02 and 2.25 respectively. The cost per kilogram of lentil and mustard production were found to be Tk. 13.86 and Tk. 12.34 and per kilogram return was found to be Tk. 28.05 and Tk. 15.47 respectively. Based on the secondary information, the highest benefit cost ratio was obtained from potato (3.15) followed by lentil (3.02) among the competitive crops.

#### TECHNICAL EFFICIENCY OF MAIZE GROWERS IN SELECTED AREAS OF BANGLADESH
#### Moniruzzaman, M. R. Karim, Q. M. Alam and M. S. Rahman

The study was carried out in four major maize growing areas, namely Chuadanga, Dinajpur, Bogra and Lalmonirhat districts during 2006-2007 to estimate the technical efficiency of maize growers. A total of 200 farmers, taking 50 from each area, were selected by random sampling technique. Per hectare average cost of production were Tk. 44197 and net return were Tk. 25575. Maize production in the study areas was found to be profitable. Findings of impact of different inputs use on maize yield revealed that farmers did not use inputs judiciously. But the average technical efficiency of maize growers was reasonable in all areas. Lack of capital and high price of TSP were the main constraints to its production.

# SOCIO-ECONOMIC ANALYSIS OF MULTI-CROP POWER THRESHER IN TWO SELECTED AREAS OF BANGLADESH

#### R. Islam, Q. M. Alam, M. S. Alam and M. A. Hossain

The study was conducted in Barisal and Jamalpur districts during 2006-2007 to identify the socio-economic outcomes of BARI designed Multi-Crop Power Thresher (MCPT). A total of 22 farmers taking 8 farmers from Jamalpur and 14 farmers from Barisal district were selected. To purchase a multi- crop power thresher the farmers need to invest a higher amount of money (Tk. 33117). The operating cost of MCPT per year was Tk. 33149 and Tk. 41585 for Jamalpur and Barisal areas respectively. The farmers got net income of Tk. 53346 and Tk. 59802 for both areas respectively. The machines were running successfully with some interruptions (varied brand to brand) that were fully in control by the farmers. So, MCPT have a great positive role in alleviating rural poverty as well as increasing farm income and employment. According to farmers' opinion, price of MCPT should be reduced. Without some troubles, MCPT proved to be viable in the mechanization of agriculture to the farmers.

# ECONOMICS OF VEGETABLES PRODUCTION AND ITS DISTRIBUTION PATTERN IN BANGLADESH

#### R. Islam, M. N. Islam and Q. M. Alam

The study was conducted in Rajshahi and Khulna division during 2006-2007 to identify the vegetables production and distribution pattern. Secondary data were collected from DD and DAE offices. All the districts of these two divisions were sufficient in vegetables production. Among all the districts, Jessore district was the most surplus area and it was amounted 476963.34 m. tons. On the other hand, Kurigram district was the lowest surplus area. Jessore district was the highest production area among the districts and the total production of Jessore district was 549078 m. tons and Narail was the lowest production area which was amounted to 56692 tons.

### IMPACT ASSESSMENT OF FSRD SITES OF OFRD, BARI, GAZIPUR

## M. A. Hossain, M. S. Rahman, M. R. Hasan, M. A. Hossain, and Q. M. Alam

The study was initiated at Farming Systems Research and Development (FSRD) site Narikeli, Jamalpur during 2006-2007 to assess the impact of the technologies demonstrated to the FSRD sites. Data were collected from from 15 farmers. The findings of the study suggested that the recommended technologies were profitable. MBCR was found to be greater than two for all the recommended technologies. Technologies like crop production, homestead farming, livestock and fisheries also created employment opportunity to the family members. The overall SPIS was found to be 78.33 percent indicating overall change in socio-economic status of the sample

farmers. The level of adoption of BARI technologies varied from medium to very low level. Farmers in the study area also faced some problems like non availability of improved seed, lack of BARI vegetables seeds, high price of inputs etc.

## Abstract 2005-2006

## ECONOMIC PERFORMANCE AND EFFICIENCY OF BARI MAIZE SHELLER IN TWO DISTRICTS OF BANGLDESH

### Rafiqul Islam, M. N. Islam and Q. M. Alam

The study was conducted in Dinajpur and Kushtia districts during 2005-2006 to measure the socio-economic impacts and adoption status of BARI developed maize sheller. A total of 33 farmers taking 18 farmers from Dinajpur and 15 farmers from Kushtia district were selected. Agricultural machinery is very much useful and acceptable by the farmers. The machine is running successfully with small interruption that is fully in control of the farmers. BARI developed maize shellers generated a large amount of gross income in a year which was higher than its purchasing costs. So, the maize sheller has a great positive role in alleviating rural poverty as well as increasing farm income and employment. According to the farmers, the price of maize sheller should be reduced and to be made available for the farmers in all locality for its intensive use. Skill manpower should be developed for mechanized production and use. Without some troubles, BARI maize sheller proved success in the mechanization of agriculture to the farmers.

## ASSESSMENT OF SELECTED BARI TECHNOLOGY VILLAGE IN BANGLADESH

M. N. Islam, R. Islam, M. I. Hossain and Q. M. Alam

The study was carried out in two-technology villages to assess the economic performance of BARI technology and its impact in the farmers' field. The study was conducted in Jessore and Chittagong district. A total of 40 farmers equally represented by 20 farmers in each location were selected randomly. All the selected BARI crops grown by recipient farmers in both locations are found profitable. Study also revealed that the area of BARI crops, cropping intensity as well as income from agriculture increased with the introduction of BARI technology of the recipient farmers in the study locations.

# ECONOMIC PERFORMANCE OF IMPROVED PULSE PRODUCTION IN BANGLADESH: TECHNICAL EFFICIENCY AND RELATED ISSUES

## M. A. Monayem Miah, M. K. Hasan, M. S. Aktar and M. A. Bakr

The study was conducted by fitting stochastic parametric approach to farm level cross sectional data for 360 pulse producers to measure the technical efficiency and economic performance of improved pulses production. The estimated results showed that the average level of technical efficiency among sample farmers for blackgram, lentil and mungbean were 85%, 91% and 76% respectively. This implied that given the existing technology and level of inputs the output could be increased by 15%, 9% and 24% respectively for blackgram, lentil and mungbean. Education of the respondents and training on pulse production played a significant role in the technical efficiency effects. At the same time any effort in improving farmers' knowledge through formal or informal training could help in improving productivity of pulse. Seeds from Agricultural Extension Office or Bangladesh Agricultural Development Corporation also played a significant role in the technical efficiency which deserves the necessity of supplying good quality seeds to the farmers for achieving higher technical efficiency.

## COST OF SOIL EROSION AND BENEFIT OF CONSERVATION IN THE CHITTAGONG HILL TRACT REGIONS OF BANGLDESH

M. A. Monayem Miah and S. M. F. Islam

The study measured the cost of soil erosion due to shifting cultivation (Jhum) and estimated the benefits of soil conservation through establishing Multi Strata Fruit Orchard (MSFO) in the Khagrachhari district during April-December, 2005. It also assessed farmers' perceptions on shifting cultivation (Jhum) and conservation technology. Marginal impact was measured through productivity change method, and benefit of soil conservation was estimated using project appraisal technique. The study showed that Jhum farming causes huge soil loss (41.05 t/ha/ hr), degrades soil quality, decrease crop yield, and causes various environmental degradations. The productivity of crops under shifting cultivation has been decreased with decrease in fallow period. The farmer cultivated Jhum crops on 6 year fallow hills received higher net benefit than the farmers of other years because of increased top soil depth. Contrarily, the conservation technology was highly profitable and acceptable to the farmers as its rates of returns (BCR14.14, NPV Tk. 5822536, and IRR 65.92%) were very high. Functional analysis showed that Jhum farmer would receive 190% higher return if they adopt MSFO technology. Knowing all the negative impacts of shifting cultivation, hill farmers practiced it due to scarcity of plain land, requirement of livelihood, and ignorance of modern cultivation system. Most of the hill farmers expressed high interest toward MSFO technology, and wanted to adopt it if they get financial support and technical assistance from concerned authority, without financial support from any source; way out from shifting cultivation would be a difficult task.

## **RESEARCH BENEFIT OF DURA VARIETY POTATO IN BANGLADESH**

## M. A. Baset, Q. M. Alam, and M. R. Karim

An ex-ante study was undertaken to quantify the future benefit from the adoption of Dura variety potato during 2006-2007. This variety was recently approved by the National Seed Board (NSB) of Bangladesh and released by the Tuber Crops Research Centre (TCRC) of Bangladesh Agricultural Research Institute. The model used for this study was developed by Akino and Hayami (1975) based on the economic surplus approach. The Internal Rate of Return (IRR) to Dura variety of potato was calculated to be 44%. The result indicated that each taka invested returns Tk. 0.44 per year from Dura variety potato research and development which was highly profitable.

# MANGO MARKETING AND PROCESSING SYSTEM IN BANGLADESH

#### M. A. Matin, M. I. Hossain, M. A. Baset and M. R. Karim

The study was undertaken to analyze the marketing systems of mango both at farmers' and intermediaries' level. Three important mango growing areas, namely Dinajpur, Chapai Nawabganj and Meherpur districts were selected for the study. A total of 30 farmers, taking 10 farmers from each district, and 45 intermediaries, were selected randomly for the study. Per quintal marketing cost of mango by farmer was Tk. 133. Among the cost items, transportation cost incurred the major shares, which were about 45 percent. Beparies purchased mango from farmers through local arathdar and sold it to retailer through urban arathdar. Their average marketing cost was Tk. 446. Their gross marketing margin and net marketing margin was Tk. 1037 and 591 respectively for transacting one quintal of mango. Retailer purchased mango from beparis through urban arathdar and sold it to the consumers. Their gross marketing margin and net marketing margin and net marketing was about Tk. 498 and Tk. 261 respectively. On an average the farmers in the study areas received Tk. 2379 per quintal of mango. Average price per quintal of mango was

found to be highest in Dinajpur (Tk. 2698) followed by Chapai Nawabganj (Tk. 2234) and Meherpur (Tk. 2038).

#### TOMATO MARKETING SYSTEM IN BANGLADESH

M. A. Matin, M. R. Karim and M. I. Hossain

The study was carried out to identify the most efficient and suitable marketing channels of tomato in selected areas of Bangladesh by using primary data collected randomly from 120 farmers and 99 traders. Out of 99 traders 40 were beparies, 12 arathdar (Local), 8 arathdar (Dhaka), paikers 3, faria 9 and 27 retailers. According to the volume of tomato handled and longevity or participation of the intermediaries in the channel, four major channels were identified as dominant in the study area. The channel *Farmer-Bepari-Arathdar (Dhaka)-Retailer (Dhaka)-Consumer* was ranked first. The results showed that *Farmer-Arathdar (Local) – Bepari-Arathdar (Dhaka)-Retailer (Dhaka)-Consumer* possesses the highest marketing efficiency. The performance indicators revealed that channel Farmer-Bepari-Arathdar (Dhaka)- Retailer (Dhaka)-Consumer and channel Farmer-Bepari-Arathdar (Dhaka)-Retailer (Dhaka) – Retailer (other district than Dhaka)-Consumer were not relatively efficient in the tomato producing regions. Establishment of tomato processing plant in the intensive growing areas may be the remedy of the problem which will ensure fair prices for the farmer.

## BLACKGRAM CULTIVATION AT FARM LEVEL: INPUT USE, PRODUCTIVITY, AND RESOURCE USE EFFICIENCY

#### Q. M. S. Islam

The study was conducted at Chapai Nawabganj and Sherpur districts to examine the effect of various input use and to estimate the resource use efficiency for blackgram production. The study was confined to 105 farmers, selected randomly. The study revealed that blackgram cultivation was profitable although the farmers were not getting the normal yield due to lack of proper management practices. Average gross margin was found to be Tk. 22891/ha on full cost and Tk. 25510/ha on cash cost basis. Benefit Cost Ratio (BCR) was 3.76. It was calculated that the average cost per kg of blackgram cultivation was Tk. 8.40 and Tk. 3.99 on full cost and cash cost basis respectively. The coefficient for human labour, TSP and DAP were found to be statistically significant.

## EX-ANTE IMPACT ANALYSIS OF SHATABDI VARIETY OF WHEAT

# M. R. Karim, M. A. Baset and Q. M. Alam

An Ex-ante rate of return analysis for estimating the future returns from Shatabdi variety of wheat was conducted during 2005-2006 using Alston et al. (1995) spreadsheet method. It was found that the ex-ante IRR to the total investment of Shatabdi variety of wheat research and extension was 44 percent and the efficiency index was 17:1. Under various assumptions of shifter, expenditures, yield change, rate of adoption, elasticities and exogenous growth rate, the magnitude of IRR varied from 35 to 85 percent and the magnitude of efficiency index varied form 12:1 to 160:1. Therefore, the variety Shatabdi would be an outstanding contributing variety for increasing wheat production and sustaining self-sufficiency in the future.

# IMPACT ASSESSMENT OF TWO FARMING SYSTEM RESEARCH SITE

M. I. Hossain, M. N. Islam, M. A. Matin, R. Islam, E. A. Begum, M. A. Quayyum, M. N. Islam and M. A. Hossain The study was undertaken in Tangail and Pabna districts during 2005-2006 to evaluate the technologies given to the FSR sites of OFRD. In Tangail, different technologies were given to the farmers during 1984 and in Pabna during 1989. A total of 53 farmers taking 31 from Tangail and 22 from Pabna were selected. It was found that many farmers still continuing the technologies like homestead vegetables and fruits cultivation, improved crop management, dewarming, beef fattening, artificial insemination, poultry vaccination, improved fish culture (mono culture), use of improved Chula, use of composting, and bee keeping. These practices helped increase income of the farmers and generate employment opportunities greatly. Farmers faced problems with some BARI technologies which should be studied in depth.

# DISSEMINATION AND IMPACT ASSESSMENT OF IPM TECHNOLOGIES

## M. I. Hossain, M. A. Matin, M. N. Uddin and S. N. Alam

The study was undertaken in Comilla, Jessore and Bogra districts during 2005-2006 as part of an effort to disseminate the IPM technologies to the farmers and to assess their advantages. One experiment and one vegetable, namely bittergourd were included in the study. The experiment was fruit fly control with Bishtop and pheromone traps. A total of 51 farmers were selected for fruit fly control. The use of fruit fly control traps helped the farmers to increase their returns and income. The use of the traps in cucurbits was found to be very effective in reducing insect infestation and fruit damage. Farmers in the study areas were very much enthusiastic about the IPM technologies for vegetables cultivation.

## Abstract 2004-2005

## COMPARATIVE ADVANTAGES OF FRUIT FLY CONTROL TRAPS OVER FARMERS' PRACTICES IN CUCURBITS IN SELECTED AREAS OF BANGLADESH

#### M. I. Hossain and M. A. Monayem Miah

The study was conducted in Comilla, Jessore and Lalmonirhat districts during 2001-2004 to estimate the benefits of IPM technologies over farmers' practices. A total of 220 farmers, taking 60 from Comilla and 80 from each of Jessore and Lalmonirhat districts, were selected. Two crops, namely sweet gourd and bittergourd with two technologies, namely Bishtop traps and pheromone traps were used in the study. The farmers in the study areas were benefited from the fruit fly control traps with higher yields (sweet gourd 51-79%, bittergourd 12-27%) and higher returns (BCR 2.75 to 6.02) than the farmers' traditional practices. Fruit fly control through the use of Bishtop and pheromone traps in cucurbits was found very effective in reducing insect infestation and fruit damage. Respondent IPM technology farmers could save costs due to use less insecticide and labour in their experimental plots. Farmers in the study areas were found to be very enthusiastic about the use of Bishtop traps and pheromone traps. Therefore, the technologies should be disseminated to the farmers' fields through the involvement of researchers, extension personnel, and NGOs.

# ECONOMICS OF WATERMELON CULTIVATION IN SELECTED SALINE AND NON-SALINE AREAS IN BANGLADESH

#### M. Nazrul Islam

The study was undertaken in both saline and non-saline areas to acquire knowledge about watermelon cultivation and assess profitability from its cultivation. The study was conducted in Noakhali and Panchagarh district. A total of 20 farmers, equally represented by 10 farmers from each location, were selected for the study. A total of 6 groups, 3 from each location were constituted and discussed with them about watermelon cultivation. In most cases, cultivation practices varied between the locations. The total variable cost was Tk. 50826/ha and Tk.

43005/ha in saline and non-saline areas respectively. Gross margin was Tk. 48660/ha in saline area, while it was Tk. 58895/ha in non-saline area. Benefit cost ratio was 1.96 and 2.37 in saline and non-saline area respectively.

# ECONOMICS OF OFF-SEASON TOMATO CULTIVATION IN A SELECTED AREA OF PANCHAGARH DISTRICT

## M. Nazrul Islam

The study was conducted in a village under Boda Upazila in Panchagarh district to collect data on cultivation practices of off-season tomato and estimate the costs and return from its cultivation. A total of 10 off-season tomato cultivating farmers were interviewed. The study revealed that the additional activities were not required to produce off-season tomato in comparison with winter season tomato. In order to produce off-season tomato, the total variable cost was Tk. 31896/ha and gross margin was calculated Tk. 144832/ha with benefit cost ratio of 5.54.

# MAIZE PRODUCTION THROUGH CONTRACT GROWING SYSTEM

## T. M. B. Hossain, M. I. Hossain, M. R. Karim and A. K. M. H. Haque

This study was undertaken in Dinajpur and Lalmonirhat districts during 2004-2005 to measure the profitability of maize production under contract growing system. A total of 80 farmers, taking 40 from each district, were selected purposively. The sampled growers were the contract growers of two organizations, namely Dipshikha and Doel Agro Industry Ltd. under the two aforesaid districts respectively. The non-contract growers were also selected from the respective study areas. The study revealed that contract growers spent Tk. 4.34 to produce per kg maize on full cost basis and Tk. 3.07 on cash cost basis. They earned gross return of Tk. 6.97/kg which leaded to gross margin of Tk. 2.63 on full cost basis and Tk. 3.90 on cash cost basis. The cost of production of contract growers was 10% higher on full cost and 16% higher on cash cost basis than that of non-contract growers. The gross returns and gross margins of contract growers were also higher than non- contract growers by 23% and 55% respectively. Farmers' share under contract growing system should be higher and this should be encouraging to the farmers. For the matter, more research is needed for the improvement of the contract growing system in the study areas.

## MAIZE MARKETING SYSTEM IN SELECTED AREAS OF BANGLADESH

# M. A. Matin, M. S. Rahman, M. I. Hossain and A. K. M. H. Haque

The study was undertaken to estimate the costs margins and price spreads at different levels of marketing channels, procurement, processing, and distribution of the finished product by the feed millers as well as to find the related constraints. Four important maize growing areas, namely Bogra, Dinajpur, Chuadanga and Thakurgaon districts were selected. A total of 120 farmers, 16 farias, 40 beparies, 12 arathdars, 8 feed mills and 12 trader-cum-processors were selected. Five major channels were identified in this study of which channel-I, *Farmer – Faria-Bepari (Chantal)-Arathdar-Cum –Wholesaler- Feed Millers-Poultry Farm* ranked first. In channel-I, producers' gross share was 77 percent and net share was 75 percent per quintal of maize. Similarly, in channel-II, the farmer's gross share and net share were 80 and 78 percent of consumers' price respectively. The result reflects that there is a negative correlation between farmers' share and the number of intermediaries in the channel dominance of intermediaries, lack of scientific and technical knowledge about storage, lack of drying facilities, and not easy access to feed mills were the major problems of maize farmers. Lack of capital, adequate market information, political unrest were the major problems of the intermediaries and irregular availability of maize, high storage charge, scarcity of skilled labour and load shedding were the

major problems of the feed processors. Lack of storage facilities was also the major problem for both intermediaries and the feed processors.

# VEGETABLE MARKETING AND ITS EXPORT POTENTIALS IN BANGLADESH

M. R. Karim, M. A. Matin, T. M. B. Hossain and M. I. Hossain

The study was confined on the vegetable export marketing in Bangladesh for focusing export performance and highlights the problems of the same. The study was conducted at Dhaka, Comilla, Jessore districts and Sham Bazar of Dhaka city. Data were collected at randomly from 60 vegetable growers, 30 intermediaries and 5 exporters. Vegetable export from Bangladesh is declining since 1997-1998. A large number of vegetable items are being exported from Bangladesh in various countries, especially in Middle East countries and United Kingdom. Marketing costs of vegetable export in these countries differ mainly for higher air freight charge and phyto sanitary cost. The profit per quintal of vegetables export was Tk. 929.95 and 2590.66 for Middle East and UK respectively. Higher sales price received from UK was the main cause of higher profit. Scarcity of cargo space, flight delays, lack of proper co-ordination between the exporters and the importers etc. were the major problems in the export trade of vegetables from Bangladesh.

## GROWTH, INSTABILITY AND PRICE FLEXIBILITY OF MANGO IN SELECTED AREAS OF BANGLADESH

#### M. A. Matin, M. I. Hossain and M. R. Karim

The study was conducted in 2004-2005 to assess the growth, fluctuation, instability and price flexibility of mango in Bangladesh. Data were collected from secondary sources like Bangladesh Bureau of Statistics (BBS), Department of Agricultural Marketing (DAM) and other related agencies in Bangladesh. The growth rate of real prices of mango was increased over the period due to increasing population and higher demand of mango in Bangladesh. The nominal price increase was caused by inflationary effect. The extent of fluctuation of nominal prices was higher relative to area, production and yield fluctuation. Price flexibility analysis revealed that harvested amount and the post harvest prices has negative relationship for mango in Bangladesh. In order to improve the growth with stability in production, new thrust on research must be in the direction of evolving high-yield-cum-high-stability varieties also greater emphasis should therefore, be given for evolving short duration and weather tolerant high-yielding varieties of mango.

## SMALL-SCALE AND INDUSTRIAL PROCESSING NEEDS OF POTATO IN BANGLADESH

## M. I. Hossain, A. Al- Mamun, M. E. A. Begum and M. M. Hossain

The study was undertaken in Dhaka, Munshiganj, Chandpur and Joypurhat districts. There are some small-scale processing activities in industries and homestead levels for potato. A total of 60 homesteads were selected for interview for homestead level processing and four potato flakes and starch industries for industrial processing were selected. In industries, only potato flakes and starch are prepared and potato chips, potato shemai and potato powder are prepared in the homestead levels in a very traditional way. Diamont variety of potato is preferred for processing due to its high contents of dry matter and starch along with its lower moisture content. Bigger

size of potato (40-90 mm) is required for this processing. At homestead level processing, any variety of potato can be used. For long term use, some alternate varieties should be selected and its production system should be developed. Solution of related problems can encourage the entrepreneurs to intensify the business.

# FARM LEVEL PRODUCTION AND UTILIZATION OF SELECTED FRUITS IN BANGLADESH

# R. Islam, Q. M. Alam, A. K. M. H. Haque, M. A. Baset and M. I. Hossain

The study was conducted in Pirojpur and Bagerhat districts during 2004-2005 to measure farm level production and utilization of golden apple and sapota. Both the fruits are produced in the kitchen-garden premises. A total of 112 samples taking 60 from Pirojpur and 52 from Bagerhat district were selected randomly. Respondent farmers used intensive family labour for the production of aforesaid fruits. The cost of except establishment year of a garden was found to be high and the cost of fruit production for other years was found to be minimum. The farmers got income from third year and continued up to the death of the trees. The production of the fruits was found to be highly profitable to the farmers during the middle age of the garden. Farmers were facing some problems for producing and selling of fruits like damaged by birds, low price, insect infestation etc. The price of sapling should be reduced and quality sapling should be supplied to the farmers at the time of their needs.

# IMPACT OF FOUR CYLINDER MANUAL (PEDAL) PUMP ON PRODUCTIVITY, INCOME, AND EMPLOYMENT IN A SELECTED AREA OF BANGLADESH

Q. M. Alam, Rafiqul Islam and M. A. Baset

The study was conducted in Rajshahi Barind areas of Bangladesh to know the short and long term impact of four cylinder manual (Pedal) pump developed by Bangladesh Agricultural Research Institute (BARI). Thirty four cylinder pedal pump users and 30 non-users were selected for this study. The pump was dominated by small farms who cultivated vegetables in homestead fallow land. Simple cost and return analysis revealed that the pump was profitable in the short-run. It was found that in both private and social point of view the pump was profitable and acceptable in the short run as well as in the long run. The command area of the pump was 0.20 ha. The pump was found underutilized. For full utilization of the pump, its operation should be extended to the main field where water source is available. Nevertheless, the pump is a substitute to modern irrigation system.

## IMPACT OF POTATO RESEARCH IN BANGLADESH: AN EX-POST ANALYSIS

## M. A. Baset, Q. M. Alam and Rafiqul Islam

An ex-post rate of return analysis was conducted for estimating the returns of HYV of potato research and extension in Bangladesh using Akino and Hayami Economic Surplus Model. Discounting technique was used to assess the efficiency of potato research and extension. It was found that IRR to the total investment in HYV potato research and extension was calculated at 54%. Therefore, the HYV potato research and extension has proved to be as outstanding contributing variety for increasing potato production in Bangladesh.

# ECONOMIC ASSESSMENT OF SOIL CONSERVATION TECHNOLOGY FOR HILL FARMING IN HILL REGIONS OF BANGLADESH

## M. A. Monayem Miah and S. M. F. Islam

Jhum farming in the Chittagong Hill Tracts (CHT) region degrades soil quality due to slashing and burning of vegetation, and topsoil erosion. In order to minimize soil erosion and farmers' livelihood development, BARI scientists have been trying to disseminate Multi Strata Fruit Orchard (MSFO) technology to hill farmers since 1988. Based on the above issues, the present study was conducted at Khagrachhari district during June 2004 to find out the socio-economic profile of the Jhum farmers and to assess farmers' attitudes towards Jhum cultivation and soil conservation technology. A total of 60 MSFO households and 40 Jhum farmers were selected randomly. The study revealed the family size of Jhum and MSFO farmers were 5.10 and 4.72 respectively. More than half of the respondents were under the age group of 31-45 years. The overall literacy status of MSFO farmers was higher than that of Jhum farmers. A higher percentage of Jhum (63%) and MSFO (47%) farmers were reported to be illiterate. Most Jhum farmers (65%) were dependent on wage earnings, whereas MFSO farmers mostly (84%) depend on agriculture for maintaining their family. Both type of farmers owned equal farm size of 3.628 ha. Hill farmers grow crops under Jhum system knowing all negative impacts of this system. About 90% of the Jhum farmers were reported to adopt soil conservation technology if they were provided full financial assistance from government. On the other hand, most MSFO farmers adopted soil conservation technology for getting more financial benefit and to benefit the children in future. They wanted to expand this technology to new areas if they get further financial assistance from government. They were agreed to motivate others to adopt this technology in various ways.

## Abstract 2003-2004

## ASSESSMENT OF BARI TECHNOLOGY VILLAGE IN SELECTED AREAS OF BANGLADESH

## M. S. Rahman, M. N. Islam, Q. M. Alam, A. K. M. H. Haque and T. M. B. Hossain

The study was carried out in 12 technology villages under nine districts to find out the yield gaps of different crop varieties developed by BARI and to evaluate their performance in the crop museum plot as well as contract farmers plot during 2003-2004. The average yield gap of potato (Cardinal, Diamand, Raza, Dheera, and Multa), mustard (BARI Sarisha-9), lentil (BARI Masur-4) and Wheat (Shotabdi) was found below 15 percent in museum plot and in contract farmer plot, the yield gap of wheat was 10 percent. Potato (Cardinal, Dheera, Raza), wheat (Sourav, Gourav, Shotabdi), lentil (BARI Masur-4) chickpea (BARI Chola-5), bush bean (BARI Jhar shem-1), cowpea (BARI Felon-1) performed well in museum plot. The reasons behind performing not well varieties were supply of seed in late, insect pest infestation, and not providing training to the farmers. To reach the goal of BARI technology village theme, seed, and training should be provided to the farmer's timely as well as related scientists under each discipline must be involved with the activities.

## PERFORMANCE OF BARI RELEASED POTATO VARIETIES IN SELECTED AREAS OF BANGLDESH

#### A. K. M. H. Haque and R. Islam

The study was conducted at Rangpur and Jessore districts to estimate the adoption, profitability, input use, and production constraints of BARI potato for comparing with on-farm demonstration trials and farmers field results. The gross returns of different BARI potato varieties, namely Diamond, Cardinal and seedling tuber were higher in on-farm demonstration trials than that of farmers' field. There was significant difference of most of the explanatory variables of BARI potato production under farmers' field. The highest profitable variety was seedling tuber i.e. if they produce potato from seeding tuber followed by Diamond and Cardinal in the farmers' field. Again, Diamond variety was popular in Southern part and along with Diamond, the variety Cardinal was also popular in Northern part of Bangladesh. However, of the total potato area on an average about 79 percent area was covered by Diamond variety for both the districts. Again in Jessore about 87 percent of total potato area was covered by Diamond variety followed by Cardinal (12%) and seeding tuber (1%). But in Rangpur, the variety Diamond covered 71

percent and Cardinal 21 percent of the total potato area. The farmers of BARI potato adopter facing several problems like non availability of latest disease free variety of potato seed in time, good quality fertilizer and insecticide. High price of input was recorded as one of the major problem to the potato farmers.

# ADOPTION STATUS AND ECONOMICS OF SESAME CULTIVATION IN A SELECTED AREA OF BANGLADESH

A. N. M. Saleh, R. Islam and A. K. M. H. Haque

The study was conducted in Khulna district during 2003-2004 to measure the socio-economic impact and adoption of BARI developed sesame variety. A total of 40 farmers were identified for collecting data. The farmers in the study area received Tk. 7131 and Tk. 112945 as gross margin on full cost and cash cost basis respectively. The benefit cost ratio was 1.97. The yield was 964.29 kg per hectare which was lower than that of national average of 1.5 tones per hectare. The farmers were facing various problems to cultivate local variety. Sesame cultivation could be done much profitable by using modern varieties and modern package of technology.

# PRODUCTIVITY GROWTH AND ITS DECOMPOSITION FOR SELECTED CROPS OF BANGALDESH

### M. N. Islam and M. R. Karim

The productivity growth and its components catching-up (efficiency) and technical change were studied for wheat, pulse, oilseed (edible), summer and winter vegetable, and potato over the year 1990-2000 and 1980-2000. Data were collected from different BBS issues and other available secondary sources. It might be said that there were a diminishing progress observed in productivity in the 90's except the case of potato and the changes were mostly due to efficiency level. There was no break through in technological change in productivity for all crops. The study revealed that productivity growth for wheat, pulse, and potato was in better situation than oilseed and vegetables. It might be due to massive extension program operated by both of the research and agricultural extension sector. In fact, comparatively less importance were given to oilseed and vegetables extension work than rice, wheat, pulse and potato. Although there might be some progress, but it was confined in some pockets. For example, in the peri-urban areas, especially for vegetable, this might not reflect in the national level. There might not be possible to make a big technological break through in a short period of time in agriculture. But there are possibilities to increase productivity over time by increasing efficiency with existing technology. It might be given in reality, through massive extension work and in these regards, both research sector and agricultural extension sector should work together. Side by side input quality and reasonable price should be ensured for the farmers.

# STUDY ON SUSTAINABLE SMALL HOLDER PERI-URBAN VEGETABLE PRODUCTION WITH SPECIAL REFERENCE TO PESTICIDE USE IN BANGLDESH

A. S. M. G. Hafeez and S. N. Alam

The study was undertaken to assess the current usage of pesticide and fertilizer in vegetable production with their impact on cost and return in four areas of Jessore and Bogra districts containing 100 sample farmers. The findings of the study indicated that the cost of insecticide application in vegetable cultivation was higher in Jessore district than that in Bogra. Regarding

cost of insecticide, the results showed that pesticide cost constituted 31.6% of the total cost of brinjal cultivation in Jessore compared to 21.58% in Bogra. For bean cultivation pesticide cost registered higher in Jessore (32% of the total cost) than that in Bogra. The findings also implied that higher insecticide cost for vegetable cultivation reduced the BCR of the farmers. Apparently it seemed that gross benefit of the farmers of Jessore was higher than Bogra but in respect of benefit cost ratio the farmers in Bogra enjoyed more benefit than that in Jessore.

#### IMPACT OF POTATO RESEARCH IN BANGLADESH: AN EX-ANTE ANALYSIS

#### M. A. Baset, Q. M. Alam and T. M. B. Hossain

An ex-ante rate of return analysis was conducted using the Economic Surplus Model to estimate the Internal Rate of Return (IRR) of newly developing potato variety provento of Tuber Crops Research Centre (TCRC), BARI. The IRR to the total investment in provento variety potato research was calculated at 34%. Sensitivity analysis revealed that the estimated IRR of provento variety of potato ranges from 29 to 39%. When the supply elasticity increased by 25%, the IRR was 30%, and when the supply elasticity decreased by 25%, the IRR became 39%. The ex-ante analysis indicated that the expenditure on the provento variety of potato of TCRC for the research and development was a good investment.

## ADOPTION OF IMPROVED PULSE TECHNOLOGIES IN SELECTED AREAS OF BANGLADESH: A FARM LEVEL STUDY

# M. A. Monayem Miah, M. S. Akter, M. A. Bakr, A. K. M. H. Haque and Q. M. S. Islam

The study was conducted in six pulse growing districts, namely Jhenaidah, Kushtia, Rajbari, Faridpur, Barisal and Chapai Nawabganj in 2004 to assess the farm level adoption of improved pulse technologies with farmers' experience and attitudes toward pulse production. For each type of pulse a total of 25 farmers, 20 adopters and 5 non-adopters were selected from different upazilas for interview. The total number of sample farmers was 420. The overall adoption of pulse technologies was found to be very encouraging since 44% of the pulses farmers adopted improved pulses and 52% of the total pulse area was devoted to improved pulse production. The highly adopted varieties were BARI Mash -1, 2 and 3, BARI Masur-4 and BARI Mung -4 and 5. Indigenous mungbean had almost completely been replaced by improved varieties in most of the study areas. The adopters plowed their lands and sowed seed according to the recommendation, but did not follow the recommended sowing method and fertilizer doses. The study further revealed that different socio-economic variables like age, time spend in agricultural activities; influence of family members, influence of neighbour, and influence of DAE personnel were significantly responsible for adopting improved pulse technologies. Farmer's attitude seemed to be very positive toward pulse production since 63% of the adopters wanted to increase their pulse area for improved pulse production in the coming year. Both adopters and non-adopters encountered various constraints such as, susceptibility of pulse crop to insect and diseases, heavy rainfall and lack of quality fertilizers and insecticides. The non-adopting farmers claimed that they were not familiar with the new variety and its recommended technology packages. Moreover, lack of seed availability was also found to be a barrier to the adoption of improved pulse technologies.

# AN INVESTIGATION ON THE IMPORTANCE OF TECHNICAL KNOWLEDGE AS A DETERMINANT OF FARMERS INCOME

## Q. M. Alam and T. M. B. Hossain

The study was conducted in Dinajpur district of Bangladesh during 2002-2003 to know the importance of technical knowledge on farm income and wheat productivity. A total of 93

samples, comprising 68 farmers, 19 block supervisors, and 6 wheat scientists were interviewed. Both primary and secondary data were used for the study. The knowledge of farmers was measured by scoring method. For aggregating scores, different aspects of knowledges were given due weight. Results revealed that farmers' technical knowledge was positively associated with income and productivity. The gap was obvious when maximum possible knowledge score of 54.7 and the aggregating scores obtained 25.11 (49.90%). Production function analysis further demonstrated that technical knowledge was a significant determinant of wheat farm income, but at diminishing return. Farmers were lacking knowledge especially in the areas of wheat diseases, insects and their control measures, proper seed rate, seed purification and sowing method, source of credit, research center's activities regarding wheat production and management. It was recommended that training facilities should be further geared up with adequate booklet/leaflet providing wheat production and management knowledge and information to the farmers.

## DEVELOPMENT OF INTEGRATED SALINITY MANAGEMENT TECHNIQUES FOR THE COASTAL ECO-SYSTEM OF BANGLADESH: AN ECONOMIC ANALYSIS

#### M. Nazrul Islam

The performances of four crops, namely tomato, chili, barley, and sunflower were tested under different irrigation and planting techniques in saline soils at Char Majid, Noakhali during the Rabi season 2003-2004. Tomato and chili were grown under furrow and drip irrigation while barley and sunflower were grown only under furrow irrigation. The planting techniques followed bed and furrow and ridge and furrow along with farmers practice (flat land). Among four crops, tomato and chili found profitable and encouraging to the farmers under drip irrigation with ridge and furrow planting techniques. Although, sunflower cultivation under furrow irrigation with ridge and furrow planting techniques obtain higher yield, but economic analysis showed that not encouraging to the farmers. Cultivation of barley under all the treatments incurred losses. So, in the upcoming Rabi season, sunflower and barley may be substituted by other suitable crops with the discussion of respective person.

# PRESENT STATUS OF BARI RELEASED VEGETABLE IN THE SEED MARKET OF BANGLADESH

## T. M. B. Hossain, A. K. M. H. Haque, M. R. Karim, M. N. Islam and M. S. Rahman

The study was conducted in six districts, namely Mymensingh, Rangpur, Bogra, Jessore, Khulna, and Chittagong to know the availability of BARI released varieties in the seed market and to identify their position in respect of quantity and quality during the period of 2003-2004. Five seed shops were selected from each district and total sample size was 30. The study revealed that 97% sellers knew about Bangladesh Agricultural Research Institute (BARI) in Bengali, but only 37% sellers knew the meaning of BARI in English. Based on sellers' opinion, 51% farmer knew the variety name and 29% farmer knew the name of the seed company. Out of 39 BARI released variety, 25 varieties were available in the market and it indicated that out of 17 types of vegetables 15 vegetables seed of BARI released variety were found in the market. One hundred percent seed sellers sold the varieties Raton (Tomato), BARI Dherosh-1 (Okra), Tasakisan (Radish) among all the varieties. In this study, all the varieties of individual vegetable which are available in the market were ranked in respect of amount of sell and quality. It is found that on the basis of amount of sell, under the rank one of the BARI varieties were Tasakisan 43%, BARI Derosh-1 87%, Roton 60%, BARI Lao-1 48%, BARI Gimakalmi 68% BARI Sheem-1 33%, BARI bati sak-1 100%, Uttara 27%, BARI Lalsak-1 24%, BARI Chinasak-1 100%, BARI Motor-1 100%, BARI Puisak-1 13%, BARI Jharseem-1 100% and Laboni 50%. However 63% sellers' reported selling of BARI variety was high. Sellers faced many problems in selling BARI variety such as insufficient supply of seed, lack of good quality seed, false information of germination rate on the packet, lack of information and advertisement of new released BARI variety, unattractive packet of BADC supplied seed, and price of BADC seed was high.

#### Abstract 2002-2003

## AN ECONOMIC ANALYSIS OF PLANT NURSERY BUSINESS IN SELECTED AREAS OF BANGALDESH

#### M. A. Haque, M. A. Monayem Miah, M. A. Rashid and M. E. Haque

The study was conducted in Jessore and Gazipur districts during 2002-2003 to know the economic profitability and socio-economic problems of plant nursery business. A total of 40 private plant nursery owners, four government nurseries and six NGO nurseries were selected for the study. The study revealed that 60% private nursery owners had secondary level of education and 50% owners performed their business on lease land. More than 55% owners had 6-10 years of experience in nursery business. Nursery business had vast potentials of generating employment and income for the owners. The numbers of annual employment per acre generated by a private, government and NGO operated nursery were 1069 man-days, 717 man-days and 696 man-days respectively. The annual net return per acre for private, government and NGO nursery was Tk. 87356, Tk. 48643 and Tk. 216988 respectively. The benefit cost ratio over full-cost basis was found to be 1.50, 1.47 and 1.63 for private, government and NGO nursery in the study areas respectively. Non availability of improved seed/seedling was the first rank problem for government nurseries.

## PROFITABILITY OF MUNGBEAN INCLUDED CROPPING PATTERNS IN NORTH AND SOUTH-WESTERN REGIONS OF BANGLADESH

## M. R. Karim and M. N. Islam

The data used for this study were taken from secondary sources. The study revealed that gross return and gross margin were found to be higher for three crops pattern for all the regions and the pattern created substantial labour employment opportunities for the farmers. But for Mungbean-T. Aman - Fallow pattern, the BCR and returns to labour was found to be the highest for all regions. The farmers of the study areas reported that they did not cultivate three crops in a same piece of land for years after year because it decreased soil fertility. Generally, they practice two crop and three crop cropping pattern alternatively as reported by the farmers. As the farmers of the regions had no better alternative, they should practice three crops cropping pattern including mungbean as one of the crop.

# RESOURCE USE EFFICIENCY OF CUCUMBER PRODUCTION IN SELECTED AREAS OF BANGLADESH

#### M. S. Rahman, T. M. B. Hossain, M. N. Islam and M. A. Rashid

The study was carried out in Rangpur and Kushtia districts during 2002-2003 to measure the resource use efficiency in cucumber production. A total of 80 samples, taking 40 from each district were selected randomly for the present study. The average costs of cucumber were Tk 37956 per hectare. The cucumber farmers obtained 28780 kg yield per hectare. The gross margin was estimated to be Tk. 62448 per hectare. Benefit cost ratio was estimated at 2.66 on full cost and 8.16 on cash cost basis. The results of the study revealed that respondent farmers did not use inputs judiciously. Technical efficiency was found on an average reasonable in both the areas. Production of cucumber was found to be profitable to the farmers in the study areas. Insect-pest infestation was the main problem to the farmers for cucumber production.

## ADOPTION OF SOME BARI DEVELOPED AGRICULTURAL MACHINERY AT FARMERS LEVEL IN BANGLADESH

R. Islam, M. A. Matin, A. K. M. H. Haque, S. Ahmmed and A. N. M. Saleh

The study was conducted in Dinajpur and Kushtia district during 2002-2003 to measure the socio-economic impacts and adoption status of BARI developed agricultural machinery. A total of 22 farmers were selected as sample by taking 10 farmers from Dinajpur and 12 farmers from Kustia districts respectively. Agricultural machinery is very much favorable and acceptable by the farmers. The machines are running successfully with small interruption that is full in control of the farmers. All type of machines is creating a large amount of gross income in a year those are higher than its purchasing costs. So, these machines have a great positive role in alleviating rural poverty as well as increasing farm income and employment. According to the farmers in all locality for its intensive use. Skilled manpower should be developed for mechanized production and use. Without some troubles, BARI machinery proved success in the mechanization of agriculture to the farmers.

## PROFITABILITY AND ADOPTION STATUS OF BARI GIMAKALMI-1 IN SOME SELECTED AREAS OF BANGLADESH

### T. M. B. Hossain, M. M. Anwar, M. A. Monayem Miah and M. S. Rahman

The study was conducted in Jessore and Rangpur districts during 2002-2003 to know the profitability and adoption status of BARI Gimakalmi-1. A total of 45 farmers were selected purposively for the study. The adoption of Gimakalmi-1 at farm level was reported to be very low. The average yield of gimakalmi was found to be 18210 kg/ha. The costs of production were Tk. 19626 and Tk. 7315 per hectare on full cost and cash cost basis respectively. Net return was calculated at Tk. 35004 and Tk. 47.315 per hectare respectively on full cost and cash cost basis. Benefit cost ratios were 2 while returns to labour were Tk. 236. Low demand in the market and low market price were two major problems faced by the farmers in producing of BARI Gimakalmi-1.

## SOCIO-ECONOMIC PERFORMANCE OF BARI RELEASED WHEAT VARIETIES IN SELECTED AREAS OF BANGLDESH

## A. K. M. H. Haque and R. Islam

The study was conducted in Dinajpur and Rangpur districts to see the adoption status, profitability, inputs used, production constraints of BARI wheat at the farmers' level, and compared the findings with the results of on-farm demonstration trials. Purposive stratified random sampling was applied for data collection. A total of 77 adopter farmers were interviewed through pre-designed questionnaire. The study revealed that the gross returns of different BARI wheat varieties, namely Kanchan, Sourav, Gourab, Shatabdi and Protiva were higher in on-farm demonstration trials than that of farmers' fields. There was significant difference of most of the explanatory variables of BARI wheat production under farmers' field. The yield of different BARI wheat varieties in farmer's field was significant. The highest profitable variety was Shatabdi followed by Sourav, Gourab, Protiva and Kanchan. The farmers of BARI wheat cultivation faced several problems like non-availability of latest wheat variety seed and quality seed, good quality fertilizer, and unfavorable weather for wheat cultivation.

# SOCIO-ECONOMIC ASPECTS OF PEST MANAGEMENT PRACTICES IN VEGETABLE CULTIVATION: A PRA REPORT OF THREE VILLAGES

M. I. Hossain, M. A. Monayem Miah and M. N. Islam

Three vegetable growing villages, namely Monshasan under Comilla district, Gaidhghat under Jessore district and Barabari under Lalmonirhat district were purposively selected for the study. A total of 90 respondents, taking 30 respondents from male vegetable farmers, 30 from female vegetable farmers, and 30 from different professional groups, were selected for the study. The farmers in the study areas intensively and non-judiciously use insecticides to their vegetables fields. They believe that vegetable cultivation is not possible without insecticide use. Although they know the bad impact of insecticide spraying, they do not take any safety measure during spraying. They are looking for alternative measures for saving their crops from insect-pest infestation. Except in the homestead areas, women do not have strong involvement in vegetable cultivation in the fields. All the key informants in the study areas opined that they could play important roles in many ways to minimize the use of insecticides in the vegetable fields. The marketing system of vegetables in the study areas was traditional and inefficient which was handled by private intermediaries. Vegetables production was mostly constrained by insect-pest infestation and inadequate cash money. Finally, joint collaboration of researchers, DAE and NGOs are needed for successful implementation of IPM technologies in the farmers' fields.

#### Abstract 2001-2002

### IMPACT OF MAIZE RESEARCH AND EXTENSION IN BANGLADESH

## M. I. Hossain, M. A. Monayem Miah, T. M. B. Hussain and G. H. Kennedy

The study was undertaken during 2001-2002 to evaluate the past investment on research and extension in Bangladesh. An Economic Surplus Model with an ex-post analysis was done to estimate the returns to investment on composite varieties and hybrids of maize that have been replaced the local varieties. The growth rates of area, production and yield of maize were increased dramatically after the release of improved maize varieties. The Internal Rate of Return (IRR) to investment was calculated at 23%. During 2000-2001, about 65.70% more maize production was made available because of the farmers' adoption of composite varieties and hybrids of maize. The yield of composite varieties of maize ranged from 40 to 65% and hybrids ranged from 73 to 79% higher over the local varieties. Under various assumptions about the research and extension expenditures, the IRR ranged from 17 to 28% and benefit cost ratio from 9 to 19. The accumulated foreign exchange saving since 1992-1993 was Tk. 291.59 billion. The study indicates that the funding of maize research and extension is a good investment. Therefore, both government and donor agencies should come forward to invest in maize research and development activities in the country.

#### IMPACT OF KAZI PEYARA RESEARCH AND EXTENSION IN BANGLADESH

#### M. I. Hossain, M. A. Monayem Miah and M. S. Rahman

The study was conducted during 2001-2002 to evaluate the past investment on research and extension of Kazi Peyara (a guava variety) in Bangladesh. For the purpose, Economic Surplus Model with ex-post analysis was used to estimate the returns to improved varieties of guava that have been replaced the local/traditional varieties. Significant increase in area, production and yield of guava were observed after the release of Kazi Peyara variety. The internal rate of return to total investment in both Kazi Peyara research and extension was calculated at 29 percent. It was found that in 2000-2001, about 27.10 percent more guava production was made available

because of the farmers' adoption of Kazi Peyara variety. The potential yield of Kazi Peyara variety was 83 percent higher over the local/traditional varieties. Under various assumptions about the research and extension expenditures, the IRR ranged between 23 and 34 percent and benefit cost ratio between 12 and 31. This indicates that the funding of Kazi Peyara research and extension was a good investment. Therefore, more extension and promotional activities should be strengthened for the crop.

## RESOURCE USE EFFICIENCY OF COUNTRY BEAN PRODUCTION WITH COMPETITIVE CROPS IN JESSORE REGION

#### M. A. Haque, M. A. Rashid and M. I. Hossain

The study was undertaken in Jessore district during 2001-2002 to estimate the profitability of country bean production and compare the returns with other competitive crops. The competitive crops considered in this study were brinjal, pointed gourd, cabbage, and cauliflower. A total of 80 farmers taking 40 from each area for country bean and 120 farmers taking 30 for each competitive crop were selected for the study. It was found that the production of country bean and selected competitive crops was found to be profitable at farm level. The benefit cost ratio of country bean was found to be 2.05 on full cost basis, whereas for competitive crops, it was 2.52, 2.67, 2.42 and 2.80 for brinjal, pointed gourd, cabbage and cauliflower respectively. The magnitudes of the coefficient of country bean implied that human labour, tractor, Urea, TSP and MoP had considerable effects on gross return. Again, the ratio of MVP and MFC of human labour, tractor, Urea, TSP and MP were positive and more than one which implied that more profit could be obtained by increasing investment in these inputs. The BCR of country bean was found to be lower than the competitive crops. Since country bean is produced extensively in the study areas, better management with available inputs are urgently needed in the study areas for further development of this crop.

## PROFITABILITY AND TECHNICAL EFFICIENCY OF IMPROVED MUNGBEAN CULTIVATION IN SELECTED AREAS OF BANGLADESH

#### M. R. Karim, M. N. Islam, M. A. Bakr and M. I. Hossain

The study was conducted in Jessore, Jhenaidah and Chuadanga districts during 2001-2002 to assess the efficiency of mungbean production under farmers' practice. A total of 90 sample farmers were selected as respondents for this study. It was found that improved varieties of mungbean grown in Kharif-I season was highly profitable at farm level. The technical efficiency of mungbean at the existing level of resource use was found to be 90%. This indicated 10% higher potential for increasing mungbean yield at the present level of resource use. The issues related to the performance of this variety exhibit that economic returns from mungbean were found to be higher than that of sesame. It prevents environmental degradation through increasing soil health and provides food and nutrition security to farm families and increase employment opportunities to rural people to some extent.

## IMPACT OF FARM MECHANIZATION ON SMALL SCALE INDUSTRIES AND IMPROVING LIVELIHOODS OF RURAL LABORERS IN BANGLADESH: A CASE STUDY IN GAZIPUR AREA

## M. A. Monayem Miah and M. Serajul Islam

The study was undertaken in Sreepur Upazila of Gazipur district during the period from August 2001 to March 2002 to assess the socio-economic impacts of farm mechanization on development small-scale industries, creating employment opportunities, and changing the livelihoods of rural labourers. A total of 130 labourer households of which 40 samples of each from farm labourer and non-farm labourer, and 25 of each from woman labourer and household

women labourer's group were randomly selected for the study. Farm mechanization had both direct and indirect effects on creating employment opportunities and better income in the study areas. It also made remarkable impacts on the improvement of their industries in the study areas. It also made remarkable impacts on the improvement of their standard of living to some extent. The rural labourers experienced a considerable increase in their annual income (75 to 113%), household expenditure (27 to 141%), annual savings (100-328%), and their household asset position. The study emphasized the distribution of farm machinery to labourers' group after providing skill training for wider adoption of mechanized cultivation in the country.

# INCOME AND EMPLOYMENT THROUGH COCONUT HUSK IN SOME SELECTED AREAS OF BANGLADESH

## M. S. Rahman, M. N. Islam and M. I. Hossain

The study was undertaken in Jessore and Khulna districts during 2001-2002 to know the income and employment opportunity through producing coir from coconut husk. A total of 100 households taking 50 from each area were randomly selected from the lists for interview. The production of coir was found to be 0.87 kg/day/household. The cost and return of coir were Tk. 7.46 (Tk. 8.57/kg) and 45.70 (Tk. 52.53/kg) per day per household respectively. Gross margin and benefit cost ratio were Tk. 38.24/day/household and 6.13 respectively in cash-cost basis. This is the additional return outside their household work. The labour employment for coir production was found to be 12 hours/day/household and 446 men day/household/year. Therefore, it was observed that coir production generated income and employment opportunities in the study areas. Difficult to make fiber from coconut husk manually was reported to be the major problem of coir production.

# A STUDY OF INSECTICIDES USE IN VEGETABLES CULTIVATION AT FARM LEVEL IN SELECTED AREAS OF BANGLADESH

## M. A. Rashid, M. M. Anwar, M. I. Hossain and M. S. Rahman

The study was conducted in Jessore and Rangpur districts during 2001-2002 to identify different pest problems and practices, inputs use and economic returns at farm levels. A total of 160 samples taking 20 from each crop and from each study area were selected randomly. It was found that shoot and fruit borer for brinjal, bean borer and white fly for country bean, fruit fly for pointed gourd, and spodopetra & diamon backmoth for cabbage production were the key insect and pests in the study areas. About 98% of the farmers relied on the application of insecticides to control insect pests and 87% indicated that the insecticides use was profitable. Majority of the farmers of Jessore sprayed insecticides more than 141 times in brinjal cultivation. For other selected vegetables, farmers sprayed insecticides 40-60 times in a season. Specially for Jessore region, during the rainy season, majority of the farmers sprayed every day or every alternative day while in the winter, the spraying frequency was reduced once a week. About 98% of the insecticide users felt physical discomfort following the spraying and more than 3% were hospitalized due to different complexities related to insecticides use. Insecticide use found to be a costly input constituting 32% of the total cost of production of brinjal followed by the cost of fertilizers (26%). This study reflected the indiscriminate and irrational use of insecticides.

# PROFITABILITY AND ADOPTION STATUS OF RED AMARANTH VARIETY BARI LALSHAK-1 IN SELECTED AREAS OF BANGLADESH

T. M. B. Hossain, M. S. Rahman, M. I. Hossain and M. A. Monayem Miah

The study was conducted in Jessore, Rangpur and Kushtia districts during 2001-2002 to know the profitability and adoption status of red amaranth variety BARI Lalshak-1. A total of 75

farmers taking 25 from each district were selected purposively for the study. The average yield of vegetable and seed were found to be 4746 kg/ha and 261 kg/ha respectively. Average gross return was estimated to be Tk. 34277/ha. The cost of production was Tk. 17016 and Tk. 10493 per hectare onfull cost and cash cost basis respectively. As a result, gross margin was calculated at Tk. 17261 and Tk. 23784 per hectare respectively onfull cost and cash cost basis respectively. Benefit cost ratio was 2.01 and returns to labour were Tk. 157 per man-day. The average adoption rate of BARI Lalsak-1 was found to be 43%. Unavailability of seed in the market and low market price of vegetables were found to be the major problems in production of BARI Lalshak-1.

# ECONOMICS OF SEEDLING RISING ON FLOATING BED IN THE BEEL AREAS OF BARISAL AND PIROJPUR DISTRICTS

## R. Islam, M. N. Islam, M. R. Karim and M. I. Hossain

Seedling rising on floating bed is a very popular practice among the farmers of the low lying areas of Barisal and Pirojpur districts. It is a self-innovative and labour intensive technology. In rainy season, the farmers collect and gather water hyacinth and Khuday Pana and give size as rectangular form, which is locally called as *Dol*. Farmers prepare '*Mada*' like a small ball by Khuday Pana and kanainala. *Mada* is being placed on Dol with sprouting seed. After a certain period of time, this sprouting seed became suitable for transplanting. The farmers do not use any agricultural equipment to raise seedling in this method. The farmers get higher income by this seedling raising activities. The benefit cost ratio on cash cost basis for different vegetables, namely bottle gourd, country bean, bittergourd, brinjal and tomato were near about 3.0. It indicated that seedling rising on floating bed was very much profitable in coordination with family labour in the study areas. To earn more profit, farmers have to face some unwanted problems like natural hazards, scarcity of fund etc. Moreover, there are huge potentialities for seedling rising on floating bed in the areas.

# COST AND RETURN ANALYSIS OF BETEL NUT AT FARM LEVEL IN BANGLADESH

### S. C. Barman, M. N. Islam, R. Islam and M. I. Hossain

The study was conducted in Chittagong, Barisal, Feni and Lakshmipur during 2000-2001 to estimate the profitability of betel nut cultivation. In the study of 180 betel nut gardens, the average garden size was found to be 0.24 ha and covered 16% of total farm area. In total 34% gardens were under mixed plantation and 66% were under single nut plantation. Considering the cost of sapling and other inputs, the average establishment cost of gardens found to be Tk. 7945/ha at current prices and it was Tk. 2.64 per plant only. The average annual management cost for one hectare betel nut garden was estimated to be Tk. 3272 and gross cost, including land value was found to be Tk. 10875/ha Tk. 3.62 per plant only. Gardeners obtained an average yield of 14.46 tons/ha and 4.81 kg/tree/year. So, the return from betel nuts was Tk. 115680/ha at farm gate price and return from by-products was Tk. 483/ha. Considering management cost as variable item, the annual return over it found to be Tk. 112891.00/ha and Tk. 37.58 per tree on sample gardens. In financial analysis, over average garden life period of 38 years the BCR, NPV and IRR were estimated at 5.58, Tk. 2797473, and 51% respectively indicated that the betel nut cultivation is highly profitable.

## PERFORMANCE OF MUSTARD TECHNOLOGY ON THE EXPERIMENTAL PLOTS VERSUS FARMERS' PLOTS

A. K. M. H. Haque, R. Islam and M. I. Hossain

The study was conducted in Jessore and Pabna districts during 2000-2001 to assess the performance of improved technology of BARI mustard. A total of 80 mustard growers taking 30 adopter farmers and 50 non-adopter farmers were selected randomly for the study. Improved varieties of mustard (BARI variety) covered about 49 percent of the farmers owned land, while it was 27 percent for local and 14 percent for exotic variety. Farmers used more fertilizer for cultivation of BARI mustard than exotic and local variety where farmers used insecticides only in exotic variety 'Punjab Jota'. It might be that the local variety has more resistance capacity for insects and pests. The yield of exotic 'Punjab Jota' variety was not satisfactory compared to local variety. There was no significant difference among the average yields of local, exotic and BARI mustard varieties and similar difference was found among the BARI Sharisha-6, 8 and 9 respectively. Short duration for mustard crop is an important factor for adoption in the present cropping system. BARI Sharisha-9 and local Tori-7 is short duration crop. The variety Tori-7 (local) can be replaced by BARI Sharisha-9 with respect to yield and other important biological factors. Farmers used more but not recommended doses of Urea, TSP, MP, irrigation, insecticides and manures in BARI variety than local/exotic varieties. There was significant difference of inputs used per hectare among local/exotic and BARI mustard varieties. Among the BARI varieties, considering yield factors, BARI Sharisha-8 was performed higher than BARI Sharisha-6 and BARI Sharisha-9 respectively.

# A STUDY ON TRUE POTATO SEED (TPS)

## TECHNOLOGY AT FARM LEVEL IN SELECTED AREAS OF BANGLADESH

M. M. Anwar, M. A. Rashid and M. I. Hossain

The study was conducted in Bogra and Munshiganj districts during 2001-2002 to see the adoption, profitability, and problems of potato production by TPS technology. The study also compared the adoption and profitability of potato production using TPS and HYV potato. A total of 120 farmers were interviewed from two districts. The study revealed that TPS area was less than 1% in Bogra district, but TPS technology was not found in Munshiganj. The gross return, gross margin and benefit-cost ratio were higher in TPS technology compared to HYV potato in Bogra district. Again, the gross return, gross margin and benefit cost ratio of HYV potato were higher in Munshiganj district than Bogra due to better management and fertile land. The reasons for not producing potato using TPS by the farmers in Munshiganj were tuberlet production needs to pay more attention and labour, potato productivity by HYV seeds and tuberlet were not significantly difference, and lower storage capacity. The farmers of TPS technology were facing several problems like non-availability of TPS, problems of tuberlet production, high cost of TPS, and lack of proper training.

#### Abstract 2000-2001

## RETURNS OF INVESTMENT IN THE VARIETALS RESEARCH AND EXTENSION OF WINTER TOMATO IN BANGLADESH

#### M. A. Monayem Miah and M. I. Hossain

An ex-post rate of return analysis was conducted to estimate the returns from investments in the varietals research and extension of winter tomato in Bangladesh. Distribution of social benefits among the producers and consumers of tomato are also determined using an economic surplus model. Several discounting techniques were used to assess the efficiency of the programme. Data and information relating to market and research were obtained from published sources, scientists, extension workers, and economic sections of the respective organizations. A social

rate of return 57% and a net present value Tk. 237.01 million were estimated. This rate of return was comparable to rate of returns estimated for cereal and fibre crops in Bangladesh. The Benefit Cost Ratio (BCR) and the Present Value Research Costs (PVRC) of the programme were estimated to be 10.30 and Tk. 32.97 million respectively. Due to inelastic demand, all the benefits of the programme passed on consumers' as estimated by consumers' surpluses, whereas the producers' surpluses were negative over the years of the programme. However these results need to be clarified by further supply and demand elasticity estimations. Sensitivity analysis reveals that the IRR, BCR and NPV ranged from 44 to 70% 5.45 to 18.85, and Tk. 138.58 to Tk. 343.83 million respectively under various assumptions on the benefits and the costs of research and extension.

# IMPACT OF RADISH RESEARCH AND EXTENSION IN BANGLADESH

# M. I. Hossain and M. A. Monayem Miah

The rate of change in area, production, and yield of radish over the last 21 years were found to be 2.62, 3.62 and 1.00 percent respectively. After the release of improved varieties of radish, the area and production increased dramatically. The internal rate of return in radish research and extension was found to be 19 percent. About 13.30 percent more production of radish was made available in 1997-1998. It might be due to the farmers' adoption of the BARI-released radish varieties. Under various assumptions about the magnitude of the benefits, the research and extension expenditures, and the IRR ranged between 14 and 28 percent. This indicates that the funding of radish research and extension is a good investment.

## IMPACT OF MUNGBEAN RESEARCH AND EXTENSION IN BANGLADESH

#### M. I. Hossain and M. A. Monayem Miah

An ex-post rate of return analysis was considered to estimate Internal Rate of Return (IRR) to BARI released improved varieties of mungbean that have been replaced by the local varieties. The growth rate of area, production and yield of mungbean over the last 19 years were 7.78, 8.45 and 0.67 percent respectively. After the release of improved varieties of mungbean, the area, and production increased dramatically. The internal rate of return in mungbean research and extension was calculated at 34 percent. About 19 percent more mungbean was made available in 1997-1998. It might be due to the farmers' adoption of the BARI released mungbean varieties. The average potential relative yield of BARI Mung varieties over the local varieties was found to be 41 percent higher. The cost of production of high yielding varieties of mungbean was 49 percent higher than the local varieties. Under various assumptions about the magnitude of the benefits and the research and extension expenditures, the IRR ranged between 18 percent and 50 percent. This indicates that the funding of mungbean research and extension is a good investment.

## CROP CULTIVATION PRACTICES AND INPUT-OUTPUT RELATIONSHIP OF MAJOR CROPS IN BANGLADESH

#### M. A. Rashid, M. M. Anwar and M. I. Hossain

The study analyzed the economic aspects of major crops such as wheat, potato, maize, some vegetables, oilseeds and pulses. A total of 1980 growers were randomly selected from Dinajpur, Rangpur, Bogra, Rajshahi, Naogaon, Khulna, Jessore, Jhenaidah, Faridpur, Pabna, Tangail, Dhaka and Comilla districts during 1998-2000. The crops studied in the selected districts were found profitable to the farmers. The benefit cost ratios varied from 1.18 to 2.80 on full cost basis. The return to labour was found to be the highest in potato (Tk. 406/day) and the lowest in

mustard (Tk. 87/day). Multiple regression analysis revealed that the yields were greatly influenced by the use of human labour, animal labour, seed, and application of fertilizer. These factors were directly or jointly responsible for the variation of these crop yields. The study also revealed that the crop growers faced various types of problems, such as, high price of chemical fertilizer & insecticides, non-availability of quality seed/seedlings, low market price of products at harvest period, and lack of storage facilities.

## ASSESSMENT OF BLACKGRAM VARIETY BARI MASH-1 VERSUS FARMERS' TRADITIONAL PRACTICES IN SOME SELECTED AREAS

M. N. Islam, M. R. Karim, M. I. Hossin and Q. M. S. Islam

The study was conducted to evaluate the performance of blackgram variety BARI Mash-1. Data were collected from two upazilas (Chapai Nawabganj Sadar and Shibganj) of Chapai Nawabganj district. A total of 98 farmers (49 demonstration plots and 49 non-demonstration farmers) were interviewed to fulfill the objectives of the study. The study revealed that there was no significant difference in agronomic practices and inputs use for blackgram cultivation both for BARI Mash-1 and local variety. But in the case of yield, significant difference was found between BARI Mash-1 and local variety. The yield was found 35 percent higher for improved variety than local variety of blackgram. Results of multiple regression models using dummy variable showed that BARI Mash-1 variety had a positive significant impact on production of blackgram could be replaced by BARI Mash-1 and per hectare return from this variety would be increased by Tk. 4542.

# PERFORMANCE OF BARI PULSE TECHNOLOGY ON EXPERIMENTAL PLOTS VERSUS FARMERS' PLOTS

## A. K. M. H. Haque, M. R. Karim and M. I. Hossain

The study was conducted in Jessore and Narail districts to compare the performance of BARI pulse technology between experimental and farmer's plots. A total of 60 Masur farmers were randomly selected among which 30 from non-adopter and 30 from BARI masur adopters. The improved lentil covered about 37 percent of the farmers' total owned land where the local variety occupied only 20 percent. Farmers used higher seed rate in local variety than improved variety as per recommendation seed rate, but the yield per hectare was lower than that of yield realized from research trials and demonstration plots. But the returns to seed were higher. Due to poor management practices in farmers' fields, the yields were lower for all varieties. So, there is scope for further improvement to increase per hectare yield in on station trials. In farmers' fields, farmers not did not apply the recommended dose of Urea, TSP and Potash but with the lower dose of those fertilizer farmers add Gypsum and manure upon the fertilizer recommended by the scientists. These types of practices were done by the farmers in all cases, namely improved and local varieties. But returns to Gypsum were found higher (Tk. 703) for local than improved (Tk. 703) varieties. In the case of returns to manure, the higher returns (Tk. 65) were obtained by improved variety than local (Tk. 5) variety. Again, the farmers did not apply insecticides along with other fertilizers to their crops.

# RESOURCE USE EFFICIENCY AND PRODUCTIVITY OF POTATO FARMS IN SELECTED AREAS OF BANGLADESH

## S. C. Barman, R. Islam, and M. I. Hossain

In order to investigate the level of resource use efficiency and productivity of potato farms, the study was conducted at farmers' level in two districts, namely Bogra and Munshiganj with a

sample of 90 potato growers applying Cobb-Douglas production function model. The functional analysis revealed that some technological inputs such as Urea, TSP and manure were over utilized whereas other factors like human labour, seeds, power tiller and animal power, irrigation facilities, MP and pesticides were under-utilized, and applied in potato production more rationally. Results of the study also inferred that the potato farmers, although economically more rational in some cases were not using resources at an optimum level. Uneconomic utilization of factors on potato farms resulted in decreasing productivity in scale with less than unit production elasticity. So, the potato farmers in Bangladesh will have to make adjustments in the existing use of various input factors and directing to an optimization for increasing their income from potato production.

# ADOPTION STATUS OF GUAVA VARIETY KAZI PEYARA IN SELECTED AREAS OF BANGLADESH

## M. S. Rahman, M. I. Hossaion and M. A. Monayem Miah

The study was undertaken to know the level of adoption of improved management technologies and profitability of guava variety Kazi Peyara production in Natore and Gazipur districts. Results revealed that different agronomic practices and use of inputs were found to be lower than the recommendation. The adoption level of improved technology of Kazi Peyara was found medium. The production of Kazi Peyara was found to be very remunerative to the farmers in the study areas. Benefit cost ratios were estimated at 4.77 and 4.53 in Natore and Gazipur districts respectively. Severe attack of die-back/wilt was identified as a major constraint to Kazi Peyara production.

# POST HARVEST PRACTICES AND LOSSES OF BRINJAL IN SELECTED AREAS OF BANGLADESH

## M. A. Haque, M. A. Rashid, M. A. Monayem Miah and M. I. Hossain

The study was conducted in Jessore, Bogra and Jamalpur districts to find out the post-harvest activities involved in brinjal production and marketing, and to estimate losses incurred at farmers' and traders' level. A total of 90 farmers and 150 traders were randomly selected for interview. The post-harvest activities practiced by the farmers and traders were harvesting, washing, cleaning, grading, packaging, transporting, and buying and selling of brinjal. The post-harvest losses were estimated to be 16, 5 and 10% at the levels of farmers, beparies and retailers respectively in the study areas. In different marketing channels, these losses ranged from 24 to 29% of the total volume of brinjal transaction. The involvement of women in post-harvest activities was found to be very negligible.

# STUDY ON THE POTATO SEED TECHNOLOGY AT FARM LEVEL IN BANGLADESH

#### M. M. Anwar, M. A. Rashid, M. R. Karim and M. I. Hossain

The study was conducted to examine the adoption and constraints of true potato seed technology at the farmers' field. A total of 160 farmers and 40 farmers from TPS and 40 HYV potato farmers from each district were selected. It also compared the cost and return of HYV potato production from TPS technology. The study showed that the adoption rate of TPS technology was lower than HYV potato. Gross return was also higher in TPS technology compared to HYV potato. Influence of explanatory variables on probability of adoption for TPS showed that, TPS technology was positive and significantly related with contact extension service and training on tuberlat production. The farmers of TPS technology were facing several problems. Their major problems were non-availability of TPS, lack of training facility, and problems of tuberlat production.

## ECONOMICS OF VEGETABLE CULTIVATION UNDER KANDI SYSTEM IN LOW LYING AREAS OF BARISAL AND PIROJPUR DISTRICTS

M. R. Karim, R. Islam, M. N. Islam and M. I. Hossain

Vegetable cultivation under Kandi system in low laying area of Barisal and Pirojpur regions is very popular among the farmers. Two upazilas, namely Banaripara under Barisal district and Nazirpur under Pirojpur district were selected for this study. Data were collected through survey method. This technology was developed by the local farmers and practiced hereditarily since long before. Kandi is a raised bed surrounded by deep furrows where vegetable are grown insensitively. Most of the farmers cultivated vegetable (e.g. snake ground ribbed gourd, cucumber, bitter gourd etc.) normally, requiring trellis along the border of Kandis. Usually more crops were grown intensively in Rabi than Kharif seasons due to favorable weather. However, some crops, mostly cucurbits, overlapped from one season to another season because of their photo insensitivity. Locally made hand implements used to do tillage operation. About one meter long sickle was widely used for tillage, weeding, mulching, and other operation. The estimated benefit cost ratio for the study for both areas were near about 2. So, the Kandi system was very much profitable farming in Barisal and Pirojpur regions and could be extended among the farmers widely.

# MARKETING OF MAJOR FRUITS IN BANGLADESH

#### M. A. Haque and M. I. Hossain

The study was undertaken to analyze the marketing system of major fruits such as pineapple, banana, mango, guava, jackfruit and papaya both at farmers' and intermediaries' level. Based on the concentration of fruit production, 15 districts, namely Tangail, Moulvibazar, Rangamati, Mymensingh, Narsingdi, Bogra, Joypurhat, Jessore, Rajshahi, Chapai Nawabganj, Meherpur, Pirojpur, Chittagong, Gazipur and Pabna were selected for the study. A total of 380 farmers taking 20 farmers from each area for each fruit, and 570 intermediaries taking 30 intermediaries were selected randomly from primary and secondary markets for the study. Four major channels were identified in fruits marketing system among which the channel-I (Farmer-Faria-Bepari-Arathdar-Retailer-Consumer) was ranked first. The production of selected fruits was found to be profitable to the farmers. High price gap was found between farmers and consumers level at peak harvesting period. The post-harvest losses of pineapple, banana, mango, guava, jackfruit and papaya were 13.8, 19.9, 18.7, 6.4, 10.9 and 21.7 percent respectively of total fruit transaction. Low price, high transport cost, perishability, price instability, inadequate capital, lack of processing industry, and inadequate storage facility were the major marketing problems encountered by both farmers and intermediaries.

## MARKETING AND POST-HARVEST PRACTICES OF GLADIOLUS FLOWER IN SELECTED AREAS OF BANGLADESH

M. S. Rahman and M. I. Hossain

The sudy was conducted in five districts, namely Jessore, Kushtia, Khulna, Satkhira and Dhaka to evaluate marketing and post-harvest practices of gladiolus. A total of 55 intermediaries were selected randomly for this study. Gladiolus flower reached to consumers from farmers through a number of channels in which Farmer-Faria-Bepari-Retailer-Consumer was found to be most important. The quantities sold varied in different months specially its demand were found higher during different occasions and social functions. The prices were found higher during these periods. The selling price of gladiolus flower varied from Tk. 120 to Tk. 360 per 100 sticks. Marketing margins and profits were found to be higher for retailers than bepari, but the volume of transactions were found much higher for beparis. Farmers' net share was found within 29 percent. Different post-harvest practices were observed for gladiolus flower and its loss ranged from 2 to 10 percent. Creation of marketing facilities with better transportation and fair price can sustain the market of the crop.

## MARKETING OF VEGETABLE AND ITS IMPLICATIONS FOR PEST MANAGEMENT PRACTICES

## M. I. Hossain, M. A. Monayem Miah, M. N. Islam and M. A. Baset

The study was conducted in four districts, namely Gazipur, Dhaka, Comilla and Jessore to assess the price and marketing of vegetable and its implications for pest management. A total of 586 farmers and 2304 intermediaries were randomly selected for interview. 43% and 36% of the traders mentioned that vegetables were affected by insects and diseases respectively. The vegetables were also affected by bad handling and transportation which was reported by 13 percent of the traders. There were other causes like delay selling, more ripen and rotten. It was observed that the prices of blemish vegetables were always found less than the blemish-free vegetables. That is, there is always loss for the farmers as well as for the traders due to less prices for blemish vegetables. These blemish vegetables are mainly affected by the insects and diseases. This loss varied from 12 to 35 percent for different vegetables. This situation is found when the farmers are using lot of spraying in their vegetables. If the farmers get higher prices for these good vegetables, they can minimize the loss of blemish vegetables. For the purpose, the awareness should be developed among the farmers, traders and consumers.

## AN ANALYSIS OF MAIZE MARKETING SYSTEM IN SELECTED AREAS OF BANGLADESH

## M. A. Matin, M. S. Rahman and A. K. M. H. Haque

The study was undertaken in some selected areas of Bangladesh to estimate the costs, margins, and price spreads at different levels of maize marketing, procurement, processing, and distribution of the finished product by the feed processors as well as to find out the problems of farmers and traders of maize. Five major channels were identified of which channel-I (Farmers – Faria-Bepari – Arathdar - Cum- Wholesaler- Feed Mill/Processor -Poultry Farm) ranked first. In channel-I, producers' gross share was 78.24 percent and net share was 76.44 percent per quintal of maize. Similarly, in channel-II, the farmers' gross share and net share were 80.14 and 78.28 percent of the consumers' price respectively. The results reflected that there was a correlation between farmers' share and the number of intermediaries in the channel Net profit of trader-cum-processors and feed millers was Tk. 19.72 and Tk. 27.68 per quintal respectively. Dominance of

intermediaries, lack of scientific and technical knowledge about storage, lack of drying facilities, and limited access to feed mills was the major problems faced by the maize farmers. Lack of capital, adequate market information, and political unrest were the major problems of the intermediaries. Irregular availability of maize, high storage charge, scarcity of skilled labour, and local shedding were the major problems of the feed processors. Lack of storage facilities was also a crucial problem faced by the intermediaries and feed processors.

## MUSTARD-BASED CROPPING PATTERNS AND ITS IMPACT ON FARMERS' INCOME AND EMPLOYMENT

#### G. H. Kennedy and M. R. Karim

The study was conducted in two upazilas, namely Kahaloo and Adamdighi of Bogra district, where mustard was introduced in the existing cropping patterns in the last couple of years. A total of 95 sampled farmers producing mustard were selected randomly taking 45 from each upazila. Respondent farmers obtained per hectare yield of 1052 kg from mustard cultivation. The average cost of cultivation was Tk. 8537 per hectare. Gross margin was Tk. 8777 and BCR was 2.04 which implied that the cultivation of mustard was profitable at farm level. With the adoption of mustard as an additional crop in the existing cropping pattern in the study areas, income of the farmers increased significantly. The new crop also led to generate employment of the rural labourers in those areas. Modern technology packages can lead the increased yield of mustard and enhance income and employment. Two major crops, namely T. Aman and Boro were grown in a considerable amount the plant in the study areas. If it is possible to utilize the turnaround time between the two crops by short-duration mustard crop, there is an ample scope to increase the farm income as well as employment opportunities.

## STUDY ON POST-HARVEST MANAGEMENT OF POTATO AT FARM LEVEL IN SELECTED AREAS OF BANGLADESH

#### G. H. Kennedy and M. R. Karim

The study was conducted in Bogra and Joypurhat districts to find out the post-harvest management of potato. A total of 77 potato producing farmers were randomly selected as the sample for the study. The study revealed that about 60% farmers kept potato directly on the ground after they had taken from the field, about 39% farmers spread the potato nakedly over the bamboo made Macha and only 1% farmers kept potato in the gunny bags on the ground. After harvest the crop and before sell, 95% farmers used to grade the potato for better market price. Farmers incurred loss due to improper post- harvest management practices. Farmers used to practice all the post harvest management operations in a traditional manner. They were not trained on post-harvest handing of this crop to reduce losses. Potato is produced in bulk and it's very difficult to store all the produce in their farm houses at a time. Again farmer have very limited access to store their potato in the cold storage. So finding no storage places farmers are compelled to sell their produces just after harvest which causes financial loss for them. Instead of suggesting establishment of new cold storage by the private sector, cooperative cold storage should be established to reduce the losses at farmers' level.

#### Abstract 1999-2000

## CROP CULTIVATION PRACTICES AND INPUT-OUTPUT RELATIONSHIP OF SELECTED CROPS IN BANGLADESH

#### M. A. Rashid, M. M. Anwar, M. Ahmed and M. I. Hossain

The study was conducted in Dinajpur and Jamalpur for wheat, Rangpur and Savar for maize, Rangpur and Bogra for potato and Jessore and Tangail for mustard cultivation during 1998-1999 and 1999-2000 to ascertain the economic profitability and resource use efficiency and interrelationship between inputs and outputs of the selected crops. A total of 180 farmers were randomly selected for each crops and taking 90 from each corresponding area. The results revealed that respondent farmers received higher returns from all selected crops in the study areas. The multiple regression analysis showed that the coefficients for human labour, seeds and Urea for wheat, human labour, seeds, Urea, TSP and MP for maize, human labour, seeds, MoP and irrigation for potato and human labour and seeds for mustard were found to be significant. The ratio of Marginal Value Product (MVP) and Marginal Factor Cost (MFC) of the selected variables were found to be positive and greater than one. This indicated the economic use of the inputs for the crops included in the study.

## ASSESSMENT OF IMPROVED MUNGBEAN TECHNOLOGY VERSUS FRAMERS' TRADITIONAL PRACTICES IN SELECTED AREAS OF BANGLADESH

### Q. M. S. Islam, M. N. Islam and M. R. Karim

The study was undertaken in Jessore, Jhenaidah and Chuadanga districts to determine the performance and present status of BARI mung cultivation. Several block demonstrations were conducted by the LBMPP in the farmers' fields to popularize the developed technologies of mungbean. Four improved varieties of mungbean were demonstrated in the farmers' fields in the study areas. It was found that BARI mung-4 performed better in terms of yield and profitability among the improved varieties. The average yield of BARI mung-4 was 1305 kg/ha followed by BARI mung-2 (1241 kg/ha). The gross margin (Tk. 19886/ha), benefit cost ratio (2.46), and returns to labour (Tk. 220/day/person) were found to be higher for BARI mung-4 compared to other varieties of mungbean. Due to drought in 1998-1999, the demonstration plots of Southern regions (Barisal, Patuakhali and Jhalakati) were totally damaged. So in these reasons, farmers' attitude was found negative towards mungbean cultivation. The main constraint for the expansion of BARI mung varieties was non-availability of quality seeds, difficulty in harvesting, and more labour requirement. More motivational trials in the farmers' fields were suggested for BARI mung cultivation.

# REAL ADOPTION IMPACT MEASURE OF POTATO TECHNOLOGIES ON PRODUCTION AT FARMERS' LEVEL

# S. C. Barman and M. N Islam

The study was conducted in Comilla to determine the real adoption of potato technologies in the farmers' fields. In real adoption impact measures of potato technologies, it was observed that due to various socio-economic factors farmers were deviating from the recommendations. The degree of deviations observed in the farmers' practices from the standard recommendations for potato were used while deriving the real impact of adoption of technology on yields. Real Adoption Impact (RAI) has been introduced keeping in view that mere use of any technology should not be proper to consider the adoption of that technology. Expected yields are obtained for a given level of adoption of technologies i.e., for a given value of RAI using fitted regression equation of observed potato yield on RAI. Expected yield gap and observed yield gap were calculated for useful comparison and found the expected yield-gaps of diamand potato were very close to the observed yield-gaps. The farmers in the study areas were not adopting potato

production technologies completely and properly in real operations. Using real adoption impact measure, it will be possible to predict the yield of potato in advance once one knows the farmers' capacity to follow the recommendations, and consequently suggestions for higher yield of potato can be made by the extension workers effectively.

## ADOPTION AND PROFITABILITY OF HYV CHICKPEA IN THE HIGH BARIND TRACT OF BANGLADESH

#### Q. M. S. Islam, M. R. Karim, M. O. Ali and M. M. Rahman

The study was conducted in Barind area comprising of three districts, namely Rajshahi, Chapai Nawabganj and Naogaon during the Rabi season to assess the adoption of HYV chickpea cultivation and agronomic practices followed by the growers and to ascertain the cost and returns of chickpea cultivation. The study revealed that 65 percent of the sampled farmers were found to adopt HYV chickpea and 60 percent of the total area was occupied by HYV. The adoption of HYV chickpea was found less in Naogaon district. Major reasons in favour of the cultivation of the improved varieties were high yields, attractive colours, large size, and high price. Fifty-five percent of the sampled farmers cultivated chickpea within November. Yield was increased about more than 200 kg/ha. Gross margin was Tk. 18532/ha and Tk. 14125/ha on cash cost and full cost basis respectively. Benefit cost ratio was 3.13. Chickpea production, seed preservation and per capita consumption were found increasing trend. Farmers were fond to use mostly jute bags and polythene bags for chickpea storage.

## AGRO-ECONOMIC PROFILE OF ELEPHANT FOOT YAM PRODUCTION IN SOME SELECTED AREAS OF BANGLADESH

## M. R. Karim and A. K. M. H. Haque

The study was conducted in Pabna, Satkhira and Chittagong districts to find out the existing practices of elephant foot yam production at farm level. A total of 120 growers were randomly selected taking 40 from each location. The results revealed that the production technologies used for yam cultivation was more or less similar in all the study areas. All the sampled farmers cultivated local variety of yam and the method of planting was also found similar in all study areas. On an average, the spacing for planting was found to be 43 x 43 inches. The farmers applied ash, Urea, cowdung, TSP and MoP at the rate of 8 t/ha, 13 t/ha, 144 kg/ha, 167 kg/ha and 48 kg/ha respectively. These were applied in two splits as basal and top-dressing. The average yield of foot yam was estimated to be 21 t/ha. Per hectare total cost and gross margin for yam production was found to be Tk. 77033 and Tk. 61458 respectively. The benefit cost ratio was calculated as 1.79.

## HYV POTATO PRODUCTION IN SOME SELECTED AREAS OF BANGLADESH

#### M. M. Anowar and S. Akhter

The study was conducted in Rangpur, Bogra, Jessore, Munshiganj and Comilla districts to know the socio-economic conditions of potato growers and to estimate the profitability of potato cultivation. A total of 150 farmers were randomly selected taking 30 from each study area. The results revealed that potato cultivation was profitable at farm level and most of the farmers in the study areas cultivated potato on commercial basis. Potato is a short duration crop and it is easily fits in cropping patterns. Rice-Rice-Potato was the most popular cropping pattern found in the study areas. The study showed that the growers of Comilla, Munshiganj and Jessore districts used higher quantity of inputs than Rangpur and Bogra. Gross return from potato was found higher in Munshiganj (Tk. 1676/ha) and lower in Bogra (Tk. 103536/ha). Lack of quality seeds, high cost of fertilizers, lack of cold storage facilities, and lack of extension service were the major constraints for potato production in study areas.

#### **MARKETING OF MAJOR FRUITS IN BANGLADESH**

M. A. Haque, M. Ahmed and M. I. Hossain

The study was conducted in Rajshahi, Chapai Nawabganj and Meherpur districts for mango; Mymensingh, Narsingdi, Bogra, Joypurhat and Jessore for banana to determine the marketing systems of these fruits. The study highlighted some baseline information mainly on mango and banana production and its marketing practices. The annual production of mango was 25 t /farm. Its production cost and marketing cost were Tk. 2429/ton and Tk. 785/ton respectively. Net return was Tk. 15555/ton and benefit cost ratio was 5.84. Marketing margins of faria, bepari and retailer were Tk. 2513, Tk. 4536 and Tk. 4312 per ton respectively and profits were Tk. 1503, Tk. 1039 and Tk. 2141 per ton respectively. The post-harvest loss of mango was 158 kg/ton which was 16% of the total production. On the other hand, the production of Sagar variety of banana was 39 ton/farm. The production and marketing cost of Sagar were Tk. 3206 and Tk. 750/ton respectively. Its return was Tk. 5004/ton, benefit cost ratio was 2.26. The production of Sabri per farm was 36 ton. The production and marketing cost of Sabri variety of banana were Tk. 3409 and Tk. 780 per ton respectively. Its net return was Tk. 6711/ton and benefit cost ratio was 2.60. Marketing margins of faria, bepari and retailer for Sagar variety were Tk. 1213, Tk. 3220 and Tk. 3313 per ton respectively and profits were Tk. 308, Tk. 650 and Tk. 1417 per ton respectively. For Sabri banana, marketing margins of faria, bepari and retailer were Tk. 1300, Tk. 4400 and Tk. 3400 per ton respectively and profits were Tk. 436 and Tk. 676 and Tk. 1504 per ton respectively. The post-harvest loss of Sagar variety production was 148 kg/ton whereas it was 115 kg/ton for Sabri variety. Four major channels were identified for mango and banana marketing. Price instability, perishability, inadequate capital, high transport cost, low price, lack of processing industry, and imperfect marketing system were the major problems existed in mango and banana marketing system in Bangladesh.

#### Abstract 1998-1999

# SOCIO-ECONOMIC PERFORMANCE OF IMPROVED TECHNOLOGY OF WHEAT PRODUCTION

#### A. K. M. Habibul Haque

The study was conducted to assess the performance of improved technology of wheat production. Data were collected from on-station demonstration trials of Wheat Research Center (WRC) of BARI. Only labour data were taken from Agricultural Economics Division of BARI which was collected from primary sources. Six promising varieties of wheat e.g. *Kanchan, Protiva, Akbar, Gourab* and *Sourab* were tested on-station demonstration trials against the traditional variety *Sonalika*. The highest grain yield under irrigated condition (4.44 t/ha) was observed from the variety *Gourab* which was identical with *Akbar* (4.26 t/ha), *Sourab* (4.11 t/ha), *Protiva* (3.91 t/ha) and *Kanchan* (3.78 t/ha). Cost of production of wheat per hectare under irrigated condition was Tk. 15638, Tk. 15638, Tk. 15617, Tk. 15617, Tk. 15617, and Tk. 15767 on the basis of total variable cost for *Gourab, Sourab, Kanchan, Protiva, Akbar* and *Sonalika respectively*. Where per hectare gross return were Tk. 39960, Tk. 38990, Tk. 38340, Tk. 35190, Tk. 34020 and Tk. 28890 for *Gourab, Sourab, Akbar, Protiva, Kanchan* and *Sonalika respectively*. The per hectare gross margin were Tk. 24322, Tk. 21352, Tk. 18403, Tk. 19573,

Tk. 22723 and Tk. 13099 on the basis of full cost basis respectively. The lowest benefit cost ratio was 0.39 on full cost basis for *Gourab* variety under irrigated condition and under rainfed condition, the lowest benefit cost ratio were obtained from variety *Sourab* (0.33) and *Gourab* (0.34).

#### PINEAPPLE MARKETING IN SELECTED AREAS OF BANGLADESH

#### M. A. Haque and M. Ahmed

The study was conducted in Tangail, Moulvi Bazar and Rangamati districts in the year 1998-1999 to know the marketing channel, post-harvest loss, marketing margin and production, and marketing problems of pineapple. A total 150 farmers taking 50 from each area, 105 traders from three primary markets and 90 traders from three secondary markets were selected randomly. Results revealed that the pineapple area per farm was 0.77 ha, the average yield of pineapple was 15.31 tons per ha. The yield was found highest in Tangail due to good variety, soil fertility, and proper management. Major part of pineapple was sold during the harvesting period due to their cash requirement and lack of storage facility. The cost of production of pineapple was Tk. 1071 per ton. The production cost was highest in Rangamati due to higher human labour cost. The marketing cost of pineapple at farm level was Tk. 528 per ton. Net return of pineapple was Tk. 1385/ton and benefit cost ratio was 1.86. Five major channels were identified for pineapple marketing in which faria, bepari, arathdar and retailers were involved. The average cost of marketing for faria, bepari and retailer were Tk. 419, Tk. 739 and Tk. 324 per ton respectively. Marketing cost was the highest for bepari (Tk. 739/ton) due to transport cost (Tk. 343), arathdar's commission (Tk. 184/ton), and the cost of loading and unloading (Tk 66/ton) of pineapple. The highest margin was obtained by bepari (Tk. 1026) followed by retailer (Tk. 988/ton), and faria (Tk. 745/ton). On the other hand, profit was highest for retailer (Tk. 663/ton) followed by faria (Tk. 326/ton) and bepari (Tk. 302/ton). Low price, price instability, inadequate capital, perishability and high transport cost were the major problems of pineapple marketing.

# PRODUCTIVITY, VARIABILITY AND TECHNOLOGY OF CARROT PRODUCTION AT FARMERS' LEVEL

#### M. R. Karim and M. Ahmed

The study analyzed carrot (*Daucas carota*) production technology and its economic performance. The survey was conducted at four villages, namely Varaimari, Mirkamari, Charmirkamari and Kalarkandi of Ishurdi Thana under Pabna district. A total of 77 carrot producers were selected at random for interview. The average yield was estimated at 13.52 tons/ha. Per hectare gross cost of producing carrot was Tk. 47030. Per hectare gross return and gross margin were Tk. 118841 and Tk. 79325 respectively. Benefit cost ratio and returns to labour were found to be 2.53 and Tk. 200 respectively. The more use of animal labour, fertilizer, manure, and oilcake were found to be negative implied that variability of yield decreases with the increase use of inputs while seed, human labour, and insecticide were found to be positive implied that variability of yield increases as these inputs use increase.

# AN OVERVIEW OF POTATO PRESERVATION TECHNIQUES IN RANGPUR DISTRICT

## M. M. Anowar, M. A. Rashid and M. Ahmed

The study was conducted at Rangpur district to know the different types of potato preservation methods including its cost and return. A total of 30 farmers, taking 10 farmers each from small, medium and large groups, were selected purposively. The study revealed that after harvesting of potato, the farmers used two types of storage methods i.e. indigenous methods and cold storage method in which they preferred indigenous preservation method. This method resulted quick

delivery of the products in the markets which in turns helped the farmers supply of cash money for boro production. In the indigenous methods, small, medium, and large farmers stored 1760, 5840 and 8950 kg of potato per farm and in the cold storage methods 350, 3580 and 7530 kg per farm respectively. Indigenous preservation methods were on the ground under shade, on the Macha under shade and mixed with sand under shade. The highest number of farmers used on the ground under shade preservation technique (70%), whereas only 10 percent farmers used mixed with sand under shade preservation technique. The farmers preserved their potato during March to 1<sup>st</sup> April and they started to sell from the last week of April to the end of June. The highest percent of farmers (70%) sold their potato in the month of May. Forty percent of the large farmers sold their preserved potato in the 1<sup>st</sup> and 2<sup>nd</sup> week of June. Total preservation cost was found highest for large farmers due to damage of potato (23 kg/quintal). Preservation benefits for small, medium and large farmers were found to be Tk. 133, Tk.162 and Tk.166 per quintal respectively.

# PERFORMANCE OF WHEAT PRODUCTION IN SALINE AREA OF FENI DISTRICT-A CASE STUDY

#### M. Nazrul Islam

The study was conducted at Sonagazi to assess the profitability, constraints, and farmers' attitude towards wheat production. The scarcity of quality irrigation during the dry season limits the cultivation of Boro rice and Rabi crops in Sonagazi. In the Rabi season, soil rises out, deep and wide cracks develop, and surface soil become very hard in that area. As a result, land preparation activities become very difficult in the dry season. Moreover, after harvesting of transplanted Aman rice, the turnaround time to catch the optimum time for Rabi crop is very short in the region. There were some problems in the area which limit the expansion of wheat cultivation. The average yield was found to be very low in the study area (1630 kg/ha in irrigated plots and 1401 kg in non-irrigated plots). The average gross return was Tk. 17320 and Tk. 15080 per hectare in irrigated and non-irrigated plots respectively. About 65% of the farmers had intention to increase wheat area due to its profitability. Wheat can be grown profitably with irrigation and other technology package.

# PRICE ANALYSIS OF DRY AND GREEN COCONUT AND COCONUT OIL IN BANGLADESH

#### S. C. Barman

The study was undertaken to analyze the price of dry and green coconut and coconut oil in Bangladesh. The data on wholesale prices of dry coconut, green coconut, and coconut oil etc. were collected from Department of Agricultural Marketing (DAM), Ministry of Agriculture and also from several reports of the Bangladesh Bureau of Statistics (BBS), Ministry of Planning. The normal price trend of coconuts and coconut oil over a period of years has increased progressively. Year to year fluctuation of prices was high with coefficient of variation ranges from 18 to 29 percent showing the critic behaviour of prices of coconut and coconut oil. The Compound Growth Rates (CGR) was 5.51, 6.26 and 7.96 percents for green coconut, dry coconut and coconut oil respectively. However, the quantity of coconut oil used has decreased with a negative annual growth rate around 14 percent and the coefficient of variation was 41 percent. This negative trend in coconut oil utilization reflects the effects of higher price and availability substitutes of it mainly in manufacturing industries in the country.

## ECONOMICS OF VEGETABLE SEED PRODUCTION IN SOME SELECTED AREAS OF BANGLADESH

#### S. M. Golam Hafeez

The study was undertaken in Jessore, Rangpur and Tangail districts to find out the socioeconomic characteristics of seed producers, profitability of seed production, and its related constraints. A total of 90 vegetable seed producing farmers were selected randomly taking 30 farmers from each upazila. The study revealed that the small farmers used 19.65% of their lands for seed production which was found higher than other two categories. The cost of per kg seed production of radish, tomato and cauliflower were Tk. 24137, Tk. 29321 and Tk. 80225 respectively. Net return from per hectare seed production of radish, tomato and cauliflower were Tk. 20955, Tk. 86808 and Tk. 86787 respectively. Seed producers faced problem of selling their seeds in the markets and they were bound to sell these to the traders with low price. They also encountered problem of getting institutional credit support for seed production purposes.

## ASSESSMENT OF IMPROVED LENTIL TECHNOLOGY VERSUS FARMERS TRADITIONAL TECHNOLOGY IN SELECTED AREAS

#### Q. M. S. Islam, M. R. Karim, M. N. Islam, and M. A. Bakar

The study was conducted in six districts, namely Kushtia, Meherpur, Jessore, Jhenaidaha, Faridpur and Rajshahi to know the performance of selected BARI varieties of lentil, farmers' attitudes and its related constraints. Four varieties of lentil i. e BARI Masur-4, BARI Masur-3 and BARI Masur-2 along with local varieties were demonstrated in the farmers' fields. BARI Masur-4 performed better in terms of yield and profitability among the four varieties. On an average, BARI Masur-4 gave the higher yield (1130 kg/ha) followed by BARI Masur-3 (992 kg/ha), and BARI Masur-2 (981 kg/ha). The yield was about 43% higher in BARI Masur-4, 26% in BARI Masur-3 and 24% in BARI Masur-2. Area under local variety was decreasing, whereas the adoption of improved varieties was increasing at farm level. Most of the farmers in the study areas had intention to increase the area under lentil cultivation. Lack of improved varieties of pulses found to be an important constraint to increase in area under pulses.

#### Abstract 1997-1998

# COMPARATIVE PROFITABILITY OF TRUE POTATO SEED (TPS) TECHNOLOGY WITH SEED TUBER IN SELECTED AREAS OF BANGLADESH

### M. Ahmed, A. K. M. H. Huq and M. A. Huq

The purpose of this study was to compare the profit as earned from TPS technology and seed tuber under Bangladesh condition. Data were collected from randomly selected 120 farmers from two study areas, namely Bogra and Jessore districts. Thirty farmers each under TPS technology and seed tuber were selected from one union of each district. The major findings of this study were TPS technology reduced 10 percent seed cost and increase yield about 9 ton/ha than seed tuber. Per hectare net return from TPS technology and seed tuber were Tk. 44459 and Tk. 15930 respectively. Benefit cost ratio was higher for TPS technology (2.15) than seed tuber (1.36). Lack of knowledge about TPS technology and non availability of TPS seed were the main problems faced by the farmers.

## RESOURCE USE EFFICIENCY UNDER IRRIGATED CROP IN SELECTED AREAS OF BANGLADESH

#### M. A. Rashid, M. Ahmed, M. N. Islam and M. R. Karim

The study was carried out to estimate the resource use efficiency of different irrigated crops in Rangpur and Dinajpur districts during 1997-1998. Cob-Douglas production function was chosen to measure the contribution of individual key variables in the production of potato and wheat. The results of the study revealed that the ratio of MVP and MFC for both the crops of human labour, seed, Urea and irrigation were positive and more than one which implied that more profit can be obtained by increasing investment in these inputs. The coefficient for human labour, seed, Urea and irrigation were found to be significant which means these factors contributed significantly to the production of potato and wheat as irrigated crops.

## ADOPTION AND ECONOMIC PROFITABILITY OF MUNGBEAN VARIETY BARI MUNG-2 IN TWO THANAS OF JESSORE DISTRICT

### M. R. Karim, Q. M. S. Islam, M. Ahmed and A. K. M. H. Huq

The study was undertaken to determine the adoption, economic profitability, farmers' attitudes toward mungbean variety Barimung-2 and probable constraints to the expansion of Barimung-2 cultivation. Two upazilas, namely Jhikorgachha and Chowgachha under Jessore district were purposively selected considering the higher concentration of Barimung-2 cultivation. Altogether a sample of 160 Barimung-2 growers was selected from the population of 478 farmers. Barimung-2 is being cultivated since 1994 in these two upazilas. The area under this crop cultivation became four times more by 1995 as compared to 1994. Mungbean area increased in 1998 by 27.29% from 1994 .The total production was 31.48 ton and yield/ha was 1.041 ton. Since 1994, per hectare yield has been decreasing. Per hectare average cost of production was found to be Tk 84093, it was higher in Jhikorgachha (Tk. 9178) and Tk. 7776 in Chowgachha. Per hectare average yield of mungbean on the sample plots was estimated to be 1037 kg and return was Tk. 19736. Per hectare average gross margin on full cost basis was Tk. 11243 and cash-cost basis it was Tk. 14527. The average benefit cost ratio was only 2.32 when calculated on full cost basis, and it was 3.59 on cash-cost basis. About 55% of the total sample farmers expressed their desire to increase Barimung-2 area in the next year. About 39% sample farmers reported that they would keep the mungbean area at least same in the next year. Eighty one percent farmers reported that harvesting of mungbean is a difficult work and required more labours. About 90% farmers said that insect attack and diseases were the major problems.

# IMPACT OF TENURIAL ARRANGEMENTS ON CROP PRODUCTION IN SELECTED AREAS OF SALINE TRACTS OF BANGLADESH

M. N. Islam, M. A. Hossain and M. Ahmed

For identifying the impact of tenurial arrangement on productivity, this study was conducted in Barguna, Khulna and Feni districts with a sample size of 135 farms. The results of the study indicated that owner farms were more efficient in allocating and utilizing available resources than those of other tenurial groups. They enjoyed higher land productivity in comparison with other groups. The productivity difference was mainly due to differences in resource endowment and management. Therefore, it may be concluded that the prevailing tenancy system had a negative influence on productivity.

## EMPLOYMENT WITH AVAILABLE TECHNOLOGY IN POTATO PRODUCTION WITH REGARD TO GENDER VARIABLES

#### S. C. Barman and M. Ahmed

The study was conducted to assess the available technology used in potato production with 90 potato farmers of three farm size groups; small, medium and large in two districts, namely Bogra and Comilla. It was found that the employment of labour with available potato technologies was significantly different with regard to gender variables. Out of 1765 labor hours/ha, 89% were male labourers and only 11% were female labourers. Among different farm size groups, the highest female labour were employed on medium farms (13%) compared to small (10%) and large (9%) farms. Respondent farmers also used 22% hired labour and 78% owned family labour of size 5.52 members. Between two study districts, farmers in Bogra employed significantly higher number of labours/ha both male and female in potato production compared to Comilla. Employment of labours with regard to gender variables, it was found that female labours were employed in operations like seeds cutting and sorting, weeding and earthling up, harvesting and cleaning the potatoes. It was also observed that the employment of female labours in potato production restricted not by the biases of potato technologies to either gender rather influenced by socio-economic status of the family and holds an inverse relationship between richness, higher degree of social esteem and employment of women labourers in production sectors.

# Abstract 1996-1997

# LEMON MARKETING SYSTEM IN BANGLADESH

## M. A. Matin, A. S. M. A. Huq, M. R. Karim, A. K. M. H. Haque and M. Ahmed

The study was undertaken in two important lemon growing areas, namely Sreemongal for seedless lemon and Patia for Kagzi lemon. Wholesale and retail markets were selected from major consuming areas of Dhaka and Gazipur to analyze the lemon marketing system. The study identified 11 channels for seedless lemon and 5 channels for Kagzi lemon. Highest quantities were routed through channel-I (Farmer - Bepari - Arathdar (Dhaka) - Retailer (Dhaka) -Consumer) for both lemons. Channel-III (Farmer – Arathdar (Local) - Bepari- Arathder (Dhaka) - Retailer (Dhaka) - Consumer) incurred the highest marketing cost (Tk 283/ thousand) for seedless lemon and channel-II (Farmer-Bepari-Arathdar (Dhaka) - Piker, (other district than Dhaka) - Retailer (other district than Dhaka) - Consumer) incurred higher marketing cost (Tk. 241/thousand) for Kagzi lemon. Net margin was highest in channel-II (Tk. 492/thousand) for seedless lemon and in channel-I (Tk. 635/thousand) for Kagzi lemon. The producers' share in the consumers' price was 35 percent for seedless lemon and 33 percent for Kagzi lemon. Marketing cost varied between 23 to 25 percent of retail price for seedless lemon and between 18 to 19 percent for Kagzi lemon. Again net margin or profit varied between 40 and 42 percent of retail price for seedless and 48 to 49 percent lemon for Kagzi. Marketing margin analysis showed that business of lemon was profitable for intermediaries. Channel-IV (Farmer-Arathdar (Local) – Bepari - Arathdar (Dhaka) – Piker, (other district than Dhaka) - Retailer (other district than Dhaka) - Consumer)) possesses the highest marketing efficiency for seedless lemon and channel-II possesses higher marketing efficiency for Kagzi lemon.

## FACTORS AFFECTING COWPEA YIELD IN SELECTED AREAS OF BANGLADESH

## S. C. Barman

The study was conducted in Patiya and Sudharam upazilas in Chittagong Division to identify the factors affecting cowpea yield. It was found that the yield of cowpea significantly influenced by farm size, soil texture and topography, cropping pattern, method of sowing and seed rate in existing climatic condition. Average per hectare yield of cowpea for large farmers was observed to be higher compared to small and medium farmers. The average yield on sandy loam soil was 824.89 kg/ha which was significantly higher than the yield on loamy soil (669.79 kg/ha) and sandy clay (440.69 kg/ha). Medium high land had an average yield of 767.37 kg/ha which was significantly higher compared to the average yield of 316.64 kg/ha on high land. Vegetables -T. Aman -Cowpea cropping pattern produced higher yield of 1045.42 kg/ha compared to the average yield of 672.11 kg/ha and 454.49 kg/ha obtained from the plots of Aus-T. Aman-Cowpea and Fallow-T. Aman-Cowpea patterns respectively. Farmers received significantly higher yield of 724.80 kg/ha who followed broadcast method than that of the farmers who obtained 678.79 kg/ha followed line sowing method. The average yield was found to be the highest on sample farmers for those who used the higher seed rate (90 kg/ha) in broadcast method particularly in Patiya area. However, farmers should have cultivated cowpea on the plots preceding T. Aman and vegetables crops for maximum yield in existing climatic condition in the area.

## COCONUT AND ITS TREND IN AREA AND PRODUCTIVITY IN BANGLADESH

## S. C. Barman and M. Ahmed

This study was undertaken to assess the trend of area, production, and productivity of coconut in Bangladesh. The data have been drawn from a number of published sources. Division wise data for 42 years on acreage, production, and yield of coconut have been collected from the Bangladesh Bureau of Statistics. The area under coconut showed an impressive growth in Bangladesh during the period from 1966-1967 to 1991-1992. This growth rate slackened in early nineties. The average increase in coconut area in the year 1993-1994 over 1951-1952 was more than 70% in Bangladesh. The total production of coconut during 1951-1952 was 59000 tons only which rose to 93000 tons during 1993-1994 recording and increase of 59% over a period of 42 years. The average productivity of coconut in Bangladesh during 1951-1952 was 3.20 tons per hectare which was decreasing till 1961-1962 to 2.73 tons/ha. After that it increased to 3.31 tons/ha. There after the productivity was observed to be declining till 1976-1977. This declining trend in productivity was mainly due to the declining trend in Khulna Division. During 1951-1952 national production was 59000 tons in which Khulna division producing 48000 tons coconut. The sharing in the national production was 82% which slipped down to 61% during 1976-77 though the total production increased to 60000 lakhs tons during 1976-1977. However, the total production increased in Bangladesh as well as in all divisions which was actually due to area expansion not by per unit productivity of coconut.

# IMPACT OF TENURIAL ARRANGEMENTS ON CROP PRODUCTION IN SELECTED BARIND TRACTS OF BANGLADESH

## M. A. Hossain, A. K. M. H. Haque, M. S. Alam, and M. Ahemd

The study was conducted at different Barind areas under Rajshahi, Chapai Nawaaganj and Bogra Districts of Bangladesh. The objective of the study was to identify the different tenurial arrangements to understand the influence of present tenancy system on crop production. It was found that owner farmers were more efficient in allocating and utilizing available resources than those of other tenurial groups. They enjoyed higher land productivity in comparison to other groups. The productivity differences were mainly due to the differences in resource endowment

and management. In Bogra, an opposite result was found. There tenant farms were found to be more efficient than other tenurial groups. In Bogra, "contact sharing tenancy" system was prevalent. Therefore, it could be concluded that the contact sharing tenancy system has a positive influence on the productivity of crop.

# PRODUCTION AND MARKETING OF AQUA AROID IN SELECTED AREAS OF BANGLADESH

## M. A. Haque, A. K. M. H. Hoque and M. Ahmed

The study was conducted in three locations viz. Narail, Chittagong, and Sirajganj districts to analyze existing production technology, profitability and constraints to aqua aroid production and marketing. On an average, 36 pair days of animal power, 335 man days of human labor, 32556 suckers, 13.22 ton of manure, 488 kg of chemical fertilizer and Tk. 126 for insecticides were spent for cultivation of aqua aroid in one hectare of land. Yields of rhizomes were found to be 73.39 t/ha and stolon 4.77 t/ha. Per hectare gross return was calculated at Tk. 17642, total variable cost was Tk. 39818, gross margin Tk. 136584 and benefit-cost ratio was 3.43. Two channels (i) Grower-Bepari-Urban retailer-Consumer and (ii) Grower-Rural retailer-Consumer were existed in aqua aroid marketing. Gross marketing margin obtained by intermediaries in channel-I was Tk. 1005, whereas Tk. 665 was attributed to marketing cost and Tk. 390 was profit. Percentage of producers' share was 65. Constraints faced by the cultivators were lack of knowledge about improved production technology, lack of HYV seed, lack of irrigation facility, and low price of aqua aroids.

## HUMAN LABOUR EMPLOYMENT IN CROP ENTERPRISES

# M. A. Rashid, M. N. Islam, A. S. M. A. Huq, A. K. M. H. Haque and M. Ahmed

The study was carried out to identify the major factors responsible for variation in employment of labour in crop enterprises. For this study 31 small, 20 medium and 15 large farmers were randomly selected from Bogra district. The average number of workers (male and female) per households exhibit positive relationship with farm size. It was observed that hired labour contributed 77% to total human labour use per households due to increased cropping intensity in the area. In addition, there is a clear positive relationship between farm size and hired labour use. In this study multiple regression co-efficient analysis was used to assess the influence of various factors that were responsible for variation on labour employment. Twelve explanatory variables were employed to explain the human labour employment. Five variables included were significant in explain the employment. The model explained 95% of the observed variation of employment in the three categories of farms. Regression co-efficient of gross cropped area and gross income were statistically significant and positive. The model explained 79% to 95% variation of employment under three categories of farms for all the variables included in the model.

## ADOPTION STATUS OF BARI CHICKPEA AND ITS PROFITABILITY IN THE HIGH BARIND TRACT OF BANGLADESH

# Q. M. S. Islam, M. R. Karim, A. K. M. H. Haque and M. N. Islam

The study was conducted in three chickpea growing districts, namely Rajshahi, Chapai-Nawabganj and Naogaon to assess the expansion of chickpea area in High Barind Tract, to estimate the rate of adoption of improved chickpea cultivars, and the impact of chickpea cultivation on rice based cropping systems. A total of 180 farmers were selected from three zones/blocks, namely intensive, medium and low. Data were collected through interview schedule during the year 1996-1997. The area of chickpea increased more than four times (from 1213 ha to 5452 ha) and its production was more than six times (786 to 4621 ton) during the year 1984-1985 to 1995-1996. Within the sampled farmers' only 26% adopted improved varieties and cultivated 23% of the total chickpea area. Unavailability of seed was the major constraints to adopt the improved varieties. Highest gross margin of Tk. 39117/ha on cash cost basis and Tk. 2952/ha on full cost basis was found in intensive zone. Similarly, the highest benefit cost ratio of 2.60 was also observed in intensive zone.

## EFFECT OF FERTILIZER AND PESTICIDES ON PRODUCTION OF HYV POTATO IN MUNSHIGANJ DISTRICT OF BANGALDESH

#### M. N. Islam, A. S. M. A. Huq, Q. M. Alam, A. K. M. H. Haque and M. Ahmed

The study was carried out to examine the intensity of fertilizer and pesticides use on HYV potato in Munshiganj district. Time series data of last 15 years, 1979-1980 to 1993-1994 in respect of area and production were taken from BBS. The primary data were collected from randomly selected 100 farmers from Munshiganj district. To determine the effect of fertilizer level on the productivity of HYV potato, a "fertilizer response function" was used. The exponential growth rates of area and production for HYV potato were 6.01 and 7.73 percent per annum in Munshiganj and these were 4.06 and 4.75 percent for Bangladesh respectively. It was also found that growth rates of area and production were higher for Munshigani than those of whole Bangladesh. It was also observed that average yield for the last 15 years (1979-1980 to 1993-1994) for Munshiganj was 33% higher than the average yield of Bangladesh. The surveyed farmers used three times more chemical fertilizer than the recommended dose. No manure was used at all. Further, the multiple regression function was fitted to study the influence of pesticides and land on yield. The negative sign of the coefficient for pesticides from the above regression equation indicated negative influence and high doses of pesticides, implied irrational behavior of potato growers. In this context, the extension agency should educate the farmers about the negative impact.

## Abstract 1995-1996

# POTENTIALITIES AND PROBLEMS OF MUSTARD/POTATO PRODUCTION AS AN ADDITIONAL CROP BETWEEN TWO RICE CROPS

#### Q. M. Alam and M. N. Islam

The study was conducted to examine the economic feasibility of growing mustard/potato after harvesting of T. Aman and before transplantation of Boro paddy. The study areas were purposively selected in nearby villages, namely Kazipara, Batoi, Noharapara, Ulkhar and Paikor of Kahalu Thana in Bogra district. Three sets of information were collected from 100 randomly selected farmers from the selected villages. The first set of data covered Aman paddy-Mustard-Boro paddy cropping pattern. The second set of data included Aman-Potato-Boro cropping pattern. The third set of data included Aman- Boro cropping pattern. The study revealed that both mustard and potato increase farmers' income as an additional crop between Aman and Boro paddy. More than 80 percent of farmers are producing mustard and potato between two rice crops. It was found that irrigation problem related to these crops was irrigation management problem rather than irrigation availability problem. Farmers were especially interested in the HYV mustard because of its various advantages. Potato can be grown profitably between these two crops. Mustard as a short duration crop can easily be grown between these two crops. The major constraints on its expansion were identified as irrigation management and co-ordination problems between farmers rather than economic and agronomic. Site specific irrigation policy, implementation of irrigation low, and motivational activates can resolve this problem of mustard/potato expansion between two rice crops.
# IMPACT OF TENURIAL ARRANGEMENTS ON CROP PRODUCTION IN SELECTED CHAR AREAS OF BANGLADESH

M. A. Hossain, M. R. Karim and A. K. M. H. Haque

The study was undertaken to examine different tenured arrangements and to compare input use levels by different tenurial classes. The study was conducted at different char areas under Kurigram, Gaibandha and Kishoreganj districts of Bangladesh. A total of 135 farms from three districts, taking 45 farms from each districts, were selected for the study. The study found that owner farms were more efficient in allocating and utilizing available resources than those of other tenurial group at Kurigram and Gaibandha areas. The productivity differences were mainly due to the differences in resource endowment and management. At Kishoreganj, tenant farms were found to be more efficient than other tenure groups. The results of the study suggest a number of planning options for developing agriculture of char areas in general and improving the conditions of the farmers at those selected locations in particular. There should be an arrangement so that the tenants operators get due share of the production and major land reform measures should be taken for improving the tenure arrangements.

# AGRO-ECONOMIC ANALYSIS OF MUKHIKACHU CULTIVATION IN SELECTED AREAS OF BANGLADESH

# M. A. Haque and A. K. M. H. Haque

The study was undertaken to determine existing production practices, cost and margin, and constraints to mukhikachu production in Bogra, Rajshahi and Habiganj districts. A total of 90 farmers, taking 30 farmers from each area, were selected randomly. The farmer's practices showed that mukhikachu cultivation was profitable. It was also found that farmers used local variety and applied imbalance doses of fertilizers for mukhikachu cultivation. The average per hectare yield of mukhikachu was found 11.88 ton/ha and the yield was highest in Bogra 13.19 ton/ha. Communication gap between research and extension should be reduced and research result related to new technology of mukhikachu should urgently transfer to the farmers' field through extension people. For the shortage of cash money and technical know how, the farmers did not use manures and fertilizers properly. As a result, the yield of mukhikachu at farm level was lower than the research yield. So credit facility should be given to the farmers in time on easy terms and conditions, and on the other hand farmers should be trained about new technology of mukhikachu cultivation.

# ECONOMICS OF GARLIC PRODUCTION IN SELECTED AREAS OF BANGLADESH

# M. A. Matin, A. S. M. A. Huq, M. R. Karim and A. K. M. H. Haque

The study was conducted in two districts, namely Natore and Faridpur to compare the economic benefit of garlic production with some other crops and to identify the constraints to its higher production at farm level. A total of 100 garlic farmers were selected randomly taking 50 samples from each upazila. The study also compared the economic benefit of garlic with two major competitive crops, namely onion and wheat. Results of the study indicated that the cultivation of garlic was profitable but not at satisfactory level. Farmers were producing garlic with indigenous varieties following traditional technologies, as a result yield and BCR was not at optimum level. Yield of garlic was much lower than the yield in experimental plots. However, there is a great scope for improving the existing technologies of garlic production. Therefore, emphasis should be given on more research in developing HYVs of garlic and low input based sustainable

production technologies for maximizing the yield and income. Prices of garlic during harvest period were low so it is needed to develop proper marketing facility by which farmer can get higher price of their product. Farmer faced problem like high price of seed, lake of institutional credit, lack of fertilizer, and pesticide etc. which were the barriers of garlic production. Arrangement of institutional credit, and fertilizer and pesticide should be provided at a reasonable price is suggested.

## ECONOMICS OF POWER TILLER UTILIZATION IN BANGLADESH

# M. A. Rashid, M. N. Islam. A. S. M. A. Huq and A. K. M. H. Haque

The study was undertaken to examine the socio-economic characteristics of power tiller owners, to ascertain the profitability of power tiller operations and to identify the problems associated with power tiller introduction in rural Bangladesh. The study was conducted purposively in two districts, namely Bogra and Jessore. Data were collected from 35 power tiller owners from Bogra and 38 owners from Jessore. Average farm size of power tiller owners was 3.04 ha for Bogra district and 2.17 ha for Jessore district. Average family size of Bogra and Jessore districts were 8.2 and 7.22 respectively. Education level of the sampled owners of Bogra districts had 4.11 members illiterate while it was 3.55 for Jessore district. It was found that power tiller earned appreciable amount of profit in both of the districts. It was Tk. 21306 per year in Jessore and Tk. 8107 per year in Bogra. Lack of knowledge, lack of deep ploughing, lack of powerful engine, low qualities of spare parts, high cost of repairing, and fuel were the major problems faced by the farmers in power tiller operation. To remove the problems, government should impart training to the farmers, import better quality engine, import spare parts with reasonable prices, ensuring unadulterated fuel with low price, and provide credit facilities with low interest rate to the farmers for purchasing power tiller.

#### IMPACT OF CHICKPEA IN HIGH BARIND TRACT OF BANGLADESH

Q. M. S. Islam, M. R. Karim and A. K. M. H. Haque

The study was conducted in three districts, namely Rajshahi, Chapai Nawabganj and Naogaon to assess the expansion of chickpea area in high Barind tract to evaluate farmers' preference for different varietal trails of chickpea and the impact of chickpea cultivation on rice based cropping system. A total of 120 samples, taking 75 chickpea and 45 non-chickpea farmers, were selected at random. Area was expanded more than four times from 1984-1985 (1213 ha) to 1995-1996 (5452 ha) and production increases more than six times (786 to 4621 ton). One hundred percent farmers choose HYV chickpea and gross return was found more in chickpea (Tk. 16615/ha). Higher gross margin was found in chickpea both cash cost (Tk. 44816/ha) and full cost basis (Tk. 36150/ha) as compared with non-chickpea farmers. Benefit cost ratio was 2.91 and 2.17 for the chickpea and non-chickpea farmers respectively. Farmers preferred Nabin variety for its higher yield, high market demand, drought tolerant etc.

### MARKETING OF MAIZE GRAIN IN BANGLADESH

M. N. Islam, M. M. Ullah and A. N. M. Saleh

The study was conducted to assess the marketing system of maize grain from producers to consumers. Four districts, namely Jessore, Rangpur, Chuadanga, and Kurigram districts were purposively selected for the study. Altogether 60 growers, taking 15 from each district, were selected randomly. In Jessore, main marketing channel was Producer-Local Bepari-Wholesaler-Poultry Farm through which 80% of the maize grain move. In Rangpur, main channel observed Producer-GKF-Poultry Farm through which 80% of the maize grain move. The growers of Jessore obtain the highest price (Tk. 8000/ton) from BRAC than that from local bepari (Tk. 7550/ton). On the other hand, there was a formal agreement in Rangpur between GKF and maize growers that GKF will supply seed, fertilizers, irrigation, and insecticides to grow maize. At the same time GKF will purchase maize from farmers with the prevailing market price. The producers' share in the consumers' price was the highest 86.29% in channel Producer-Local Bepari-Wholesaler-Poultry Farm channel. Fifty percent of the local beparies reported that maize becomes spoil due to higher level of moisture content. Different intermediaries reported that supply of maize is inadequate and is limited within few months. Some intermediaries also reported that poultry farm generally purchase maize on credit and does not pay money in time.

#### MUKHIKACHU MARKETING IN SOME SELECTED AREAS OF BANGLADESH

# M. A. Haque and A. K. M. H. Haque

The study was undertaken to assess the marketing system of mukhikachu in Bangladesh. Bogra, Rajshahi and Habiganj districts were selected purposively. A total of 60 farmers, taking 20 from each district, were selected at random. Forty five intermediaries were randomly chosen from three primary markets taking 15 intermediaries (5 farias, 5 beparies and 5 rural retailers) from each market. It was observed that the main channels were Grower -Faria- Bepari- Arathder-Urban retailer and Grower-Bepari-Arathdar-Urban retailer-Consumer through which 38% and 35% of mukhikachu moves from growers to consumers. The average sales price per quintal of mukhikachu for faria, bepari, urban and rural retailers were Tk. 612, Tk. 713, Tk. 858, and Tk. 68.2 respectively which were 10%, 28%, 55%, and 23% higher than those of farm gate price respectively. The average cost of marketing of farias, bepaies, urban and rural retailers were found to be Tk. 34, Tk. 65, Tk. 32 and Tk. 30 per quintal respectively. The marketing margin of farias, beparies, urban and rural retailer was Tk. 57, Tk. 118, Tk. 145 and Tk. 105 per quintal respectively. The channel Grower-Rural retailer-Consumer possesses the highest efficiency in mukhikachu marketing system in Bangladesh. Low price, transportation problem, and lack of market information were the major problems faced by the farmers. The major problems faced by different intermediaries were price instability, high transportation cost, inadequate capital, weight loss and damage, lack of credit facility, and inadequate capital facility. Some measures were also suggested to make mukhikachu marketing efficiently. The measures were ensuring better price, developing existing transport, and communication facilities.

## PINEAPPLE MARKETING AND SPATIAL PRICE VARIATION

#### S. C. Barman

The study was undertaken in Moulvibazar, Chittagong and Rangamati district to assess pineapple marketing in Bangladesh. Five channels were found in pineapple marketing. In wholesale market, 61% bought product directly from growers and 39% from intermediaries. However, in retail market 45% retailers got pineapples from whole sellers, 34% from middlemen and 21% from growers. Higher price were found in wholesale compared to retail market, where the degree of competition was higher. Marketing margin was Tk. 1953.03 and Tk. 1840.32 in retail and wholesale markets respectively. Thus growers were getting 35% and 48% lower price

in respective markets and indicated absence of market regulation. Inadequate transport facility was the major problem which shared more than 80% of total marketing cost. So existing situation calls for public support for providing transports and feeding the processing plants regularly protecting farmers and processors interest.

#### Abstract 1994-1995

# ADOPTION OF WHEAT AND KNOWLEDGE GAP AMONG THE GROWERS AT DINAJPUR AND JAMALPUR DISTRICTS

# M. S. Alam, M. S. Hussain and A. N. M. Saleh

The study was conducted to find out the adoption status of the sample farmers, to know the input use and profitability with and without exposure to demonstration or on farm trials. For this study Dinajpur and Jamalpur districts were selected by taking 100 farmers from each district. The study revealed that the yield performance and financial return were much higher in demonstration than those of non-demonstration plots. The demonstration or on farm trial farmers were well known with the recommended packages of wheat cultivation. Hence, the intensive efforts under the programme should still be made to minimize this technological gap to the wheat growers. The study also showed that the majority of the wheat growers belonged to the category of low and medium knowledge gap. The farmers' knowledge gap level was higher with respect to the practices those were technically more complex and required detailed information on the practical aspects of the technology like functions of fertilizers and manures, varietals characteristics, information on fruit, and vegetables etc. In the case of wheat technology, the farmers had higher knowledge gap in different practices, like fertilizer does, seed rate, sowing time, plant protection measures etc. The study also noticed that the farmers at FSR and MLT sites had higher knowledge than those of other farmers. Therefore, they were well understood with the modern wheat cultivation practices.

# YIELD AND RETURN GAP BETWEEN HYV AND LOCAL VARIETY OF MUSTARD IN TANGAIL AND JHENAIDAH DISTRICT

## Q. M. Alam, M. S. Hussain and M. N. Islam

The study was conducted to estimate the yield and benefit gap between HYV and Local Variety (LV) of mustard. A total of 128 samples were selected from Tangail and Jhenaidah districts. In Tangail, per hectare yield of HYV mustard was 931 kg, whereas the yield of LV was 784 kg and gross return per hectare for HYV and LV of mustard was calculated as Tk. 15009 and Tk. 13132 respectively. In Jhenaidah, per hectare yield of HYV mustard was 1262 kg and LV was 1054 kg and per hectare gross return for HYV and LV of mustard was calculated as Tk. 20760 and Tk. 17749 respectively. The yield gap per hectare between HYV and LV was 47 kg and 208 kg of mustard in Tangail and Jhenaidah district respectively. The observed mean difference of yield between two varieties was found statistically non-significant. Both HYV and LV of mustard are produced under irrigation and rainfed condition depending upon sites specific condition like weather condition, resource base and supply etc. Under rainfed condition farmers spent half of their total expenses as cash cost. Relative gap in gross margins in all cost situations between two varieties were more than the relative yield gap. Under irrigation condition, farmers spent approximately one third of their total expenses as cash cost for both HYV and LV mustard. Relative gap in gross margins in all costs situation between the varieties were less than relative yield gap but still positive. But the actual benefits due to mustard in all costs situation were negative.

# COMPARATIVE STUDY ON HYBRID AND COMPOSITE VARIETY OF MAIZE IN SELECTED AREAS OF BANGLADESH

M. S. Hussain, M. N. Islam and M. M. Anwar

The study was conducted to assess the comparative profitability of hybrid and composite maize cultivation in Rangpur and Jessore districts during 1993-1994 and 1994-1995. A total of 120 respondents, in each year equally represented by 60 respondents from each district, were selected. Per hectare average cost of hybrid maize production was Tk. 20084 and Tk. 26695 in the year 1993-1994 and 1994-1995 respectively, while it was Tk. 14805 and Tk. 18000 for composite variety of maize in 1993-1994 and 1994-1995 respectively. The gross return of hybrid variety was Tk. 32809 and Tk. 42220 in the year 1993-1994 and 1994-1995 respectively while it was Tk. 21900 and Tk. 24393 for composite maize variety in 1993-1994 and 1994-1995 respectively. Yield, gross return, gross margin, as well as benefit cost ratio were higher for hybrid variety cultivation compared to composite variety. Consequently, the rate of input use such as human labour, animal power, and different types of fertilizers were higher for hybrid variety than those of composite variety. It was evident from this study that hybrid maize cultivation was more profitable, but it involved higher cost and investment.

# POTENTIALITIES OF CHICKPEA PRODUCTION IN THE HIGH BARIND TRACT, RAJSHAHI, BANGLADESH-A RAPID RURAL APPRAISAL

# M. S. Hussain, M. R. Karim, N. K. Kar and Q. M. S. Islam

The study was conducted to ascertain the technical potentialities and constraints of further expansion of chickpea in the high Barind tract. Per hectare average yield was 653 kg in 1984-1985 and increased to 1009 kg by 1993-1994. Three years mean (1991-92 to 1993-94) yield of chickpea comes to 951 kg/ha (including local and Nabin variety). But three years and ten locations/trials mean yield under research managed trial was 1521 kg/ha for local variety and 1773 kg/ha for Nabin variety. This yield gap between research managed trials, demonstrations, and farmers yield might be due to timely sowing, proper fertilizer application, and better management in research managed trials, improved varieties, and lines might have some yield potential as well. The area, production, and yield of chickpea increased at an annual rate of 0.39, 0.39 and 0.00005% respectively. On the basis of 1994-1995 the area projected to 15084 ha and production to 12993 tons in 1999-2000. After ten years the area and production will be 78269 ha and 67419 tons respectively. The farmers of Barind area were very much interested and enthusiastic towards chickpea cultivation.

# ADOPTION STATUS OF BRINJAL VARIETY "UTTARA" AT FARM LEVEL IN WINTER SEASON

#### M. A. Hossain, M. S. Hussain and M. S. Alam

The study was carried out to know the extent of adoption and rejection of the brinjal variety "Uttara" in three districts, namely Jessore, Chittagong and Pabna. A total of 75 non-adopter and 15 adopter farmers from all locations, were selected for this study. On the basis of full cost and cash cost, the costs of production of Uttara brinjal were Tk. 31101 and Tk. 17644 per hectare respectively while it was Tk. 33015 and Tk. 19796 for local varieties respectively. The average gross return of Uttara and local varieties of brinjal production was Tk.100337 and Tk. 89888 per hectare. Per hectare average gross margin was Tk. 69236 and Tk. 82693 for Uttara and Tk. 56873 and Tk. 70092 for LV on full cost and cash cost basis respectively. In all locations the

yield performance of "Uttara" brinjal showed quite high compared to the local varieties. The Uttara variety as well as its production technologies was very much unknown to the farmers at farm level which hindering for its adoption as stated by the majority of the farmers.

# YIELD GAP ANALYSIS ON POTATO PRODUCTION IN CDP DEMONSTRATION AREA

## S. M. A. Huq, M. S. Hussain and M. A. Rasid

The study was conducted to find out the yield gap and profit gap of potato under different production situation. A total of 60 sample farmers were selected from two districts, namely Dinajpur and Munshiganj taking 30 from each district. In Dinajpur, average per hectare cost of production of potato was Tk. 42743 for Non-Demonstration Plot (NDP) (Cardinal) and Tk. 58847 for Demonstration Plot (DP). Average gross return from potato in NDP was Tk. 50205 and DP was Tk. 79882. Benefit cost ratio was 1.17 and 1.36 for NDP and DP respectively. In Munshiganj, average per hectare cost of production was Tk. 82596 for NDP and Tk. 69560 for DP. Average gross return from potato in NDP was Tk. 98919 and BCR was 1.10 and 1.42 for NDP and DP respectively. Yield difference between DP and NDP was 3420 kg and the gap between the gross margins was Tk. 21441. Reason for this disparity may be good quality seed.

# PRODUCTION PRACTICES AND PROFITABILITY OF LEMON CULTIVATION IN SOME SELECTED AREAS OF BANGLADESH

# M. A. Matin, A. S. M. A. Huq, M. R. Karim, M. R. Islam and M. S. Hussain

The study was conducted to estimate the cost and return of lemon cultivation in three districts, namely Moulvibazar, Chittagong and Pabna districts of Bangladesh. Altogether 186 samples were selected from three locations based on effective life span and variety of lemon. Project analysis was done for the present study. BCR of the lemon was greater than one, NPW was positive and IRR was higher than the opportunity costs of capital. If gross cost is increased by 10 to 20% level, the returns remain the same .This means that the owner of lemon garden can also make profit if all cost slightly increases in near future. The results of the study indicated that the owners of lemon garden could earn more profits under changing situation.

# CHICKPEA CULTIVATION AND ITS PROFITABILITY IN SOME SELECTED AREAS OF HIGH BARIND TRACT

# Q. M. S. Islam, M. R. Karim, M. S. Hussain and M. S. Islam

The study was conducted to ascertain the costs and returns of chickpea cultivation in three chickpea growing districts, namely Rajshahi, Chapai Nawabganj and Naogaon taking two upazilas from each district. A total of 150 farmers, taking 25 from each upazila, were selected randomly from the total list of the farmers. The study revealed that the yield of chickpea as a sole crop was much better than the yield of chickpea as mixed crop. The per hectare average cost of chickpea cultivation was higher in mixed crop than that of sole crop. Average Benefit Cost Ratio (BCR) of sole crop was 2.87 respectively. Gross return and gross margin on both cash cost and full cost basis were found to be higher in mixed cropping than the sole crop, but BCR was lower in mixed crop. There is a scope for increasing chickpea cultivation in Barind area both in horizontally and vertically.

# ECONOMICS OF POWER TILLER INTRODUCTION IN DRAFT POWER SHORTAGE SITUATION-A STUDY IN A SELECTED AREA

# **OF BOGRA DISTRICT**

M. A. Rashid, A. S. M. G. Hafeez and M. S. Hussain

The study was conducted to identify the profitability of different crops cultivation by using power tiller and draft power, and to know the impact of power tiller and draft power use on employment and income. Fifty two sampled farmers using power tiller and 41 sampled farmers using draft power were selected randomly from two upazilas of Bogra district for the present study. The farm size of the power tiller using farmers was higher than those of draft power using farmers in the study areas. In the case of power tiller, farmers used 117, 121 and 56 man-days/ha labours for cultivating Boro, potato and mustard respectively. Again, in the case of draft power these numbers were 200, 204 and 131man-days/ha respectively. The per hectare average cost of producing boro (Tk. 11481) and potato (Tk. 25024) was higher for power tiller users compared to draft power users (Tk. 10092 and Tk. 20704), but the average cost of producing mustard (Tk. 9633) was higher for draft power than power tiller users (Tk. 8644). Per hectare yield, gross benefit and BCR of boro, potato and mustard cultivation, was higher for power tiller users than draft power users. Mechanized tillage reduces drudgery of labour, saves the time does away with those unskilled labours whose marginal productivity is very near to zero, brings out the fertility of the soil, ensures better mix of fertilization and crop protection, and thus brings higher yields.

# STATUS OF MAIZE SEED USED BY FARMERS AND CONSTRAINTS TO USE OF BETTER SEED

#### M. N. Islam, M. M. Anwar and M. M. Rahman

The study was conducted to determine the status of maize seed used by farmers and constraints to use of better seed in six districts, namely Rangpur, Rajshahi, Jessore, Dhaka, Narayanganj and Rangamati. A total of 60 growers from Rangpur, 42 from Rajshahi, 46 from Jessore, 15 from Dhaka, 15 from Narayanganj and 30 from Rangamati were selected purposively in consultation with the Department of Agricultural Extension (DAE) personnel. The study revealed that one hundred percent of the sample farmers in Dhaka, 87% in Rangpur, and 71% in Rajshahi used maize seed from their own sources. Only 29% of the sample farmers in Jessore cultivated maize for seed purpose. It was observed that majority of the sample farmers in Rangpur (88%), Rajshahi (100%), Jessore (71%), Dhaka (93%), Narayanganj (100%) and only 21% in Rangamati tested moisture of their seeds. Again 88% farmers in Rangpur, 55% in Rajshahi, 56% in Jessore, 87% in Dhaka, 100% in Narayanganj and 69% in Rangamati did germination test of their seeds.

## MARKETING OF SOME MAJOR SPICES IN BANGLADESH

# M. M. Ullah, M. N. Islam, M. S. Hussain and M. M. Anwar

The study was conducted to analyze the marketing system of three spices crops such as ginger, turmeric and chili in Rangpur, Nilphamari, Jhenaidaha, Bogra and Chittagong districts. For each spice and location, 30 farmers and 30 traders were selected randomly. Average marketing cost of ginger for faria, bepari and retailer were Tk. 97, Tk. 199, and Tk. 129 per quintal respectively. The highest margin was obtained by retailer (Tk. 625/quintal) followed by bepari (Tk. 346/quintal) and faria (Tk. 146/quintal).The highest return to investment was obtained by retailer (17%) followed by bapari (6%) and faria (2%). Average marketing cost of turmeric for faria, bepari and retailer were Tk. 67, Tk. 165-67 and Tk. 64.72 per quintal respectively. The highest margin was obtained by retailer (Tk. 1008/quintal) followed by bepari (Tk. 231/quintal) and faria

(Tk. 152/quintal). The highest return to investment was obtained by retailer (42%) followed by faria (5%) and bepari (3%). Average cost of chilli marketing for faria, bepari and retailer were Tk.42, Tk. 235 and Tk. 57 per quintal respectively. The highest margin was obtained by retailer (Tk. 918/quintal) followed by bepari (Tk. 415/quintal) and faria (Tk. 217/quintal). The rate of return to investment was quite high for retailers (16%).

## GUAVA MARKETING SYSTEM IN SOME SELECTED AREAS OF BANGLADESH

## M. A. Haque and M. S. Hussain

The study was conducted to assess the marketing system of guava. Barisal, Chittagong and Brahmanbarias district were selected purposively for the study. A total of 45 farmers, taking 15 farmers from each area, were selected randomly. Six guava markets were purposively selected taking one primary and one secondary market from each area. Ninety intermediaries were randomly chosen from primary and secondary markets. Average cost of marketing for faria, bepari and retailer were Tk. 29, Tk. 74 and Tk. 43 per quintal respectively. The highest margin was obtained by retailers (Tk. 168/quintal) followed by beparies (Tk. 150/quintal) and farias (Tk. 67/quintal). The highest return to investment was obtained by retailers (17%) followed by beparis (13%) and farias (7%). Low price of guava was the major problem faced by the farmer. Price instability, inadequate capital, high transport cost were the major marketing constraints to the farmer.

# MARKETING OF BITTER GOURD IN SOME SELECTED AREAS OF BANGLADESH

## M. A. Hossain and M. S. Hussain

The study was conducted to determine the marketing system of bitter gourd in three districts, namely Jessore, Chittagong and Rangpur. Sixty farmers and 105 traders taking 20 farmers from each location and 35 traders (10 farias, 10 beparis, 10 retailers and 5 arathdars) from both primary and secondary market of each area were selected for the study. Average marketing cost of bitter gourd for faria, bepari and retailer were Tk. 26, Tk. 132 and Tk. 63 per quintal respectively. The highest margin is obtained by beparis (Tk. 192/quintal) followed by retailer (Tk. 159/quintal) and farias (Tk. 40/quintal). The highest return to investment is obtained by retailers (8%) followed by beparis (6%) and farias (2%). Problem of price instability, lack of storage facilities, weight loss and damage and high transportation cost were the major problems faced by the intermediaries.

# PINEAPPLE MARKETING AND SPATIAL PRICE VARIATION

## S. C. Barman

The study was conducted to identify the marketing cost of pineapple and price structure both at the wholesale and retail markets. Moulvibazar, Chittagong and Rangamati districts were selected purposively. A list of 730 pineapple sellers of all markets (270 wholesalers and 460 retailers) in the survey areas were collected for the study. A total of 64 sample respondents were chosen at random from the frame. The total average marketing cost per thousand of pineapples was estimated at Tk. 465 in retail market, while it was Tk. 734 in whole sale market. The average difference of selling price over purchasing price was calculated to be 48% in the whole sale

market, while it was 35% in the retail market. The average marketing margin for per thousand of pineapples amounted at Tk. 1840 at the wholesale and Tk. 1953 at the retail market.

# WATERMELON MARKETING IN SOME SELECTED AREAS OF BANGLADESH

# M. A. Monayem Miah, M. S. Haque and M. S. Hussain

The study was conducted in four important watermelon growing districts, namely Chittagong, Comilla, Faridpur and Natore during April-May, 1995 to find out the marketing channels, determine the cost and margins of both farmers and traders, and to identify marketing problems. For the study, 40 farmers, taking 10 from each location and 120 traders from both primary and secondary market, were randomly selected and data were collected through direct interview method. Five major channels were identified in watermelon marketing among which Farmers-Rural retailers-Consumers channel was the efficient one in terms of farmers' share to the consumer's price and consumers' welfare. Marketing cost for the growers in all areas was average Tk. 80 per ton only. The farmers, on an average, received Tk.1824 per ton as net return. Marketing cost at traders' level varied from Tk. 159 to Tk. 802 per ton. Marketing margin and profits for traders per ton were averaged Tk. 1280 and Tk. 821 respectively. Low demand of watermelon and high transportation cost were the major problems faced by the farmers and inadequate business capital, price instability and high transportation cost were majors marketing constraints among the traders.

# IDENTIFICATION OF FERTILIZER USAGE PATTERN ON WINTER VEGETABLES IN JESSORE AND RANGPUR DISTRICTS OF BANGLADESH

#### M. E. Baksh, M. S. Rahman and M. S. Hossain

In order to document the existing fertilizer usage pattern for winter vegetables cultivation, a survey was conducted at Jessore and Rangpur districts during 1994-1995 cropping year. Eight winter vegetables, namely brinjal, cabbage, cauliflower, radish, tomato, country bean, spinach and potato were included for this study. A total of 320 farmers were selected randomly and 40 farmers were taken from each vegetable grower. The study revealed that farmers used fertilizers in irrational and indiscriminate ways. Majority of the farmers at Rangpur used higher quantities of cowdung for vegetables cultivation, but most of the farmers at Jessore used chemical fertilizers over recommended doses. A remarkable number of farmers top dressed TSP and MP with Urea at Jessore compared to Rangpur. In all selected vegetables, the highest quantity of fertilizer was applied for brinjal at Jessore (5 times more than recommendation) followed by cabbage and cauliflower. Farmers had shallow knowledge about efficient fertilizer management. One hundred percent farmers had no knowledge about recommended fertilizer doses. They applied fertilizer, generally, by using their own experience and consulting with other neighboring farmers, and fertilizer dealers. Only 10% and 5% farmers' practised green manuring and compost although 36% and 10% knows these respectively. Farmers faced several problems among which shallow knowledge about fertilizer doses and management, higher prices of TSP, and price fluctuation of fertilizers were the major ones.

#### Abstract 1993-1994

# ASSESSMENT OF IMPROVED TECHNOLOGY ON LENTIL AND CHICKPEA VIS-À-VIS FARMERS INDIGENOUS TECHNOLOGY IN CDP DEMONSTRATION AREAS

Q. M. S. Islam and M. S. Hossain

The study was conducted in Kushtia, Meherpur, Chuadanga, Jessore, Jhenaidah, Magura, Faridpur and Gopalganj districts to investigate the performance of improved pulse technology in relation to indigenous technology at farm level. Extensive cultivation of lentil and chickpea area and demonstration area of Crop Diversification Programme (CDP) were the major criteria for the selection of study locations. The total number of samples for each pulse crop was 128. Tabular method of analysis was followed in this study. Average yield of chickpea and lentil were found to be 1347 kg/ha and 1214 kg/ha respectively in demonstration field which were much higher than farmers field. Per hectare costs and returns of chickpea and lentil cultivation were more or less same. Total cost of chickpea cultivation was estimated at Tk. 9494/ha in demonstration field and Tk. 4704/ha in the farmers field. In all areas average, the difference of gross margin between demonstration and farmers plots was estimated to be Tk. 5002/ha. The difference of gross margin in lentil cultivation was Tk. 6622/ha. The large-scale expansion of pulses technologies for chickpea and lentil growers will obviously increase the pulse production in Bangladesh. Farmer's motivation and easy access to inputs need to be ensured for further development of pulse crops.

## ECONOMIC CONDITION OF SMALL FARM HOUSEHOLDS IN SELECTED DISTRICTS OF BANGLADESH

#### Q. M. Alam, M. M. Ullah and M. A. Rashid

The study was undertaken to assess the household income, expenditure, assets and liabilities of small farmers in Comilla, Jessore and Bogra districts. Primary data were collected from randomly selected 120 small farmers. Average annual income and expenditure of small farm households were Tk. 26562 and Tk. 21203 respectively. Significant difference existed in the income and expenditure of the households in the three different districts. The average income of small farm household of Comilla, Jessore and Bogra district were Tk. 27655, Tk. 16965 and Tk. 35055 respectively. On the other hand, the average household consumption expenditure of Comilla, Jessore and Bogra district were Tk. 28137, Tk. 19469 and Tk. 16000 respectively. In Bogra, average propensity to consume of the small farmers was found to be 0.45 only whereas, average propensity to consume in Comilla and Jessore were found to be 1.02 and 1.15 respectively. In Comilla and Jessore, the value of assets had a direct relationship with farm household's annual cash flow situation. The asset and liability ratio was 1.00: 0.16 in Comilla, 1.00: 0.12 in Jessore and 1.00: 0.02 in Bogra district. The average household's liabilities for small farms were recorded as Tk. 2991.

# ADOPTION STATUS OF SOYBEAN AND SUNFLOWER IN SOME SELECTED AREAS OF BANGLADESH

# M. I. Hossain and M. A. Matin

The study assessed the level of adoption and production of soybean and sunflower in Bangladesh. Data were collected from 67 randomly selected soybean farmers and 63 sunflower farmers from Gopalganj, Tangail, Rajshahi, and Jessore district. Spearman's Rank correlation coefficients were also used for adoption analysis. The average cost of production of soybean in Gopalganj and Tangail were Tk. 3566 and Tk. 6808 respectively. The average cost of production of sunflower in Rajshahi and Jessore were Tk. 4639 and Tk. 8132 per hectare respectively. The average yield of soybean in Gopalganj and Tangail and sunflower in Rajshahi and Jessore were 1004 kg, 1173 kg, 1130 kg and 1298 kg per hectare respectively. The coefficients of rank correlation revealed a positive significant relationship with the adoption of HYVs of soybean and sunflower. This implied that the modern varieties of soybean and sunflower could be spread

more with the availability of improved input factors. Seed germination and getting quality seeds were the major problems faced by both soybean and sunflower farmers. Attack of birds was an acute problem faced by the sunflower farmers.

# A STUDY ON YIELD GAP OF MUSTARD IN SELECTED DISTRICTS OF BANGLADESH

## Q. M. Alam, M. A. Rashid and A. S. M. A. Huq

The study was conducted in Tangail and Jessore districts to estimate the yield gap of mustard under different production situations. To estimate the yield and return response of mustard under different situations, three demonstration plots with HYV mustard demonstrated by Crop Diversification Programme (CDP) were selected and surveyed for this study. The yield and return gap between Demonstration Plots (DP), Non-Demonstration Plots (NDP) and within Non-Demonstration Plots (NDP) under different situations were estimated. In all the farm situations, the yield of mustard in Jessore was found to be higher than that of yield in Tangail, which was 20% higher in the case of DP SS-75, 20% higher in the case of NDP SS-75, and 28% higher in the case of NDP Tori-7. The return in all the cases was 27%, 21% and 47% higher respectively than Tangail districts. In Both districts, the yield of DP SS-75 was 11% higher than NDP SS-75 and 26% than NDP Tori-7, but the return on full-cost basis were 6% and 8% higher respectively. Therefore, benefit due to yield increase was largely neutralized by costs increase, while return was considered as indicator of farmer's benefit. Lack of credit facilities, high price of inputs, natural hazards, transport and marketing facilities were major problems in mustard cultivation.

# A COMPARATIVE STUDY ON RATAN AND FARMERS PRACTICED TOMATO VERITIES IN SOME SELECTED AREAS OF BANGLADESH

## M. A. Matin, M. S. Hussain, A. S. M. A. Huq and M. E. Baksh

The study was conducted to compare the financial benefit of cultivating Ratan variety tomato with indigenous/local varieties of tomato in Rangpur and Jessore district. Sixty farmers cultivating local variety and forty farmers cultivating Ratan variety were selected randomly for the study. Eight demonstration trials were also selected from each district for Ratan variety of tomato. The total cost of cultivation of Ratan variety was Tk. 27837 per hectare, whereas it was Tk. 25515 per hectare for local variety. The average yield of Ratan and local variety was 29931 kg/ha and 20433 kg/ha respectively. The net return of Ratan and local variety was Tk. 50582 and Tk. 7382 respectively in the study areas. Yield increased based on local variety for both farmers and demonstration was 46 percent and 152 percent respectively. On the other hand, yield increased for demonstration based on farmers HYV variety was 72 percent. Gross return increased based on local variety for both farmers and demonstration was 138 percent and 298 percent respectively. Gross return increased for demonstration based on farmers HYV was 67 percent. Again net return increased based on local variety for both farmer and demonstration was 585 percent and 1213 percent respectively. Net return increased for demonstration based on farmer HYV was 92 percent. The study suggested adopting full package of HYV tomato technologies at farm level for increasing the production of tomato throughout the country.

# MARKETING OF SOME MAJOR SPICES IN BANGLADESH

# M. M. Ullah, M. N. Islam, M. S. Hussain and M. M. Anwar

The study estimated the marketing margins for different market intermediaries of three spices (i.e. ginger, turmeric and chilli) in seven districts, namely Faridpur, Pabna, Rangpur, Nilphamari, Jhenaidaha, Bogra and Chittagong during 1993-1994. For each spice and location, 30 farmers and 30 traders were selected at random and interviewed them administering pre-tested interview

schedule. Tabular method of analysis using descriptive statistics was used for this study. The estimations of marketing channels, costs, margins, and profits for each of the spice were performed separately. Three major channels were identified in ginger marketing. Average marketing cost of ginger for faria, bepari and retailer were Tk. 97, Tk. 199, and Tk.129 per quintal respectively. The highest margin in ginger marketing was obtained by retailer (Tk. 312/quintal). The highest return to investment was obtained by retailer (7.58%). Five major channels were identified in dry turmeric marketing. The average cost of turmeric marketing for faria, bepari and retailer were Tk. 67, Tk. 140.67 and Tk. 64.72 per quintal respectively. Retailers received the highest return and margin (Tk. 1013/quintal) in turmeric marketing. Five major channels were identified in this study for chilli marketing. Average cost of chilli marketing for faria, bepari and retailer were Tk. 42, Tk. 235 and Tk. 57 per quintal respectively. The highest margin was also obtained by retailer and the rate of return to investment was quite high for retailer (17%). Price instability, lack of cash capital, and problem of transport were the major marketing problems in all these three species.

# PRODUCTION AND MARKETING OF GUAVA IN SOME SELECTED AREAS OF BANGLADESH

## M. A. Haque and M. S. Hussain

The study was conducted to estimate the profitability of guava in Barisal, Chittagong and Brahmanbaria districts of Bangladesh. For Production, a sample of 35 growers was selected randomly. The average production per farm was 1648 kg. The average yield per hectare was 11971 kg. The variable cost and fixed cost of production were Tk. 9806/ha and Tk. 4 950 respectively. Average gross return was found to be Tk. 60116/ha out of which gross return from main crop was Tk. 56119/ha and gross return from intercrop was Tk. 3997/ha. Benefit-cost ratio of guava cultivation was found to be 3.90. Attack of diseases, low price of guava, attack of birds & wild animals, lack of irrigation facility, lack of capital, poor transportation & communication systems, lack of HYV seed, high price of fertilizer, lack of spray machine, and lack of credit facility were the major constraints faced by the guava farmers.

## PRODUCTION OF BITTER GOURD IN SOME SELECTED AREAS OF BANGLADESH

## M. A. Hossain, M. S. Hussain and M. E. Baksh

The study was conducted in Jessore, Chittagong and Rangpur districts to estimate the economic profitability of bitter gourd cultivation. A total of 90 sample farmers, taking 30 farmers from each location, were selected at random for interview. Descriptive statistics was used in analyzing the collected data. Bitter gourd is opined to be a labour intensive crop that required on an average 330 man-days of human labour per hectare from planting to harvesting. On an average 53 percent of the total labour was supplied by owners' family. The cost of production of bitter gourd was Tk. 46788 and Tk. 28221 per hectare on the basis of variable cost and cash cost respectively. The average yield of bitter gourd per hectare was 12.94 ton. The average gross return from bitter gourd production was Tk. 93398 per hectare. High price of fertilizers and insecticides, lack of scientific knowledge about modern cultivation, heavy rainfall, high cost of cultivation, disease and insect infestation, and lack of credit facilities were the major problems faced by the bitter gourd farmers.

## EVALUATION OF POTATO PRODUCTION PRACTICES IN MUNSHIGANJ DISTRICT

## M. I. Hossain

The study was conducted to evaluate the potato production practices in Munshiganj district. Mohakali, Carkewar, Paurashava and Panchashar union under Munshiganj Sader Upazila were selected purposively. A total of 108 farmers were selected randomly out of 400 potato growers. Data and information on 15 experimental plots were also collected from the DAE office of Munshiganj Sadar Upazila. Almost all farmers in the study areas cultivated Diamond variety of potato. The average cost of production varied from Tk. 59735/ha (Panchashar) to Tk. 72467/ha (Paurashara). The average yield of potato was found highest in Paurashara (33.65 ton/ha) and the lowest in Panchashar (26.53 ton/ha). The results of experimental plots in the study areas showed that due to lower doses of inputs, the cost of production was Tk. 39532/ha. This production cost in experimental plot was much lower than the farmer's practices. This lower cost was also resulted higher gross margins and higher benefit cost ratio than the farmer's practices, and problem of getting new seeds from BADC, high prices of fertilizers and insecticides, and problem of getting credit were the major problem of potato growers.

# COMPARATIVE STUDY ON HYBRID AND COMPOSITE VARIETY OF MAIZE IN SELECTED AREAS OF BANGLADESH

### M. S. Hussain, M. N. Islam, M. M. Rahman and M. M. Anwar

The study was conducted to estimate the comparative profitability of cultivating hybrid and composite variety of maize at farm levels at Rangpur and Jessore districts. A total of 120 farmers, equally represented by 60 respondents from each district, which is furthermore equally represented by both hybrid and composite variety, served as sample of the study. The average cost of production was Tk. 20800/ha and Tk. 19 854/ha for hybrid variety in Jessore and Rangpur respectively. On the other hand, the average cost of composite variety was Tk. 14 046/ ha and Tk. 15,354/ha in Jessore and Rangpur respectively. The average gross return was Tk. 31898/ha and Tk. 33,723/ha for hybrid variety in Jessore and Rangpur respectively, while it was Tk.19385/ha and Tk. 24421/ha for composite variety. The study showed that gross margin on full-cost and cash-cost basis were higher for hybrid variety compared to composite variety. The benefit cost ratio on full-cost basis was 1.67 and 1.64 for hybrid variety in Jessore and Rangpur respectively, while it was lower (1.36 and 1.58) for composite variety in these districts. Problem of marketing, higher cost of inputs, problem of threshing, lower price of maize, and lack of credit facilities were the major problems faced by the maize growers in cultivating both maize varieties.

# AN ECONOMIC PROFILE OF PINEAPPLE PRODUCTION AND PROCESSING IN BANGLADESH

# S. C. Barman

The study was conducted in Moulvibazar and Rangamati districts to estimate the financial profitability of pineapple cultivation at the farmer's level and to identify the processing capacity at institutional level. A total of 24 agricultural blocks in two districts, 14 blocks in Rangamati and 10 blocks in Moulvibazar were taken for the study. A total 96 pineapple growers of which 40 were randomly selected from Moulvibazar and 56 were from Rangamati district. Tabular and simple statistics were used in analysing the data. The average per hectare cost of pineapple production was found to be Tk. 27621. The average per hectare production cost was found to be higher for medium farms (Tk. 30670) compared to large farms (Tk. 27 091). The average per

hectare gross return from pineapple was found to be Tk. 57349. This return was much higher for medium group Tk. 64542/ha than the return on large farms Tk. 56588/ha. The net income was higher on medium farms both on full-cost and cash-cost basis compared to large farms. The benefit cost ratio was also higher on medium farmers compared to large farmers both on full-cost and cash-cost basis. Fund crisis, higher input prices, and lower product price at farms level were found to be the major constraints to pineapple cultivation.

# POTATO CULTIVATION THROUGH ZERO TILAGE METHOD-ITS ADOPTION AND PERFORMANCE IN PATUAKHALI DISTRICT

#### A. S. M. A. Huq, M. S. Hussain and M. M. Ullah

The study was conducted to analyze the cost and return of potato cultivation through zero tillage method in Patuakhali district. Farmers' attitude towards this method and the obstacles in the path of adoption of zero tillage method was also looked into in this study. On an average per hectare yield was 15.68 ton which fetched a gross return of Tk. 78400. The gross margin on full-cost basis was Tk. 32606 per hectare, while the net return was Tk. 30106. Shortages of quality seed and money along with the higher price of inputs, like fertilizer, insecticides were the major constraints faced by the farmers. The farmers had difficulty in controlling rats which frequently attacked the crops. The above constraints also acted as hindrance in the path of adoption of this technology. In spite of lower yield and higher utilization of money, potato cultivation through this method was found to be profitable.

# MARKETING OF POINTED GOURD IN SOME SELECTED AREAS OF BANGLADESH

# M. M. Ullah, M. N. Islam and M. A. Haque

The study was conducted in Rangpur and Jessore districts to assess the marketing system of pointed gourd. Data were collected from different intermediaries during 1993-1994. Price of pointed gourd observed to be the highest (Tk. 1750/quintal for bepari and Tk. 1875/quintal for retailer) at the beginning of the harvesting period (March) and gradually decreased at the peak period (June-July) and increased at the end of harvesting period (August-September). Average price of pointed gourd at bepari and retailer levels are Tk. 1054/quintal and Tk. 1232/quintal respectively. Average cost for bepari was Tk. 150/quintal of which transport cost was the highest (Tk.100/quintal) followed by commission (Tk. 12/quintal), other costs (Tk. 10/quintal) and weighing-packaging cost (Tk. 8/quintal). Average cost for retailer is Tk. 55/quintal of which other cost was the highest (Tk. 40/quintal) followed by product loss due to rotten (Tk. 10/quintal) and transport cost (Tk. 5/quintal). Average marketing margins for bepari and retailer were Tk. 197/quintal and Tk. 178/quintal respectively. Although, bepari obtained higher margin they received lower profit because of higher marketing cost. Again, the rate of return to investment was lower for bepari (6%) than that of retailer (12%). Price instability, transport problem, and more supply problem were acute for bepari. On the other hand, price instability, lack of cash capital and more supply problems were faced by retailers.

# **TUBEROSE MARKETING IN BANGLADESH: PROSPECTS AND PROBLEMS**

#### M. E. Baksh, M. M. Rahman, M. S. Hussain and S. M. Elias

In order to identify the marketing participants, their profits, and constraints in tuberose marketing, a survey was conducted at Jessore, Khulna and Dhaka market during 1993-1994. Results showed that there were two important marketing participants and five channels in tuberose marketing. About 20960, 1530 and 675 thousand sticks were marketed at Dhaka, Khulna and Jessore town respectively in 1993-1994. During the month from November to December, supply of tuberose stick was inadequate but demand was very high, thereby resulting higher price. On the other hand, adequate supply of tuberose stick was reported during the month from May to June, although price was unacceptably low. Marketing margin, cost and profits were highest for formal retailer compared to bepari and footpath retailers. All market participants earned more market margin and profits at Dhaka compared to Khulna and Jessore market. Credit sell, price gap, money losses and spoilage and damages were the main constraints to farmers and beparis for tuber marketing.

# ADOPTION AND DISSEMINATION OF POWER TILLER AND BARI PLOUGH IN SOME AREAS OF BANGLADESH

## M. E. Baksh, M. A. Matin and M. S. Hussain

In order to document the adoption status of BARI-plough and power tiller and their economic profitability, a survey was done at Jessore, Jamalpur and Dinajpur district during 1993-1994. It was found that majority of the BARI-plough and power tiller owners were large farmer with some exception in Jessore district. Family and farm size was higher for BARI-plough owners at Jessore but smaller in Jamalpur and Dinajpur compared to power tiller owners. Number of adopted tiller increased at a faster rate of 1184% in Dinajpur than to 325% of Jessore during 1989 to 1993. Cash earning by renting out, ploughing of own land, easy management, and quick ploughing were the main causes of power tiller adoption although it has some problems to repair and maintenance. BARI-plough owner argued it as better compared to country ploughed and they wanted it with some modifications. On an average, farmers ploughed about 70.48 ha, 60.50 ha and 100.29 ha of land per year by tiller and earned gross margin of Tk. 15883, Tk. 9499 and Tk. 23674 at Jessore, Jamalpur and Dinajpur district respectively.

#### Abstract 1992-1993

# SOICO-ECONOMIC ASSESSMENT OF PULSE PRODUCTION TECHNOLOGY AND CONSTRAINTS TO ITS HIGHER PRODUCTION AT FARM LEVEL

## M. I. Hossain, M. A. Matin, M. S. Alam and M. Ahmed

The study was an attempt to know the present technology employed in pulse production and explore constraints to its higher production. Nine districts, namely Dhaka, Rajbari, Feni, Patuakhali, Jessore, Sirajganj, Barisal, Gazipur, and Chapai Nawabganj were purposively selected for the study. A total of 563 sample farmers were interviewed during 1991-1992 and 1992-1993. Total variable costs of growing pulses varied from Tk. 1372/ha for blackgram in Chapai Nawabganj to Tk. 6476/ha for chickpea in Feni. The cash cost was the highest in Rajbari for blackgram (Tk. 2237/ha) and the lowest in Jessore (Tk. 280/ha). The highest cost in Feni was mainly due to higher cost in fertilizers, seeds and human labour. The highest gross return was found for chickpea in Patuakhali (Tk. 9540/ha). The gross return was found lowest in Patuakhali for Khesari cultivation (Tk1848/ha). In Feni, the gross margin was found to be the lowest for chickpea cultivation (Tk. 180/ha). When only cash cost was considered, the gross margin was also found highest in Patuakhali for chickpea cultivation resulting the benefit-cost ratio of 2.90

on full-cost basis. The benefit cost ratio varied from 1.03 to 3.38. The higher returns from pulses crop indicated that these are profitable to the farmers and they should be encouraged to cultivate the crops showing different advantageous situations of the crops. Lack of availability of HYV seeds of pulses was reported as the most important problem of the farmers.

#### **PROFITABILITY OF HYVs AND LVs OF OILSEED CROPS**

M. I. Hossain, M. A. Matin, M. S. Alam and M. Ahmed

The study explored the production potential of major oilseed crops with its available technology, estimate their profitability, and explore constraints to higher production. The study was conducted in Tangail, Gopalganj, Sirajganj, Kishoreganj and Brahmanbaria districts. A total of 155 mustard, 63 groundnut and 67 soybean farmers were selected randomly for the study. Oilseed farmers were interviewed with the help of a structured and pre-tested interview schedule during 1992-1993. The average cost per hectare varied from Tk. 4526 to Tk. 6508 for HYVs of mustard, Tk. 3310 to Tk. 5263 for LVs of mustard, Tk. 6250 to Tk. 8521 for LV of groundnut, and Tk. 2672 to Tk. 6800 for HYV of soybean. The gross margin and the benefit cost ratio were found to be higher for HYVs mustard than that of LVs. For groundnut cultivation, the return and gross margin were found to be higher in Kishoreganj but due to higher cost, the benefit-cost ratio was lower in this area. The cultivation of soybean was also found to be profitable in the study areas. The higher cost in Tangail district reduced both gross margin and benefit-cost ratio. The returns to labour under the crops were much higher than the normal daily wage rate. The major problems encountered by the farmers were non-availability of high yielding varieties, higher price of seeds, higher price of fertilizers and insecticides, low price of output, and lack of credit facilities.

#### MARKETING OF GROUNDNUT AND SOYBEAN IN SOME SELECTED

# AREAS OF BANGLADESH

#### M. I. Hossain and M. A. Matin

An attempt was made in this study to know the marketing activities and their constraints so that necessary measures can be taken to increase the production of the crops. Three upazilas, namely Gopalganj Sadar, Kishoreganj Sadar and Sakhipur under Gopalganj, Kishoreganj and Tangail districts respectively were purposively selected for the study. Out of 230 groundnut farmers and 200 soybean farmers, a total of 120 farmers (taking 60 from each crop) were selected randomly including 70 traders from groundnut and 4 traders from soybean to constitute the sample for the study. Four primary markets and two secondary markets were also selected for the study. The sample farmers and traders were interviewed with the help of structured and pre-tested interview schedules during 1991-1992 and 1992-1993. The average cost of groundnut marketing for farmers ranged from Tk. 53 to Tk. 61. In the case of soybean marketing at farm level, these costs ranged from Tk. 11 to Tk.13 per quintal. The average per unit cost of marketing was highest for bepari in both primary (Tk. 77-Tk. 144/qt) and secondary market (Tk. 94-Tk 103/qt) followed by faria. The marketing margins and profits for groundnut were found highest for feriwala in both primary and secondary markets. Groundnut farmers reported the low price of output as an important problem followed by high transport cost. The groundnut traders reported that they need for the support of capital for business. They had also the problem of high transport cost, high commission charge, and risk of credit sale.

# SOCIO-ECONOMIC DYNAMICS OF INFLUENCING THE ACCEPTANCE, PRODUCTION AND CONSUMPTION OF SOME OILSEED CROPS

M. I. Hossain, M. A. Matin, M. S. Alam and M. Ahmed

The study was undertaken in Gopalganj Sadar Upazila under Gopalganj district, Sakhipur Upazila under Tangail district and Patya and Paba Upazilas under Rajshahi district to assess the socio-economic dynamics of influencing the acceptance of oilseed crops. A total of 67 soybean farmers and 20 sunflower farmers were selected for the study. Data were collected from the sample farmers with the help of pre-tested interview schedules during 1992-1993. The average cost of production of soybean in Gopalganj and Tangail, and sunflower in Rajshahi were Tk. 2951, Tk. 6800 and Tk. 3625 per hectare respectively. The gross return was higher in Rajshahi and this results higher gross margins as well as higher benefit-cost ratio both on full-cost and cash-cost basis. The level of adoption of HYVs of oilseed crops reveled that the adoption index of the farmers for soybean and sunflower cultivation were not encouraging. The coefficients of rank correlation revealed a positive significant relationship with the adoption of HYVs of soybean and sunflower. The average consumption for soybean in Gopalganj and Tangail were 0.45kg and 0.71kg per week respectively. For sunflower, it was only 0.84 kg/week.

# COCONUT PRODUCTION AND OIL EXTRACTION AT HOUSEHOLD LEVEL IN SELECTED AREAS OF BANGLADESH

#### S. C. Barman

The study was undertaken to evaluate coconut production and its utilization at farm level. A sample of 56 coconut gardeners (10 small, 11 medium and 35 large) in seven unions of Lakshmipur district was selected, it was observed that the average size of the coconut garden was 1.24 hectares and covered 54% of an average farm size. The average per hectare gross return was found to be Tk. 21386 annually. This return was higher in large group (Tk. 22521) compared to Tk. 17205 and Tk. 16175 for small and medium groups respectively. It was due to higher number of matured coconut per hectare obtained by the farmers in large groups compared to others. However, if we consider the gross return obtained from green coconut only, it was found that the farmers in small group obtained the highest return than others having higher number of green coconut per hectare harvested annually. When all costs were considered the average per hectare net return was estimated at Tk. 20066 annually, but on cash-cost basis it was higher (Tk. 20580). All the sample farmers reported that oil extraction through traditional method is not economically profitable. Household processors do not have any crasher and processing machine for juice collection and it is observed to be the major constraint to oil extraction process. With the support of public authority or other cooperative organizations, small coconut processing and oil extracting plant at farmers disposal would be helpful for both increasing efficiency in oil extraction and rural employment.

# TEASEL GOURD IS A HIGH LAND SUMMER VEGETABLE IN EASTERN BANGLADESH: PROBLEMS AND PROSPECTS

## S. C. Barman

This study was undertaken in Chittagong and Brahmanbaria districts to identify the problems and prospects of teasel gourd (*Momordica dioica*) production. On cash cost basis, the cost of teasel gourd production was estimated at Tk. 9873/ha in Chittagong hill tract, whereas this cost was Tk. 25531 in Brahmanbaria area because of higher expenditure on inputs, especially trellis materials. Studies at Farming System Research (FSR) sites in Chittagong region estimated per

hectare production cost at Tk. 8762.84 for bitter gourd, Tk. 7951 for ridge gourd, Tk. 8858 for cucumber, and Tk.7665 for snake gourd. All these costs were lower than the per hectare production cost of Kakrol. The farmers got average 5.47 ton/ha of teasel gourd in hilly area which was lower than the yield of other summer vegetables estimated in FSR sites in Chittagong area. Although its yield was lower, the gross as well as net returns from teasel gourd were higher compared to returns obtained from other summer vegetables because of higher market price. Lack of productive and disease resistant variety, marketing facilities, and storage facilities were identified as major problems faced by the farmers. However, in overcoming the existing problems and accelerating its production, authority may take certain measures for helping the farmers in substantial exploitation of flood-free high land for vegetables production and at the same time help in reducing the shortages of vegetables in the summer.

## CONSTRAINTS TO JACKFRUIT MARKETING IN BANGLADESH: A RAPID APPRAISAL IN SELECTED AREAS

#### M. M. Rahman

A detailed survey on production and marketing practices of jackfruit was conducted in some concentrated jackfruit growing areas like Gazipur, Bogra, Moulvibazar and Ramgarh to identify the problems and potentialities of jackfruit for future research and development programme. Rapid rural appraisal technique was employed in the study. The key informants were interviewed directly by the researcher. A checklist was used during interview. The data were collected during the early season of jackfruit marketing i.e., April to May, 1993. In the movement process of jackfruits from producer to the ultimate consumers, two types of intermediaries were found in all the study areas. These were (a) wholesalers locally known as beparies or paikers, and (b) retailers locally known as farias. The total costs of marketing of jackfruits were estimated to be Tk. 1380 per hundred fruits. The marketing costs incurred by producer-seller, wholesalers, and retailers were Tk. 305, Tk. 820 and Tk. 255 respectively, constituting 22.10 percent, 59.42 percent and 18.48 percent respectively, of the total marketing costs of jackfruits. The average total marketing margin of jackfruits was Tk. 1810. The average total marketing costs of the intermediaries were Tk. 1075 i.e 59.39 percent of the total margin. The rest, Tk. 735 constituted the profits of the intermediaries. Lack of storage facilities of any kind at the village markets forced the producers to sell fruits at considerably lower prices which were dictated by the more powerful intermediaries.

# TUBEROSE CULTIVATION IN JESSORE REGION: AN AGRO-ECONOMIC ASSESSMENT

#### M. E. Baksh, S. M. Elias, A. S. M. A. Huq and M. M. Rahman

A survey was done at Jessore district in order to understand the production technology employed by the farmers, estimate profitability, and explore constraints to the higher production of tuberose cultivation. Results indicated that tuberose cultivation gaining popularly day by day, increasing area as well as number of farmers. Farmers are growing tuberose commercially for two to three consecutive years from planting once. Spacing was maintained by 51cm x 31cm with 63251 numbers of hills per hectare. Farmers applied higher number of irrigation and chemical fertilizer in third year, but harvested more yields (1298130 no. of stick/ha.) in the second year followed by third year. The highest number of stick was obtained during Asar-Srabon (July-August) compared to other months. The highest net return (Tk. 417362/ha) was found in the second year followed by third year of Tk. 283228/ha. Lack of awareness about modern tuberose cultivation technique, higher input prices, and insect and pest infestation were the major constraints to the higher production of tuberose in the study areas.

# ADOPTION AND DIFFUSION OF POWER TILLER AND BARI PLOUGH IN JESSORE REGION: PROBLEMS AND PROSPECTS

#### M. E. Baksh, M. I. Hossain and S. M. Elias

In order to determine the adoption status of BARI-plough and power tiller, their economic profitability and factors behinds adoption, a survey was undertaken at Jessore district during 1992-1993. Results indicated that majority of the tiller owners were small category farmers compared to BARI-plough adopters and about 70% tiller owners have no draft animals at all. Number of tiller owners is increasing day by day and it was increased about 1168% in 1993 from 1989, whereas BARI-plough number was fixed at 12 numbers due to unavailability. On an average, farmers ploughed about 58.30 hectares of lands per year by tiller and earned about Tk. 37292 by investing Tk. 21437. Farmers purchased tiller for cash earning by renting it, for easy management, and quick ploughing. BARI-plough owners claimed that it was better compared to country plough. They wanted to get BARI-plough with some modification.

## BANANA MARKETING SYISTEM IN SOME SELECTED AREAS OF BANGLADESH

## M. A. Haque, M. A. Matin, M. I. Hossain, M. S. Hossain and S. M. Elias

The study was designed to generate some basic information about banana marketing system. Three banana growing areas, namely Mymensingh, Bogra and Jessore were selected for this study. A total of 60 farmers, taking 20 farmers from each area, were selected for the study. Seventy five traders were randomly selected taking 10 traders (faria and paiker) from primary market and 15 traders (faria, paiker, arathdar cum bepari) from secondary market from each area and 5 arathdar cum beparis and 5 retailers from terminal market (Dhaka city) were selected randomly for this study. Average total cost of 100 bananas in the study areas was about Tk. 33.96 of which production cost was Tk. 28.54 and marketing cost was Tk. 5.42. The average marketing cost of 100 bananas of different intermediaries was Tk. 15. Transport cost was the major cost item (38%) of different intermediaries followed by spoilage and damage (35%), loading and unloading (6%). Among the intermediaries, the cost for arathhdar cum bepari was found to be the highest due to higher cost of transport and spoilage & damage. Marketing margin of faria, arathdar cum bepari and retailer were Tk. 6.32, Tk. 16.01 and Tk. 34.02 per 100 bananas respectively. The profit of retailer was found to be the highest among all the intermediaries. Low price, high transport cost, monopoly of traders, and spot disease were the problems identified by the banana growers. Lack of capital and high transport cost were the major problems of banana marketing of different intermediaries.

# PRODUCTION AND MARKETING OF POINTED GOURD IN SOME SELECTED AREAS OF BANGLADESH

#### M. M. Ullah and M. A. Haque

The study was undertaken to assess the present technology used, profitability, and constraints to pointed gourd cultivation. Rangpur and Jessore districts were selected purposively for the study. A total of 30 sample farmers from each location were selected for interview. Data were collected from the sampled farmers during 1992. Cobb-Douglas production function was used to estimate the resource use efficiency in producing pointed gourd at farmers' level. Total cost of pointed

gourd cultivation was found to be Tk. 74776/ha. Both full cost (Tk. 73651/ha) and cash cost (Tk. 35055/ha) were found to be higher for Jessore farmers' compared to Rangpur farmers' because of using more of human labour and fertilizers. Average yield of pointed gourd was found to be 31814 kg/ha. The yield of pointed gourd for Jessore was much lower (26310 kg/ha) than those of Rangpur (38308 kg/ha) because of damaging crops by heavy rainfall. Average gross return from pointed gourd cultivation was estimated to be Tk.190884/ha. Average gross margins were Tk. 159097/ha on cash-cost and Tk. 124481/ha on full-cost basis, and net return was Tk. 116108/ha. Benefit cost ratio of pointed gourd cultivation was 2.55. High price of fertilizers & insecticides and lack of credit were the two major problems reported by the respondent farmers in the study areas.

# PRODUCTION OF WINTER VEGETABLES AND ITS CONTRIBUTION TO THE FARM FAMILIES

#### A. S. M. A Huq and M. M. Rahman

The study was conducted to analyze the production and disposal pattern of vegetables, estimate profitability, and assess the contribution of selected winter vegetables to the farm households. The study was conducted at Jessore and Comilla district during 1992-1993. Per hectare net returns were Tk. 22100, Tk. 35949, Tk. 6846 and Tk. 52178, and gross margin on full-cost basis were Tk. 31418, Tk. 44117, Tk.16188 and Tk. 59678 for cauliflower, cabbage, radish and country bean respectively. Per household consumption of total product was 2 to 7 percent in Jessore and 4 to 7 percent in Comilla. Per farm average area under cabbage and cauliflower was higher in Jessore compared to Comilla. Cash obtained from sell was higher from cabbage (Tk. 14516/Farm) followed by country bean (Tk.10085/farm) in Jessore and in Comilla districts. It was higher from cauliflower (Tk. 5470/farm) followed by cabbage (Tk. 4384/farm). From the economic point of view, country bean and cabbage cultivation was profitable in Jessore district and cauliflower followed by cabbage cultivation was profitable in Comilla district.

# Abstract 1991-92

# AGRO-ECONOMIC ASSESSMENT OF PAPAYA CULTIVATION IN SOME SELECTED AREAS OF JESSORE REGION

## M. E. Baksh and S. Hossain

The study was undertaken to assess the production technology, profitability, and constraints to higher production of papaya cultivation in four upazila, namely Jessore Sadar and Jikargachha under Jessore district and Jhenaidah Sadar and Kaliganj under Jhenaidah district. A total of 56 farmers were interviewed with the help of a pretested interview schedule. Tabular method of analysis was fallowed in the study. Per hectare cost of cultivation was Tk. 25040 for the first year, Tk. 35035 for second year and Tk. 27500 for third year. The average yields were 25.56 ton, 119.76 ton and 98.16 ton per hectare in the first, second and third year respectively. Farmers received highest per hectare gross return (Tk. 209580) and gross margin (Tk. 175553) in second year. Benefit cost ratio and net present value were calculated considering 10 percent, 12 percent, and 15 percent discount rates. The BCR and NPV were found highest in third year at all discounting rates. In third year, per hectare NPV was Tk. 271000 at 10 percent discounting rate and it was Tk. 245008 at 15 percent discounting rate. The major constraints reported by the farmers for papaya cultivation were lack of improved technology, disease, and pest infestation.

# SOCIO-ECONOMIC ASSESSMENT OF PULSES PRODUCTION TECHNOLOGY AND CONSTRAINTS TO ITS HIGHER PRODUCTION AT FARM LEVEL

#### M. I. Hossain and M. A. Matin

The study was undertaken to know the available technology of pulses production, its economic gains, and identify the constraints to pulses production in seven upazilas, namely Dhamrai, Rajbari Sadar, Sonagazi, Kalapara, Jikargachha, Raiganj, and Kapasia under Dhaka, Rajbari, Feni, Patuakhali, Jessore, Sirajganj and Gazipur districts respectively. Five pulse crops, namely lathyrus (Khesari), lentil, mungbean, chickpea, and blackgram were included in the study. A total of 502 sample farmers were interviewed with the help of a pre-tested interview schedule. The highest total variable cost of growing per hectare lathyrus was estimated to be Tk. 2989 and Tk. 3078 for Dhaka and Rajbari district respectively. The highest cost of growing per hectare lentil was Tk. 4020 and Tk. 4876 in Jessore and Sirajganj respectively. For mungbean, it was Tk. 3167 in Patuakhali and Tk. 5444 in Feni. Cost of growing chickpea was found to be much higher in Feni (Tk. 6476/ha) than in Jessore (Tk. 3715/ha). The higher cost incurred mainly for fertilizers, seeds and human labour. The cost of growing blackgram was found higher in Rajbari (Tk. 6021/ha) than in Gazipur (Tk. 4266/ha). The highest gross return was found for chickpea in Jessore (Tk. 7831/ha) on full-cost basis among all pulses in the study areas. The benefit cost ratio varied from 1.02 to 2.23. The major problems faced by the farmers were non-availability of HYV seeds in time, high price of fertilizers and insecticides, and also non-availability of credit in time.

# PRODUCTION OF POINTED GOURD IN SOME SELECTED AREAS OF BANGLADESH

## M. M. Ullah and M. Ahmed

The study was conducted to know the available technologies employed in pointed gourd cultivation, financial gains, and constraints to its higher production in Jessore Sadar Upazila under Jessore district and Mithapukur Upazila under Rangpur district. A total of 60 farmers, taking 30 from each area, was selected randomly and interviewed with the help of a pre-tested interview schedule. The average cost of cultivation was Tk. 74776/ha and it was higher in Jessore (Tk. 84883/ha) and lower in Rangpur (Tk. 62856/ha) district. The yields were recorded 26.31 ton and 38.31 ton per hectare in Jessore and Rangpur respectively. The higher yield in Rangpur resulted higher gross return (Tk. 191540/ha), higher gross margin (Tk. 163606/ha) and higher benefit cost ratio of 3.05. On the other hand, the gross return, gross margin, and benefit cost ratio in Jessore were Tk. 184170/ha, Tk. 149115/ha and 2.17 respectively. Farmers reported different problems during pointed gourd cultivation among which high price of fertilizers and insecticides, lack of credit facility in the time, and heavy rainfall were important.

# PRODUCTION OF BANANA IN SOME SELECTED AREAS OF BANGLADESH

## J. K. Saha, M. A. Matin and M. Ahmed

The study was conducted to estimate the profitability and explore the constraints of banana cultivation in Shibganj Upazila under Bogra and Trishal Upazila under Mymensingh district. A total of 90 farmers, taking 45 from each area, were selected randomly. The average per hectare cost of production was estimated to be Tk. 45029, when all variable costs were considered. The total variable cost per hectare was higher at Mymensingh (Tk. 52952/ha) compared to that at Bogra (Tk. 37284/ha). The average yield of banana was found to be 2743 Kadhi (bunches) per hectare. The average gross margin per hectare of banana was found to be Tk. 88760 and Tk. 106048 on the basis of full-cost and cash-cost respectively. Gross margin per hectare was found to be higher at Mymensingh district compared to Bogra district due to its higher yield and higher price. The average benefit cost ratio was 2.97. The bunchy top was the major constraint both at Bogra and Mymensingh for Amritsagar (one of the varieties of banana).

# AGRO-ECONOMIC STUDY OF CABBAGE AND CAULIFLOWER CULTIVATION IN SELECTED AREAS OF BANGLADESH

M. A. Matin, M. Ahmed and M. I. Hossain

The study was conducted to identify the production technologies of cabbage and cauliflower, their profitability, and constraints to higher production in Jessore Sadar and Bogra Sadar under Jessore and Bogra district respectively. A total of 120 farmers was selected randomly taking 30 farmers for each crop and interviewed with the help of a pre-tested interview schedule. The average yield of cabbage was 34.24 ton per hectare. The average cost of cabbage per hectare was Tk. 24161 on full cost and Tk. 12819 on cash-cost basis. The gross margin was found higher in Bogra both on full cost (Tk. 74700/ha) and cash cost basis (Tk. 86381/ha) due to higher yield. The benefit cost ratio was also higher in Bogra (3.77). The cost of production for cauliflower was higher in Bogra district than in Jessore district on both full-cost (Tk. 27484/ha) and cash-cost basis (Tk. 16664/ha). The yield of cauliflower was found higher in Bogra (19.5 t/ha) than in Jessore (15.48 t/ha). The gross margin of cauliflower was found higher in Bogra than in Jessore on full-cost (Tk. 89516/ha) and cash-cost basis (Tk. 100336/ha). The benefit cost ratio was also higher in Bogra (4.26). The important problems faced by the farmers in the study areas included high price of fertilizer and insecticides, lack of mechanical irrigation facility, lack of good quality seeds and low price of output.

# MARKETING OF GROUNDNUT AND SOYBEAN IN SELECTED AREAS OF BANGLADESH

M. I. Hossain, M. A. Matin, M. Ahmed and M. S. Alam

The study was conducted to find out the channels of marketing of groundnut and soybean, their costs and margins, price variation, and constraints in Gopalganj and Tangail districts. A total of 100 farmers and 52 traders were selected randomly for interview. Eight primary markets and two secondary markets were also selected for the study. The farmers and the traders were interviewed using a pre-tested interview schedule during 1991-92. The average cost of marketing for groundnut farmers ranged from Tk. 53 to Tk. 61 and for soybean farmers from Tk. 11.00 to 13.00 per quintal. Per unit cost of marketing was found highest for bepari in both primary (Tk. 77-Tk. 144/qt) and secondary markets (Tk. 94 Tk. 103/qt) followed by faria. The marketing margin and profit were found highest for feriwala in both primary and secondary markets. The groundnut traders had also some problems. They seek capital support for their business. They had also the problems of high transport cost, high commission charge, and risk of credit sale.

# MARKETING OF ONION IN SELECTED AREAS OF BANGLADESH

# M. M. Ullah and N. I. Islam

The study was undertaken to find out the channels of onion marketing, its cost and margins, and constraints to higher production in Sadarpur Upazila of Faridpur district and Sathia Upazila in Pabna district. A total of 30 farmers and 35 traders were selected and interviewed with the help of a pre-tested interview schedule. Two primary and two secondary markets were also selected for the purpose. In primary markets, marketing cost was higher for bepari (Tk. 1072/ton) followed by retailers (Tk. 1035/ton) and faria (Tk. 477/ton). Among the cost items, transportation cost was higher for bepari (64%) and faria (54%), whereas the cost of food and lodging was higher for bepari (74%). In secondary markets, marketing cost was also higher for bepari (Tk. 1311/ton) followed by retailers (Tk. 905/ton) and arathdars (Tk. 100/ton). The rate of returns on investment was found to be the highest for retailers both in primary markets (35%)

and secondary markets (32%). This return was lowest for bepari in primary markets (27%) and for arathdars in secondary markets (16%). The first ranked problem faced by the farmers was high transportation cost followed by lack of credit facility, lack of storage facility, and lack of transport facility.

# WHEAT MARKETING SYSTEM IN SOME SELECTED AREAS OF BANGLADESH

S. M. F. Islam and M. Ahmed

The study was conducted to find out the channels of wheat marketing, costs and margins, marketing efficiency of wheat, storage system, impact of imported wheat, and constraints in Jamalpur, Rajshahi, Dinajpur, Meherpur, and Jessore districts. A total of 200 farmers, taking 40 from each location, were included in the study. Ten wheat markets, taking one primary and one secondary market from each location, were selected for the study. Seventy-five traders were selected randomly from primary markets and 120 traders from secondary markets. The average per quintal marketing cost of farias in primary markets was slightly higher (Tk. 6.84) than that of secondary market (Tk. 5.93) due to high transport cost (Tk. 2.09). Per quintal total cost of beparis was higher in the primary markets (Tk. 13.45) than the secondary markets (Tk. 12.21) mainly due to higher transport cost. Marketing cost of wheat for retailer in the primary and secondary markets were Tk. 42.15 and Tk. 41.40 per guintal. It was found that farias in primary markets obtained lower margins and profits than the farias in secondary markets. The margins of retailers in the secondary markets were higher (Tk. 114/qt) than that of primary markets (Tk. 102/qt). Profit of retailers in secondary markets was also higher (Tk. 74/qt) than that of the primary markets (Tk. 60/qt). Marketing efficiency of the traders in secondary markets was higher than primary market.

#### Abstract 1990-1991

# AGRO-ECONOMIC PROFILE OF HYV MUSTARD PRODUCTION IN SELECTED AREAS OF BANGLADESH

# M. I. Hossain, M. A. Matin, M. Ahamed and M. S. Alam

The study was carried out to assess the resources used and their effects on HYV mustard cultivation, its profitability, and to identify constraints to its higher production in three upazila, namely Shahjadpur, Magura Sadar and Brahmanbaria Sadar under Sirajganj, Magura and Brahmanbaria districts respectively. A total of 101 farmers were interviewed with the help of a pre-designed interview schedule during the Rabi season. The average yield of mustard was 899 kg/ha. The highest yield was observed in Magura (1066 kg/ha) and the lowest yield was found in Sirajganj (785 kg/ha). But among varieties, the highest yield was obtained from Sampad (1105 kg/ha). The average cost of production of HYV mustard was Tk. 7467 per hectare and average gross return was Tk. 13221 per hectare. The average gross margin was Tk. 5754 per hectare with benefit cost ratio of 1.77 under full-cost basis. When only cash cost was considered, average gross margin was Tk. 9492/ha with benefit cost ratio of 3.54. The major constraints to HYV mustard cultivation were non-availability of quality seed, high cost of fertilizers, and lack of irrigation facilities. The study suggested future research work on the development of HYV varieties and location-specific appropriate technological packages.

# CONSTRAINTS TO SOYBEAN CULTIVATION IN SELECTED AREAS OF BANGLADESH

# J. K. Shaha, M. A. Matin and M. Ahmed

The study was conducted to assess the use of technology for soybean cultivation, its profitability, and to identify constraints to its higher production at farmers' level in Tangail and Gopalganj

district. A total of 90 farmers were interviewed with the help of interview schedule during the Rabi season. The study revealed that the farmers purchased seeds only from the selected agent of MCC on condition that they must sell their products at pre-fixed price, which causes a great loss of expected benefit to the farmers. There was a problem of getting quality seeds in time and also usually they did not get seeds if they were not included in the list made by Gano Unnayan Pracheshta (GUP), and NGO which acted as an agent of MCC. Farmers cultivated only one variety of soybean, pb-1 and did not follow any recommended method of cultivation. The farmers faced the problems of insect attack in their fields. Insecticides were not available in time. Non-availability of credit facilities and lack of knowledge of soybean cultivation and their uses were the other causes for non-expansion of soybean cultivation. The study suggested that some research works and extension activities like development of high yielding varieties of soybean, location specific appropriate technological packages, marketing policy, and timely availability of inputs at reasonable price.

# ECONOMIC PROFILE OF BANANA CULTIVATION IN SELECTED AREAS BANGLADESH

# M. I. Hossain, M. A. Matin, M. Ahmed and M. S. Alam

A survey was conducted to assess the existing technology employed in banana cultivation, profitability, and constraints to banana cultivation in Mymensingh, Bogra and Jhenaidaha district. A total of 135 farmers were interviewed with the help of pre-designed structured interview schedule during 1990-1991. The average yield of banana was 2473 bunches per hectare. The highest yield was found in Mymensingh (2597 bunches/ha) and the lowest yield was found in Bogra (2352 bunches/ha). The average cost of production of banana was Tk. 45029/ha when all variable costs are considered and Tk. 27741/ha when only cash costs were considered. The total variable cost was the highest in Mymensingh (Tk. 52952/ha) and the lowest in Bogra district (Tk. 37284/ha). Average gross return was Tk. 133789 per hectare. Gross return was the highest at Mymensingh (Tk. 168156/ha) and the lowest in Bogra (Tk. 102735/ha). Average gross margin was Tk. 88760/ha on full cost and Tk. 106048/ha on cash cost basis. The average benefit cost ratio was 2.97 and 4.82 on full cost basis and cash cost respectively. The major constraints to banana cultivation were more prevalence of bunchy top, occurrence of panama disease, high cost of fertilizers and insecticides, lack of institutional credit facilities, etc. The study suggested that future research work on development of modern high yielding varieties with appropriate low-cost technological packages and socio-economic studies, especially marketing structure be carried out.

# AGRO-ECONOMIC PROFILE OF WINTER BRINJAL CULTIVATION

# M. A. Haque and M. Ahmed

A study was conducted to know the existing agronomic practices, profitability of winter brinjal cultivation and to identify the constraints to its higher production at farm level in three upazilas, namely Islampur in Jamalpur district, Gaforgaon in Mymensingh district and Kaliganj in Jhenaidah district. A total of 105 farmers were selected taking 35 farmers from each Upazila which included 20 small, 10 medium and 5 large category farmers at random and they were interviewed through pre-tested survey schedule during the winter season. The average yield of brinjal was 28.36 tons per hectare and it was found higher (34.67 t/ha) in Jhenaidah and lower (23.48 t/ha) in Mymensingh district. The average cost of brinjal cultivation was Tk 25993/ha on the total variable cost basis and Tk 6635/ha on the basis of cash cost. Average gross return was Tk 156374/ha and it was higher in Jhenaidaha (Tk 173329/ha) because of higher yield although the price was lower. The benefit cost ratio was 2.00 and it was higher in Mymensingh (2.18) followed by Jhenaidah (1.96) and Jamalpur (1.99). Medium farmers received higher gross margin and high benefit cost ratio than other groups of farmers mainly due to lower cost of

production and higher yield. Diseases and insect infestation, high cost of fertilizers, lack of institutional credit facilities, and marketing problem were the major constraints to brinjal cultivation in the study areas.

## AGRO-ECONOMIC PROFILE OF PINEAPPLE CULTIVATION

M. M. Ullah and M. Ahmed

A survey was conducted to know the existing agronomic practices of pineapple cultivation, to estimate the profitability of its cultivation and to explore the constraints to its higher production at farm level in Madhupur Upazila of Tangail district. Data were collected from 110 pineapple growers with the help of pre-tested interview schedules during 1990-1991. Average yield was 17.79 t/ha per year and it was the highest in third year (24.21 ton/ha) with an average weight of a pineapple was 1.50 kg. The per hectare cost of pineapple cultivation was Tk. 11615 for the first year, Tk. 8200 for the second year, Tk. 22213 for the third year, Tk. 17892 for the fourth year, Tk. 19621 for the fifth year and Tk. 15519 for the sixth year. Among all cost items, human labour occupied the major portion. On an average, farmers received about Tk. 13022/ha from different intercrops during the first year and Tk. 2707 during the second year. Farmers received the highest return (Tk. 54062/ha) during the third year, followed by fifth year (Tk. 46619/ha) and fourth year (Tk. 45010/ha). Gross margin was also highest in the third year (Tk. 31849/ha) followed by fourth year (Tk. 27118/ha), fifth year (Tk. 26998/ha) and sixth year (Tk. 26784/ha). The major constraints for pineapple cultivation were marketing problems, lack of improved production technology and lack of institutional credit facility. The study suggested that some future research works on optimum balanced fertilizer doses, adaptability trial of HYV varieties, identifying best combination of intercrops and development of improved management practices. etc. should be done to economize and maximize production of this crop.

#### Abstract 1989-1990

# PANIKACHU PRODUCTION IN JAMALPUR: IT'S AGRO-ECONOMIC CONSTRAINTS AND POTENTIALITIES

# M. E. Baksh, M. A. Hoque, M. Ahmed and M. I. Hossain

A study on agro-economic constraints and potentialities of a newly introduced panikachu line (introduced from Asam, India as told by the farmers) was conducted at Sarishabari and Jamalpur Sadar upazila of Jamalpur district during Rabi, 1989-1990. A structured interview schedule was used for interviewing 70 purposively selected farmers who were cultivating panikachu cultivars like newly introduced IRRI, Dholkhamer (DK) and Narikeli kachu to find out the existing production practices and to estimate the financial profitability of panikachu. The area was found with increasing trend with IRRI kachu, while the existing local cultivars had diminishing trend. In the cultivation technologies, planting space (65cm x 70 cm) was observed in IRRI kachu, while close planting was done with DK and Narikeli kachu. Most high lands (64%) were covered under IRRI kachu while DK and Narikeli kachu recorded 67 and 40 percent under medium and high land condition respectively. Higher quantity of manures and fertilizers were also recorded for IRRI kachu at the rate of 536, 242 and 100 kg for Urea, TSP, and MP respectively while in DK and Narikeli kachu, fertilizer use was found low, but still imbalanced and injudicious. During the study, potato, radish, onion and mustard were found promising in inter or mixedcropping with IRRI kachu at 29, 13, 11 and 9 percent respectively. Man-hours required highest with DK (7784) while it was lowest with IRRI kachu. Finally, the yield of IRRI kachu was recorded highest with 97.52 t/ha, while Narikeli kachu was found lowest (46.98 t/ha) but comparable with Dholkhamer.

# IMPACT OF AGRICULTURAL CREDIT ON PRODUCTIVITY AND INCOME OF RURAL HOUSEHOLDS

M. Ahmed, M. R. Karim and M. M. Ullah

The study was conducted to assess the impact of agricultural credit on productivity and income of crops and on aggregate income of the rural household during 1989-1990. A total of 1800 rural households were categorized into borrower and non-borrower. Higher yield, gross return, gross margin, net return, and BCR was found for borrower households than those of non-borrower households indicated positive impact of credit on them. The magnitude of impact of credit was very low because credit was not used for agricultural purposes for which it was borrowed. There is potential scope for increasing productivity and income in agricultural sector by proper utilization of credit through using more inputs and improved technology. Aggregate farm income of borrower households obtained 89 percent (Tk. 50807/household) income from agricultural and only 11 percent (Tk. 6499/household) from non-agricultural source. But they spent only 31 percent (Tk. 13839/household) of the expenditure on agricultural sector and 69 percent (Tk. 31392/household) for non-agricultural sector. The similar trend of income and expenditure was also observed for non-borrower households.

# ANALYSIS OF WHEAT YIELD BETWEEN IRRIGATED AND RAINFED CONDITIONS

#### M. Ahmed

The study analyzed yield and inputs use differential between the irrigated and non-irrigated wheat farms. Data were gathered for the 1986-1987 Rabi season from 200 farmers growing wheat on some 279 plots of wheat in nine districts, namely Bogra, Comilla, Brahmanbaria, Pabna, Rangpur, Kushtia, Rajshahi, Tangail and Jamalpur. The statistical analysis was made using both descriptive statistics and significance tests. It was found that the yield was positively and significantly affected by the use of Urea fertilizer, hired labour, quantity of seed used, and price ratio of wheat to rice and harvest price of wheat. Medium farmers to reap greater yield compared to large and small farms and small farms got the lowest yield. It was found that no significant differences existed with respect to yield, hired labour and seed rate between irrigated and non-irrigated farms. It is required to remove uncertainty in yield and/or timely planting of wheat to minimize yield reduction effect of late planting due to late jo condition or late harvest of T. Aman. With supplemental irrigation becoming expensive and uncertain, the policy to develop varieties for rainfed conditions may be more appropriate and important at this stage for further development of wheat in the country.

# PROFITABILITY AND RESOURCE USE EFFICIENCY IN TEASEL GOURD PRODUCTION IN BRAHMANBARIA DISTRICT

# S. C. Barman, M. Ahmed and M. I. Hossain

The present study was undertaken in three agricultural blocks of Brahmanbaria district, namely Paharpur, Singarbil and Akhawra to assess the financial profitability and resource use efficiency of teasel gourd production. A total of 68 farmers were selected randomly and interviewed through a structured interview schedule during 1987-1988. Due to high cultivation cost (Tk. 57359/ha) and higher cash expenditure (Tk. 25530/ha), the small farmers couldn't effort for

teasel gourd cultivation. As a result, teasel gourd cultivation was concentrated proportionately on medium and large farms. Human labour, tubers, sticks, manure, and fertilizers were the major cost items. It was observed that the farmers in the medium group showed better performance with higher benefit cost ratio. The functional analysis revealed that in the survey area most of the resources used in teasel gourd production were not at optimum level. The farmers could increase their return from teasel gourd production through reallocation and intensive use of their resources. For efficient and intensive use of technological inputs, farmers need technical information particularly for fertilizer doses and agronomical practices. As such some basic research work on fertilizer trails with teasel gourd considering soil fertility status and for agronomical practices may be suggested for generating appropriate information for farmers.

# INCOME AND EXPENDITURE DISTRIBUTION PATTERN OF BORROWER AND NON-BORROWER RURAL HOUSEHOLDS

## M. Ahmed, M. R. Karim and M. M. Ullah

This study was undertaken to assess income and expenditure distribution pattern of borrower and non-borrower farmers. Data were collected form 32 districts covering 51 upazilas and 120 mouzas. A total of 1800 respondents were selected by two-stage sampling procedures. Out of 1800 respondents, 309, 600, 554 and 337 were landless, small, medium, and large farmers respectively. The respondents were interviewed with the help of interview schedules during 1987-1988. Data were analyzed in tabular forms using averages, percentages and ratios. Borrower households obtained higher income from agricultural sources than non-borrower households. But non-borrower households obtained higher income from non-agricultural sources than borrower households. Borrower households had higher expense for farm operations and purchase of farm assets than non-borrower households. Average annual income of borrower households was Tk. 57306 per farm and Tk. 53093 per farm for non-borrower households. Per capita income of borrower and non-borrower households were Tk. 6938 and Tk. 6859 respectively. Annual expenditure was found higher in borrower households (Tk. 4523/farm) than non-borrower households (Tk. 39455/farm) due to higher expenses for the purchase of farm and non-farm assets, repair, and other operational expenses. The implication of the findings was that credit helped the farmers to earn more income which was mobilizing from agricultural sectors to non-agricultural sectors. To avoid risk and uncertainty in agriculture, government should take some measures like crop insurance, livestock insurance, and incentives for investment.

# WHEAT MAKETING SYSTEM IN BANGLADESH: SOME PRELEMINARY FINDINGS

# M. Ahmed, S. M. F. Islam, M. A. Haque, and M. S. Alam

The study was conducted during March, 1990 in five wheat growing districts, namely Jamalpur, Jessore, Meherpur, Rajshahi and Dinajpur to assess existing wheat marketing system. Data were collected from 50 farmers, 75 intermediaries of primary markets and 120 traders of secondary markets with the help of a structured interview schedules. The traders purchased wheat during March to May with a quantity 32 quintal per trader in primary markets, whereas it was 139 quintal per trader in secondary markets. The cost of marketing for farias, beparis, and retailers were higher in primary markets than the secondary markets. Again, the millers had the highest cost of marketing (Tk. 45.57 per 100 kg) followed by retailers (Tk. 41.78 per 100 kg). The

marketing margins of farias, beparis and retailers were found higher in the secondary markets than the primary markets. Including primary and secondary markets, the retailers obtained the highest marketing margins (Tk. 108.28/quintal) followed by millers (Tk. 59.45/quintal). Inadequate capital, price instability and inadequate storage facilities were major problems faced by the respondents. The study suggested that credit facilities should be increased in the primary markets, especially for faria, bepari and retailers, and price incentive should be provided for the farmers.

# ECONOMICS AND RESOURCE USE EFFICIENCY IN MUKHIKACHU PRODUCTION AT FARM LEVEL

M. Ahmed, J. K. Saha, M. I. Hossain and W. A. Zahan

The study was conducted in three districts, namely Kushtia, Jessore and Bogra to estimate resource use efficiency in mukhikachu production in 1989. A sample of 120 farmers (40 farmers from each district) was selected randomly. The average cost of production of mukhikachu was Tk. 39815 per hectare when all variable costs were included. When only cash-costs were considered, the average cost per hectare of mukhikachu was found to be Tk. 19435/ha. The average cost per kilogram of mukhikachu was Tk. 2.93 and Tk. 1.38 on full-cost and cash-cost basis respectively. The average yield of mukhikachu was found 13.96 ton per hectare. The average gross return was found to be Tk. 36265 on the basis of total variable cost and cash cost respectively. The benefit-cost ratio was 1.40. Average return to family labour from mukhikachu production was found to be Tk. 10.32. Non-availability of modern variety, lack of storage facility, lack of credit facility, insect/pest attack, lack of irrigation facility etc. problems were faced by the farmers in mukhikachu cultivation. Therefore, institutional credit facilities, irrigation facilities, preservation of mukhikachu and extension services to communicate the farmers about the innovative practices are suggested.

# AGRO-ECONOMIC STUDY OF COWPEA PRODUCTION IN CHITTAGONG DIVISION

# S. C. Barman, M. Ahmed, and M. I. Hossain

In Chittagong and Noakhali districts, a survey was conducted to evaluate the production performance of cowpea in1989. A total of 80 farmers, 40 from each district were selected randomly. Both tabular and statistical techniques were used in analyzing the data. The average yield of cowpea on the sample plots was estimated to be 711 kg per hectare. The average cost of production of cowpea was observed to be Tk.7411 per hectare. The average per hectare net return was Tk. 2558 and Tk. 89010 on full-cost and cash-cost basis respectively.. As such some experiments and study may be undertaken for generating appropriate management practices and identifying optimum seed rate, for higher yield, and for profitable cowpea cultivation.

# WINTER VEGETABLES MARKETING SYSTEM IN SELECTED AREAS OF BANGLADESH

## M. Ahmed, A. K. M. H. Haque, M. A. Matin and M. I. Hossain

The study was conducted in Jessore, Bogra, Comilla and Dhaka during the winter season of 1989-1990. The data were collected from radish, cabbage, cauliflower and tomato with the help of interview schedule. A total of 160 growers, 160 beparis, 160 rural retailers and 10 urban

retailers and 20 arathdars were selected to constitute the sample for the study. The study identified five channels of vegetable marketing. These were: Grower- Consumer; Grower-Retailer-Consumer; Grower-Bepari-Arathdar-Retailer-Consumer; Grower-Agent-Exporter; and Grower-Arathdar-Exporter. The growers mostly used van and head/shoulder to carry their vegetable products in the market. The traders had highest cost in producing tomato (Tk. 357.20/quintal) and the lowest in radish (Tk. 189.38/quintal). Traders obtained highest margins in cauliflowers marketing followed by tomato marketing. High price variations for the vegetables were observed from month to month and area to area. Grower faced the problem of unstable price, lack of market place, high market tolls, and defective weighing systems. The traders reported similar problems and in addition they also reported transport problem and lack of marketing information. The study suggested better distribution systems of vegetable to ensure the fair prices for the growers.

# MANGO PRODUCTION IN BANGLADESH: IMPACT OF WEATHER AND MARKET PRICE ON OUTPUT INSTABILITY

## M. Ahmed and S. M. F. Islam

This study was conducted to assess the impact of weather and market price on output instability. Both micro and macro level data were used in the study. Micro level data were collected from four villages of Sadar Upazila under Chapai Nawabganj district. A total of 500 households were selected randomly. Tabular method, regression analysis, and output supply model were used in analyzing the data. Primary data were collected during 1989 and time series data were used from 1972 to 1986. The popular varieties of mango grown in the study areas were Gopalvog, Fazli, Langra, Khirshapti and Arshina. The average cost of production was Tk. 10532/ha including "on year" and "Off year" period. Econometric test showed that 80% of the inter district variations in instability in mango output were accounted by January-February, March-April, and May-June rainfall. The coefficients of estimates showed that variations in January-February and March-April rainfall had greater significant effect on output instability than that of May-June rainfall. Market price had no significant effect on output instability. Factors associated with instability in mango production were weather, unfavorable environmental condition, attack of insects and diseases, and increasing number of aged trees. Development of high yielding varieties, extension services, research on water management, and credit facilities are some of the recommendations for improving mango production in the country.

# AN AGRO-ECONOMIC PROFILE OF GINGER CULTIVATION AND CONSTRAINTS TO ITS HIGHER PRODUCTION IN BANGLADESH

# M. Ahmed and J. K. Saha

This study was undertaken in Rangpur and Nilphamari districts to evaluate ginger cultivation during 1989-1990. A total of 80 farmers, taking 40 farms from each district, were selected randomly. The average cost of production was Tk. 53218/ha on full-cost and Tk. 18458 on cash-cost basis. The average yield was 9.17 ton/ha with the highest in Nilphamari (9.46 ton/ha) and the lowest in Rangpur (8.87 ton/ha). The average cost of cultivation was found higher in Nilphamari. The benefit-cost ratio was similar in both the study areas. Farmers in Nilphamari, again, obtained the higher gross margins both on full-cost and cash-cost basis. Farmers sold 78 percent of the total production of ginger at different times and 21 percent used as seed and 1

percent as consumption. Farmer mentioned the problems of stealing at height, disease and insect infestation, lack of credit, high cost of fertilizers and seeds. Research for location specific technology, adaptability trial of ginger practices, and institutional credit facilities are suggested for higher production of ginger in Bangladesh.

# AN AGRO-ECONOMIC PROFILE OF WATERMELON CULTIVATION AND CONSTRAINTS TO ITS HIGHER PRODUCTION IN BANGLADESH

M. A. Hoque and M. M. Ullah

The study was conducted to document the agro-economic profile and constraints to watermelon production. Data were collected from Chittagong and Natore districts. A total of 70 farmers, taking 35 farmers from each area, were selected randomly during 1989-1990. Total human labour requirements were 185 man-days and 523 man-days per hectare in Natore and Chittagong districts respectively. The farmers of Chittagong did not use animal power for cultivation but the farmers of Natore district required 28 pair days/ha for cultivation. The average seed rate and manure used were 413 kg and 4.48 ton per hectare respectively. The quantities of fertilizers in Natore were 330 kg, 145 kg and 63 kg and in Chittagong 488 kg, 230 kg and 82 kg per hectare, of Urea, TSP and MP respectively. The average yield of watermelon was 11.35 ton/ha. Cost of cultivation, both on full-cost and cash-cost basis, were greater in Chittagong than Natore district, because of high cost of irrigation and land preparation. Lack of good quality seeds especially in Natore district and high disease infestation and lack of irrigation in Chittagong district were the major problems of watermelon cultivation. Development of disease resistant variety, appropriate pest management practices, irrigation facilities and supply of good quality seeds are suggested for higher production of watermelon.

#### Abstract 1988-1989

# IMPACT OF AGRICULTURAL CREDIT ON RURAL FINANCIAL MARKET, AGRICULTURAL PRODUCTIVITY, ASSET FORMATION, AND MOBILIZATION OF SAVINGS IN BANGALDESH

## S. M. Elias, J. Ahmed, M. R. Karim, M. A. Hoque and M. M. Ullah

The study was undertaken to assess the impact of agricultural credit on rural financial market, agricultural productivity, asset formation, and mobilization of savings in Bangladesh. A total of 1800 respondents were selected for data collection, taking 15 from each mouza which included 309 landless, 600 small, 554 medium, and 337 large farmers. The data were collected in the Rabi season 1987 with the help of pre-designed interview schedules. The study revealed that 51 and 31 percent farmers received loan from institutional and non-institutional sources respectively. The average amount distributed per loan was Tk. 6524. Average amount of non-institutional loan was found to be Tk. 5223 per household. It was found that 67 percent non-institutional loans were received from friends and relatives. No crop production loan was taken by landless respondent as they had no land. The study revealed that the cost of borrowing per hundred taka was found to be Tk.4.90. It was observed that 66 percent landless loanees, 55 percent small loanee, 45 percent medium loanee, and 42 percent large loanee used their loan for home consumption rather than spending in real purpose for which loan was taken. On an average, 24% of the total credit was repaid by the loanee. The highest (28%) repayment was made by the large farmers and the lowest was for small farmers (20%). On the whole, 61 percent farmers were found to be defaulter.

#### Abstract 1987-1988

# FARM LEVEL PROCESSING, STORAGE AND UTILIZATION OF MAIZE IN BANGLADESH

S. M. Elias, J. Ahmed and M. Ullah

This study was undertaken with a view to identify the research priority areas of post-harvest processing and storage method of maize. Four districts, namely Rangpur, Dinajpur, Nilphamari and Jessore were selected for the study. A total of 107 maize growers from four districts were interviewed. Data were collected through survey method by pre-designed interview schedule in the Kharif season of 1986-1987. Per hectare yield of maize was found 2150 kg. Out of total sampled farmers, 87 farmers stored maize grain and the rest consumed and disposed of their produces after harvest. The farmers of Rangpur and Dinajpur stored higher percentage of maize compared to Nilphamari and Jessore. It was found that 51 percent farmer stored maize in airtight tin, 42 percent in gunny bags, 31 percent in earthen pot, 21 percent by hanging on the plate made of bamboo sticks, and 15 percent in ploy bags. On an average, the cost of storing maize was Tk. 33.46 per thousand of cobs and Tk. 28.63 per quintal of grain. The consumption pattern of maize was found different within the farmers of the same area as well as between the areas. Postharvest technology for shelling, drying and storage method needs to be improved. Shelling machine could be introduced where maize produces on a large scale or commercial basis.

# COTTON PRODUCTION IN BANGLADESH: AN AGRO-ECONOMIC PROFILE

S. M. Elias, M. N. I. Mondal and M. I. Hossain

The purpose of this study was to assess the existing technology employed by the farmers in cotton cultivation, its profitability, and to identify constraints to its higher production. Jhikargachha union of Jessore, Madhupur union of Tangail and Polasbari union of Gaibandha district were selected purposively for the study, where the concentration of cotton cultivation was observed. A total of 300 farmers taking 100 from each area were selected at random. Farmers were categorized as small, medium and large according to size of holdings. Data were collected from one cotton plot of each farmer. The survey was conducted during 1986-1987 in Rabi season. The average yield of cotton was 975 kg/ha. The highest yield was found in Polashbari (1386 kg/ha) and lowest in Madhupur (676 kg/ha). The average cost of production was Tk.10177 per hectare. Location-wise average cost of production per hectare was highest in Jhikargachha (Tk. 11968) and lowest in Madhupur (Tk. 6897). Average gross return was Tk. 13972 per hectare. Gross return was highest in Polasbari (Tk. 18018) and lowest in Madhupur (Tk. 9464). The benefit-cost ratio was 1.37. Average return to labour was Tk. 37 per day. The constraints to cotton cultivation were lack of short duration variety, high cost of insecticides, lack of ginning facilities at farm level, lack of institutional credit facilities, etc. Development of short duration variety and study on management aspects especially its marketing structure is needed.

## WHEAT PRODUCTION IN BANGLADESH: AN AGRO-ECONOMIC PROFILE

## M. Ahmed, S. M. Elias, M. Azimuddin and J. K. Saha

The study investigated various elements associated with wheat production system which described the current status of production practices of wheat and its profitability at farm level. Data were collected through random sampling of 200 farmers in 9 districts of Bangladesh during 1986-1987 Rabi seasons. Average yield was found to be 1316 kg/ha. It was observed that the small farmers obtained higher yield. In terms of popularity, Sonalika was the most widely used

variety (51%) and Kanchan was the next (35%). The farmers of Jessore and Ishurdi cultivated more Kanchan variety relative to Sonalika. Majority of the farmers used seed in the range of 131 to 145 kg per hectare. About 14 percent of the sampled farmers used seed rate between 146 and 160 kg per hectare. Average variable cost of production was Tk. 4430 per hectare. The highest cost of production per hectare was found in Thakurgaon (Tk. 6672) and lowest in Jessore (Tk. 2178) district. Brahmanbaria had not only higher production (1658 kg/ha) but higher cost of production (Tk. 6256/ha) as well. Large farmers had higher cash-cost compared to small and medium farmers. Medium farmers received higher gross margin and higher benefit-cost ratio than other groups of farmers due to lower cost of production.

# A STUDY ON THE PRODUCTION AND UTILIZATION OF TOBACCO IN FOUR DISTRICTS OF BANGLADESH

# S. M. Elias and Q. Mesbahul Alam

The study assessed the present status of tobacco at farm level with regard to its cultivation practices, profitability and constraints to higher production. Data were collected from Rangpur, Nilphamari, Kushtia and Meherpur districts of Bangladesh during the 1986-1987. Four hundred farmers were selected from four districts. Average yield of tobacco was 1791 kg/ha and highest yield (2644 kg/ha) was found in Meherpur. The total variable cost was Tk.22226/ha. The cashcost of tobacco production was Tk. 16,186/ha. The gross return was Tk. 27681/ha. The gross return was much higher in Rangpur (Tk. 34823/ha) district mainly because of higher yield and lower in Nilphamari (19101/ha) district mainly due to very low price of tobacco. The average net return was Tk. 5456 per hectare with benefit-cost ratio 1.3. Majority of farmers in Rangpur and Kushtia intended to reduce tobacco area in the following year because of low output price, labour unavailability, and high price of inputs like fertilizer. The study recommended that postharvest technology associated with drying and curing, its effect on output, quality and losses need to be identified and studied.

# A SOCIO-ECONOMIC ANALYSIS OF PRODUCTION, MARKETING, AND UTILIZATION OF MAJOR OILSEEDS IN SOME SELECTED AREAS OF BANGLADESH

#### M. Sahadat Hussain

The study assessed the production, marketing, and utilization of major oilseeds in Bangladesh. Data were collected from Pabna and Brahmanbaria districts for mustard, Barguna and Kishoreganj districts for winter groundnut, Khulna and Sirajganj districts for sesame, and Chuadanga and Gazipur districts for summer groundnut. One hundred farmers for each oilseed crops were selected randomly. The average cost of production was Tk. 5094/ha for SS-35 and Tk. 4854/ha for Tori-7. The average gross return was Tk. 11256/ha for SS-75 and Tk. 7552/ha for Tori-7. The benefit-cost ratio was 1.97 for SS-75 and 1.56 for Tori-7. Per hectare average cost of production for winter groundnut, summer groundnut and sesame were Tk. 8038, Tk. 8169 and Tk. 3486 respectively. Per hectare average gross return for winter groundnut, summer groundnut, and sesame were Tk. 8539, Tk. 9563 and Tk. 5338 respectively. The average benefit-cost ratio for winter groundnut, summer groundnut, and sesame were 1.06, 1.17, and 1.53 respectively. About 53 percent of the total mustard area was under HYV (SS-75) and 41 percent under local variety (Tori-7). About 93 percent farmers were found to be continued to grow Sonali Sharisha. More profitable (55%), higher yield (22%), higher oil content (14%), and more demand (9%) were the major reasons for becoming motivated to cultivate Sonali Sharisha. The

average yield of Sonali Sharisha was found to be 1196 kg /ha, Sampad 679 kg/ha and Tori-7 605 kg/ha. The yield of Sonali Sharisha was observed to be 93 percent higher than local variety.

# AN AGRO-ECFONOMIC PROFILE OF ONION CULTIVATION AND CONSTRAINTS TO ITS HIGHER PRODUCTION IN BANGLADESH

S. M. Elias, J. K. Saha, M. R. Karim and M. N. Islam

The study attempted to assess the production practices of onion, its profitability, and identify the constraints to its higher production at farm level. Data were collected through survey method by taking 100 sample farmers from Faridpur and Pabna districts during 1986-1987. The average cost of onion production was found to be Tk. 14,906/ha. The average yield of onion was 4722 kg/ha. In Pabna, the average yield was 5388 kg/ha, whereas in Faridpur it was 4056 kg/ha. The average gross margin was found to be Tk. 8326/ha which was higher in Pabna (Tk. 11014/ha) compared to Faridpur (Tk. 6089/ha). Farmers in the survey area used very small amount of cash inputs like fertilizer. Availability of good quality seeds was one of the major problems of onion cultivation. Credit and inputs availability were completely absent in the survey areas. The study suggested some future research work on varietal improvement, marketing system and preservation of onion.

## Abstract 1986-1987

# IDENTIFICATION OF CONSTRAINTS TO PULSE PRODUCTION IN BANGLADESH

# S. M. Elias, M. S. Hussain, F. S. Sikder, J. Ahmed and M. R. Karim

The study identified different constraints to higher pulse production with emphasis on its important place in the existing farming systems and thereby helps in policy, research, and extension directions. Data were collected through survey method from 508 pulse growing farmers. The most important pulse growing districts, namely Pabna, Rajshahi, Jessore, Faridpur, Kushtia and Barisal were selected for the study. Altogether five important pulses were selected for the study. The selected pulses were kheshari (lathyrus), Masur (lentil), gram (chickpea), Mashkalai (blackgram) and Mung (mungbean). Average yield per hectare was 994 kg, 707 kg, 896 kg, 693 kg, and 698 kg, for Kheshari, lentil, chickpea, blackgram, and mungbean respectively. Among all pulses, Kheshari had the lowest cost which was Tk.1564/ha when both cash and imputed value of family inputs were considered. Gross margin in chickpea was found highest both in full-cost (Tk. 3058/ha) and cash-cost basis (Tk. 4947/ha). But benefit-cost ratio was found highest in blackgram (2.69). Return to family labour was also found highest in blackgram (Tk. 109). Pulses were produced at the subsistence level of production. In absence of any improved technology, farmers depended on the traditional practices, and hesitated to use modern inputs like irrigation, fertilizer, etc. In order to increase production of pulses proper attention should be given to its price policy, effective marketing, credit, and infrastructure support. Moreover, to exploit all possible contribution of pulses in the farming systems, enrichment of soil nutrition status, supply of nutrition to farm family and feeds to livestock, and farming systems approach to pulse research have been advocated.

# AGRO-ECONOMIC STUDY OF TEASEL GOURD CULTIVATION IN SELECTED AREAS OF CHITTAGONG DIVISION

S. C. Barman and M. Rahman

The study assessed the existing farmers' technology involved in teasel gourd production. Agroeconomic data on teasel gourd production were collected from a sample of 71 farmers randomly selected from four agricultural blocks in Kowkhali Upazila, in the district of Chittagong hill tracts, where teasel gourd grows extensively. The average yield of teasel gourd in the season on survey plots was estimated to be 5466 kg/ha. The average cost of teasel gourd production was observed to be Tk. 24718 per hectare on full- cost basis and Tk. 9873 on cash- cost basis. When all costs were taken into consideration the average net return was found to be Tk. 20758 per hectare on full-cost basis, while on cash-cost basis it was much higher and estimated Tk. 35602 per hectare. The benefit-cost ratio was 1.84. Fifty-four percent of the total farmers were willing to increase their area under teasel gourd cultivation. Higher income, higher yield, and bringing more fallow land under cultivation were the reasons for increasing in area. High inputs cost, nonavailability of organic manure, sticks, problem of sprayer service, and rotten at the primary stage of teasel gourd were the main constraints in the study areas.

# Abstract 1985-1986

# MARKETING AND STORAGE OF PULSES IN BANGLADESH

## S. M. Elias, F. S. Sikder and J. Ahmed

The study assessed existing marketing channel, margin as well as marketing cost at different levels of pulse marketing system in Bangladesh. Data were collected through survey method. One upazila from each in Faridpur and Barisal districts for lathyrus (Kheasri), Faridpur and Pabna districts for lentil, Jessore and Kustia districts for chickpea, Rajshahi and Pabna districts for blackgram and Faridpur and Barisal districts for mungbean were selected as the study area. The average marketing cost of pulses at growers' level was Tk. 8.97 per quintal. The average marketing costs for traders was lowest in Kheshari (Tk. 86.63/quintal) and highest in chickpea (Tk. 110.51/quintal). Processing, transport, and handling costs were the major cost items in the marketing of all pulses. On an average, all traders together made a profit of 54 percent over the investment. The share of the growers to the consumers' price was poor compared to traders. Low product price and lack of facilities in the market place were found important problems mentioned by the growers. The problem of unstable product price, high transport cost, and diseases infestation were major bottlenecks to the traders. The study emphasized on the rational policy on the pulses, especially on the increase in the number of processing mills in the intensive pulse growing area, introduction of contract marketing system, research to control rodent, and pest at storage level vis-a-vis post-harvest technology improvement.

#### STUDY ON UNDERUSED AGRICULTURAL LANDS OF BANGLADESH

# S. M. Elias

The study was undertaken with an aim to find out the causes of slow growth of cropping intensity and retention of fallow land in the country. Thirty upazilas from 16 districts (old) were selected for the study. The selection of district and upazila was purposive depending on the

importance of agriculture, scope for improvement, and intensity of fallow area. Fifty farmers from each upazila were selected at random taking farmers from all farm size holdings. In all the three seasons, farmers kept fallow a part of their cultivated land. If three seasons were considered to be continuously cultivated, only two third of the potentialities were being utilized and the rest one third remained unutilized. It was found that the farmers kept land fallow ranging from one month to even eight months in a year. On the average, 43 percent of the farmers kept land fallow for three months period. Altogether, 184 cropping patterns were identified. The most important patterns were T.Aman (L)-Fallow-B.Aus (L) which was practiced by 27 percent farmers. Fourteen different reasons were identified for keeping land fallow in different seasons and land types. Lack of irrigation was identified as the most important reason for keeping land fallow. Development of improved varieties for crops other than rice in summer and monsoon season particularly which can tolerate excess water situation may help to reduce fallow land in these two seasons. The study also suggested innovating technology for tillaging in minimum time, low cost post-harvest technologies, and adequate supply of seeds which will help in expansion of more lands under cultivation.

#### Abstract 1984-1985

# PERSPECTIVE OF WINTER MAIZE IN BANGLADESH: AN AGRO-ECONOMIC ANALYSIS

## S. M. Elias, J. Ahmed and F. S. Sikder

The study provided some basic information on winter maize production and consumption at farm level which will help in the formulation of research and policy on maize. A total of 120 maize growers, taking 60 from Narayanganj and 60 from Dhaka district, were selected randomly. The average cash cost per hectare of maize was Tk. 4008 which was 68 percent of the total variable cost. On an average, per hectare 150 man-days of human labour were required for maize cultivation. On an average, 1.55 percent of the total products were consumed by farm families, 97.31 percent were sold at harvest time and the rest was preserved as seed. The benefit-cost ratio was 2.42. Gross return was found higher in large farm (Tk. 18976/ha) than medium and small farms. It was observed that there was no alternative market other than green cobs. However, demand of maize for poultry and livestock feed had been created to some extent. But due to the lack of effective procurement policy, farmers are not getting facility.

# PERSPECTIVE OF SUMMER MAIZE IN BANGLADESH: AN AGRO-ECONOMIC ANALYSIS

## S. M. Elias, F. S. Sikder and J. Ahmed

The study provided some basic information on summer maize production and utilization at farm level which would help in the formulation of research and policy on maize. A total of 78 sample farmers were interviewed, where 28 farmers were from Jessore and the rest were from Ishurdi. About 60 percent farmers ploughed their land three to four times for maize. Farmers used 23 kg of seeds per hectare. The average cost of production per hectare was found to be Tk. 5859 on the

basis of full-cost. Per hectare average net profit from summer maize cultivation was Tk. 6540 on full-cost and Tk. 10926 on cash-cost basis. Benefit-cost ratio was 2.12 which indicated that maize was a profitable crop. The consumption pattern was observed to be decreased with the increase in farm size, while percentage sold had been increased with the increase in farm size. Breeding for improved variety with management practices needs to be researched out for different maize growing locations. Marketing and post-harvest technology researches were also recommended in the study.

## Abstract 1983-1984

# LENTIL PRODUCTION IN BANGLADESH: AN AGRO-ECONOMIC PROFILE

#### S. M. Elias and F. S. Sikder

The study was undertaken to know the existing pattern of agro-economic conditions of lentil cultivation and thereby to indentify the constraints of production and post harvest stages. Three upazilas, namely Bagherpara, Ishurdi, and Bazitpur under the districts of Jessore, Pabna, and Kishoreganj respectively were selected for the study. A total of 120 farmers were selected as respondents by adopting random sampling method taking 40 farmers from each of the location. The study revealed that on an average 63.3 percent of the farmers used ploughing 3-4 times and 59 percent of the farmers used laddering 2-6 times for land preparation in lentil cultivation. About 75 percent farmers used their own seeds. The average seed rate per hectare was found 41.35 kg. The application of manures and fertilizers in lentil cultivation was very low. The total variable cost of production was found to be Tk.1593/ha. The cash cost was found only Tk. 467/ha which was about 29 percent of total variable cost. In lentil cultivation, 53.4 percent of the total cost was incurred on human labour followed by 25.3 percent on seed. The average yield of main product was 502 kg/ha. The average gross margin was Tk.1953 and 3079 on full cost and cash-cost basis respectively. The benefit-cost ratio was 2.2.

## AN AGRO-ECONOMIC PROFILE OF MILLET PRODUCTION IN BANGLADESH

S. M. Elias, J. Ahmed, Q. M. Alam and F. S. Sikder

The study was undertaken to know the profile of existing production practices of millet, profitability and constraints to its higher production at farmers' level. One hundred millet
growers were selected at random from Rangpur and Dinajpur districts, where millet grew extensively. On an average, the seed rate used was 9 kg/ha. Chemical fertilizer was rarely applied on its cultivation, but the application of organic manures were 2474 kg/ha. The average human labour requirement was 128 man-days/ha. The average cost of production was Tk.1758 per hectare, when all variable costs were considered. Gross margin over all variable costs was found positive with low benefit-cost ratio (1.16). The average yield of millet was 984 kg/ha. The yield was found to have positive correlation with seed rate. The farmers, who used own stored seed received higher yields in both the districts possibly due to the better quality of seeds. Low output price, problem of marketing and non-availability of credit, seed and labor were the major constraints towards higher production of millet. The study suggested bringing a breakthrough in seed technology and management practices.

## AGRO-ECONOMIC SURVEY OF CHILLI CULTIVATION AND CONSTRATINTS TO ITS HIGHER PRODUCTION IN BANGLADESH

#### S. M. Elias and M. I. Hossain

The study assessed the existing farmers' technology of chilli production and constraints to its higher production. Survey method was used to collect data and a total of 56 chilli growers were selected at random as respondents, out of which 31 were from Bogra Sadar Upazila and 25 were from Gabtoli Upazila under the district of Bogra. The cost of production of chilli was Tk. 11031 per hectare. Average yield of chilli was 3781 kg per hectare. The average gross return was Tk. 30187 per hectare. The benefit-cost ratio was 2.82. Return to labour per day, and return to irrigation per taka invested were Tk. 89 and Tk. 26 respectively. Regarding the use of chilli, only 3 percent of the total output was used for farmers' home consumption and 72 percent was sold immediately after harvest. Farmers marketed their chilies mainly in the local market during February and March. High cost involvement due to higher doses of fertilizer and labour requirements, lack of institutional credit facilities, lack of improved post-harvest technology vis-a-vis lack of storage, and efficient marketing system were the major constraints towards the higher production of chill.

# AGRO-ECONOMIC SURVEY OF SWEET POTATO CULTIVATION AND CONSTRAINTS TO ITS HIGHER PRODUCTION IN BANGLADESH

### S. M. Elias, M. I. Hossain, N. I. Mondal and N. Islam

The study assessed the existing technology of sweet potato production and constraints to its higher production. Data were collected through survey method from 300 sample farmers of three districts, namely Jamalpur, Kishoreganj and Bhola. The average yield sweet potato was 11044 kg/ha. The average production costs per hectare of sweet potato were Tk. 6031 and Tk. 2489 on full-cost basis and cash-cost basis respectively. Cost of sweet potato increase with the decrease in the size of land holding. The average gross return was Tk. 9359/ha. The gross margin was Tk. 3328/ha on full-cost basis and it was Tk. 6870/ha on cash-cost basis. The benefit cost ratio was 1.55. The major constraints were inferior quality seeds, lack of storage facility, and lack of market demand against higher production of sweet potato. The study suggested that high yielding variety seeds of sweet potato should be tested on the farmers' field for higher adoption of this crop by the farmers.

# SOCIO-ECONOMIC ASSESMENT OF MUSTARD PRODUCTION IN BANGLADESH

M. Ahmed

An attempt was made to know the existing practices of mustard production, its profitability, adoption pattern of HYV, and the constraints to higher production of mustard. Altogether 258 mustard growers covering 30 upazilas in 12 districts were selected. The average yield was found to be 0.53 to 0.77 ton per hectare for local variety and 0.95 to 1.37 ton per hectare for HYV. The average costs varied from Tk. 6501 to Tk. 8386 and Tk. 5251 to Tk. 7869 per hectare for local variety and HYV respectively (full-cost basis). The net returns for local variety and HYV ranged from Tk. 472 to Tk. 635 per hectare and Tk. 3826 to Tk. 9285 per hectare respectively. Benefit-cost ratio was found higher for HYV than local variety. Farmers mentioned some problems of mustard cultivation such as varietal irrigation requirement, disease and pest infestation, inadequate amount of seeds, etc. Availability of quality seeds, adequate supply of irrigation water, and availability of improved technology at the farmers' field with extension services were some of the recommendations for higher production of mustard.

# APPLICATION OF PARTIAL BUDGET TECHNIQUE ON CROPPING SYSTEM RESEARCH AT CHITTAGONG

#### S. M. Elias and M. R. Karim

The study was an attempt to deal with marginal analysis of fertilizer trial on cowpea and T. Aman. Data were taken from experiments conducted by the agronomists at Cropping System Research Site (CSRS), Hathazari. The marginal analysis signifies that instead of farmers' traditional pattern, B. Aus (L) - T. Aman (L) if they switch over to the new pattern, Maize-T. Aman (HYV) - Potato (HYV), will get a return of Tk. 340 for additional investment of Tk. 100. It was observed that the marginal rate of return of the improved pattern (T. Aus (HYV)- T. Aman (HYV)-Fallow) was 295 percent over farmers' pattern. Among the eight patterns, four were tested in partially irrigated land, three in rainfed medium low land and only one pattern in rainfed high land. Dominance analysis of results revealed that T. Aus (HYV)- T. Aman (HYV)-Groundnut was the cost dominated pattern in the partially irrigated land. The highest marginal rate of return was not highest, but the gross margin of the pattern Maize - T. Aman (HYV)- Potato (HYV) was highest which encouraged the farmer to adopt this pattern.

# SOCIO-ECONOMIC ASSESSMENT OF IMPROVED TECHOLOGY OF WHEAT AND CONSTRAINTS TO ITS HIGHER PRODUCTION IN BANGLADESH

# S. M. Elias and M. S. Hussain

An attempt was made to know the existing practices of improved technology in wheat followed by the farmers, its profitability, and constraints to its higher production. One hundred farmers from each of four different areas of Bangladesh viz, Sailkupa (Jessore), Daudkandi (Comilla), Modhupur (Tangail), and Thakurgaon (Dinajpur) were selected at random. The average yield per hectare was found to be 1636 kg/ha. The analysis revealed that the cost of production per hectare was Tk. 4526 on full-cost basis and Tk. 2158 on cash-cost basis. The maximum cost was incurred for human labour. The average gross margin was Tk. 1981/ha on full-cost basis and Tk. 4349/ha on cash-cost basis. About 41 percent of the total produces were consumed by the farm family and 36 percent sold immediately after harvest. The price of wheat was observed to increase by 31 percent from harvesting to sowing period. Scarcity of human labour at the weeding time, due to alternative employment opportunities in other crops, and development works were found major constraints to wheat production. The study recommended that development of short duration and draught tolerant variety could be fitted to rice based cropping patterns without yield reduction.

# A STUDY ON POTATO MARKETING SYSTEM IN SOME SELECTED AREAS OF BANGLADESH

#### S. M. Elias, M. I. Hossain, J. Ahmed and Q. M. Alam

The study was an attempt to assess the marketing structure, price, and marketing information of potato at different points. Data were collected from seven upazilas, namely Tongibari, Bogra Sadar, Chandina, Mithapukur, Rangpur Sadar, Thakurgoan and Dinajpur Sadar. Large numbers of intermediaries were found to involve in potato marketing. Most of them acted as middlemen and usually transfer the product from one to another without adding any additional utility to the product except the incremental price. Farmers used different means of transport for potato marketing. On an average, 62 percent farmers stored potato by their own indigenous method and the rest in the cold storage. Average quantity purchased by a single wholesaler was found to be 255 ton, and 49 ton by a single bepari. In order to ensure better price and assured market to the potato growers, contract system of marketing may be introduced. Export market particularly in the South and South-East Asia has a high demand for potato. However, feasibility of exporting potato should be verified and necessary steps may be taken to encourage such exports.

# BENCH-MARK SURVEY OF JAMALPUR CROPPING SYSTEM RESEARCH SITE

# S. M. Elias, A. K. M. H. Hoque, M. S. Hussain, W. A. Zahan and M. R. Karim

A bench mark survey was conducted among the farmers' in Jamalpur before starting cropping system research. Data were collected from 100 farmers selected at random, stratified by the size of holding in three villages under Jamalpur district. Secondary data were collected from different government agencies, published materials, and official records. The average farm size was 1.32 hectares of land. Total numbers of farm household in the locality were 664, out of which 45 percent was landless farmers. The average effective family members employed in agricultural works was only 1.76 per farm. The intensity of cropping in the area was 172 percent which varied from village to village. Three distinct land types prevailed in the site were high, mediumhigh, and medium-low land which represented approximately 60 percent cultivable land of the district. Twenty percent of the farmers did not have any bullock for ploughing the land. The farmers having no draft animal were more in the case of small farm groups. Most of the farmers did not use balanced fertilizer dose. The use of fertilizer was more in Boro season than in other seasons. About 40 percent of the cultivated land was brought under irrigation. Deep and shallow tube wells were the main sources of irrigation. The farmers in the locality were progressive in adoption of modern technology and interested in revised cropping patterns. Careful designing of the improved cropping patterns for different land types and soil were expected to be accepted by the farmers of the area.

# SOCIO-ECONOMIC ASSESSSMENT OF IMPROVED TECNOLOGY OF POTATO AND IDENTIFICATION OF CONSTRAINTS TO ITS HIGHER PRODUCTION

# S. M. Elias, M. I. Hossain, N. I. Mondal and N. Islam

The major objectives of this study were to assess the improved technology of potato cultivation, its profitability, and constraints to its higher production at farm level. One hundred potato growers of each of Tongibari and Chandina Upazilas and 105 potato growers from Bogra Sadar

Upazila were selected randomly. The sample was drawn proportionately from small, medium and large farmers. About 94 percent farmers used high yielding variety of potato, namely Multa, Cardinal and Patrones. On an average, fertilizer dose was 450-469-264 kg/ha for Urea, TSP, and MP respectively. Fertilizer application by different groups of farmers ranged from 1000 kg (small) to 1732 kg (large) per hectare. The average dose of insecticide was 5 kg/ha. Duration of potato crop in the field ranged from 81 days to 98 days. The average yield of potato was 20350 kg/ha. The average production costs of potato were Tk.18969 and Tk.11431 per hectare on full-cost and cash-cost basis respectively. The benefit-cost ratio was 1.44. An overall increase of 189 percent of the price at seed sowing time was noticed. Larger increase in price at sowing time was found in Chandina (342%). Temporal price variation, insufficient cold storage facilities, non-availability of low cost storage technology at farmers' level, and lack of credit facilities for potato marketing were identified as serious problems for higher production of potato.

#### Abstract 1982-1983

# CONSTRAINTS TO INCREASE WHEAT PRODUCTION IN BANGLADESH:

### **RESULTS OF A FOUR DISTRICTS SURVEY**

# M. Ahmed and D. J. Clements

The objective of the study was to know whether the instability was an aberration, or a symptom of some basic constraints to wheat production increases in Bangladesh. The field survey was carried out in May, 1983, by taking 400 wheat growing farmers and 400 non-wheat growing farmers in four districts viz, Dinajpur, Comilla, Tangail and Jessore. About 44 percent of surveyed farmers reported scarcity of HYV seed as a serious problem. Lack of irrigation or untimely irrigation, and irregular supply of water was also a constraint with 38 percent of wheat farmers stating irrigation related problems to be severe. About 29 percent wheat growers considered lack of funds to be a severe constraint to wheat production. On-farm seed storage was reported to be a serious problem by 23 percent of the wheat farmers. About 58 percent of the respondents were concerned that wheat reduced the yield of the following Aus crop. The results of the non-wheat growers' survey revealed that irrigation problem, non-availability of seed, lack of funds, and competition with other crops, identified as major problems by 25, 20, 16 and 6 percent of the sample farmers respectively.

# MILLET PRODUCTION IN BANGLADESH: AN AGRO-ECONOMIC PROFILE OF CHEENA

#### S. M. Elias, J. Ahmed, F. S. Sikder and Q. M. Alam

The study was undertaken to know the profile of existing production practices of Cheena with profitability and constraints to its higher production at farmer's level. Data were collected through survey method from a sample of 100 Cheena growers in two districts, namely Pabna and Tangail. Sowing of seeds started from the last part of November and continued up to the last week of December. About 75 percent of the respondent farmers sowed seeds in the last week of November. On an average, 32 kg seeds per hectare were used. The average level of Urea, TSP, and MP application were 90 kg, 4.9 kg and 12.86 kg/ha respectively. The average yield of Cheena was found to be 1509 kg per hectare. The total variable cost of production was Tk.3371 per hectare, while it was only Tk.1080/ha on cash cost basis. Gross margin over all the variable costs was found positive with low benefit-cost ratio (1.31). Cheena was produced mostly for home consumption. Low yield, low output price, and lack of market were reported as the main constraints in Cheena cultivation. Breeding and agronomic research for higher yield and better

management were advocated in the study. Diversification of its utilization pattern might increase its demand vis-a-vis its production.

# SOCIO-ECONOMIC ANALYSIS OF STORAGE AND UTILIZATION OF POTATO IN SOME SELECTED AREAS OF BANGLADESH

#### S. M. Elias and M. I. Hossain

The study was undertaken to know the existing consumption practices and utilization pattern of potato by different groups of potato growers in different areas. The study was based on primary data collected directly from the operating farmers of three potato growing areas, namely Tongibari Upazila of Munshigani, Sadar Upazila of Bogra, and Chandina Upazila of Comilla district. A total of 114 farmers were selected randomly to constitute the sample for the study. The study showed that the average quantity of potato consumed by the farmers was 6.20 kg per week. All large farmers consumed potato in every month, whereas 95 percent of small farmers and 90 percent of medium farmers consumed potato in every month. The quantities of potato utilization were the highest in small farm groups (6.70 kg/week). Most small farmers (82%) purchased potato from the markets. The quantity purchased by the small farmers was 5.66 kg/week, while medium and large farmers purchased 3.62 and 1.73 kg per week respectively. On an average, 77 percent farmers stored potato at home and 7 percent farmers stored in the cold storage. Only 16 percent farmers stored potato both at home and in the cold storage. The duration of potato storage was 4 to 5 months. Potato growers consumed potato more than the national average. Even though, the utilization was very limited. Moreover, indigenous variety of potato was popular in Northern region due to its taste and availability. But farmers in Central and Eastern region preferred and consumed HYV potatoes. The study suggested the training need for the rural housewives as well as demonstration of food items to increase knowledge of many different forms of consumption which in turn would increase the demand for potato.

#### Abstract 1981-1982

# AGRO-ECONOMIC SURVEY OF MUSTARD IN SOME SELECTED AREAS OF BANGLADESH

# S. M. Elias, M. S. Hussain and S. R. Bhuiyan

The study was conducted to evaluate the existing agronomic practices, constraints to higher production, and the cost and return of mustard cultivation. Data were collected by survey method during 1980-1981 winter seasons, from 294 farmers of Pabna (Shahjadpur), Dhaka (Dhamrai) and Comilla (Brahmanbaria) districts. Out of 294 sample farmers, 100 from Brahmanbaria, 95 from Dhamrai and 99 from Shahjadpur were interviewed paying several visits. Average yield of mustard was 1140 kg per hectare and observed higher in Brahmanbaria compared to other areas. The yield was observed to be increased with the increase in seed rate and fertilizers. The average cost of production was Tk. 5774 per hectare based on total variable cost and Tk. 2422 per hectare based on the cash cost. Per day per hectare return over cash cost was found to be Tk. 49.07 with a benefit-cost ratio of 2.97. Small farms sold 57 percent of their produce immediately after harvest while the large farms sold 47 percent of their produce later in the year at higher price. Poor yield and high input cost were reported to be the main constraints to mustard

cultivation. However, about 70 percent of the sample farmers were in favour of increasing mustard area in the next year by reducing the area of wheat, millet and pulse.

# SOCIO-ECONOMIC ASSESSMENT OF IMPROVED TECHNOLOGY OF WHEAT AND IDENTIFICATION OF CONSTRAINTS TO ITS HIGHER PRODUCTION

S. M. Elias, M. S. Hussain, S. C. Barman and S. R. Bhuiyan

The objective of this study was to provide information as to how the agronomic and economic factors affected production and income from wheat cultivation. One hundred farmers from each of four different districts of Bangladesh, namely Jessore, Comilla, Tangail and Dinajpur were selected randomly. The average yield of wheat per hectare was observed to be 1517 kg. Per hectare yield received by small farmers was observed to be higher than that of medium and large farmers. The cost of production per hectare was Tk. 4359 on full cost basis and Tk. 2100 on cash cost. The average net return per hectare was found to be Tk. 405 on full cost and Tk. 2664 on cash cost basis. The benefit cost ratio was found higher for medium and large farm groups compared to small farms. Seventy eight percent of the sample farmers were reported their willingness to increase wheat area in the next year mainly for home consumption and higher income.

# ECONOMICS OF SOYBEAN CULTIVATION COMPARED TO OTHER COMPETITIVE CROPS

## S. M. Elias and S. R. Bhuiyan

The main purpose of the study was to ascertain the cost and return of soybean and other relative crops cultivation. Noakhali and Tangail districts were selected for the study. Forty nine soybean farmers in Noakhali and forty in Tangail were selected randomly for collection of data through survey method in the winter of 1980-1981. Data for other competitive crops like mustard, groundnut, gram, mungbean, potato, sweet potato, wheat, and maize were taken in the same year for comparison with soybean. The yield of soybean was found to be 1040 kg per hectare. The cost per hectare of soybean was Tk. 5688 and the net return per hectare was Tk. 1544 on the basis of full cost. When only cash costs were considered, the net benefit per hectare from the crop was found Tk. 2291. In terms of profitability, soybean ranked much lower than other oilseeds like mustard and groundnut. But it was found profitable than pulse crops like mungbean and gram. This was due to the improved variety seeds and close supervision of soybean cultivation by different agencies. However, as an oil crop, soybean was not profitable compared to other competitive crops.

# SOCIO-ECONOMIC ASSESSMENT OF IMPROVED TECHNOLOGY OF POTATO AND IDENTIFICATION OF CONSTRAINTS TO ITS HIGHER PRODUCTION

# S. M. Elias and Nazrul Islam

The study was undertaken to know the existing technology used by the farmers in potato cultivation, and to find out the constraints to higher productivity of potato at farm level. Data were collected by survey method during 1980-1981 winter seasons. A sample of 202 potato growers was selected randomly from two districts, namely Bogra and Dhaka. When all variable costs-both cash and kinds were considered, the average cost per hectare was found higher in Dhaka (Tk. 23097) compared to Bogra (Tk. 18029). Yield per hectare was also much higher in Dhaka (25009 kg/ha) than Bogra (13278 kg/ha). It was observed that despite higher cost of

production, cost per kg was lower in Dhaka than Bogra due to yield advantage. The average net benefit per hectare was found Tk. 7211 and found higher in Dhaka (Tk. 8751) than Bogra (Tk. 4953). On the average, 90 percent of total produces were sold immediately after harvest in Bogra, while it was only 19 percent in Dhaka. Seasonal variation of price was observed large in both the areas. The seasonal increment of price during the planting season over the harvest season was observed 169 percent and 151 percent in Bogra and Dhaka respectively.

# SOCIO-ECONOMIC EVALUATION OF IMPROVED CROPPING PATTERNS AT THE CROPPING SYSTEM RESEARCH SITES IN JESSORE AND CHITTAGONG

S. M. Elias, A. K. M. H. Haque, M. R. Karim and M. Rahman

The study was undertaken to evaluate improved cropping pattern at two cropping system research sites. Data were collected from the cropping system research sites in Jessore and Chittagong. At Jessore site local variety of B. Aus rice followed by mustard was tested in medium high land and observed undesirable due to its low return to investment. Under irrigated high land, maize-mustard (HYV) was tested and observed profitable in respect of gross margin and return to investment. An examination of cropping pattern B. Aus (L) – T.Aman (L) - Potato observed satisfactory performance in research managed plot than on farmers managed plot although the pattern offered less return to investment. It required less cash and provided with more rice than that of other patterns on the same land type. At Chittagong site under rainfed low land, out of two different cropping patterns tested, B. Aus (HYV) – T. Aman (HYV) – Mustard performed better than the other one. For streamfed high land, four patterns were tested and the pattern B. Aus (L) – T. Aman (HYV) – Sweet Potato was observed to be the best when, higher price for sweet potato was considered. However, when normal price of sweet potato was considered, the pattern maize -T. Aman (HYV) – Potato replaced the pattern with sweet potato and paid higher return to investment.

# AGRO-ECONOMIC SURVEY OF GROUNDNUT IN SOME SELECTED AREAS OF BANGLADESH

# S. M. Elias, M. S. Hussain and S. C. Barman

The study reflected the results of a sample survey conducted in two different extensive groundnut growing areas in Bangladesh on the existing technology employed by the farmers in groundnut cultivation. A total of 200 groundnut farmers in Kishoreganj (Bajitpur) and Noakhali (Feni) districts were selected randomly. Rabi season was considered for this study. The average yield of groundnut on the sample plots was estimated to be 1060 kg per hectare. The yield was found significantly higher in Feni (1268 kg/ha) than in Bajitpur (874 kg/ha). The average cost of production of groundnut was observed to be Tk. 7227 per hectare on full cost basis and Tk. 2860 on cash cost basis. The cost per hectare was higher in Feni than Bajitpur and it was also found higher for small farmers than for medium and large farms. When full costs were taken into consideration, the average net return was negative in both the study areas and for all farm size groups. However, when only cash costs were considered, average net return per hectare was found positive (Tk. 3242) and it was higher in Feni (Tk. 3672) compared to Bajitpur (Tk. 2790) which was mainly due to higher yield. Gross margin per hectare per day was found to be Tk. 24.60 on cash cost basis and benefit cost ratio was 2.14.

#### Abstract 1980-1981

## BENCHMARK SURVEY OF CHITTAGONG CROPPING SYSTEM RESEARCH SITE

#### S. M. Elias and A. K. M. H. Haque

A benchmark survey was carried out in few villages of Chittagong district. Data were collected from 101 farmers selected at random, stratified by size of holdings in seven villages under Hathazari Upazila. Secondary data were collected from different government agencies, published materials, and official records. The intensity of cropping in the area was 177 percent. More attention should be given to bring more land under cultivation in winter and summer seasons. The farmers did not use fertilizers at balanced dose. Large farmers used more fertilizers than small or medium farmers. Majority of the farmers used own bullocks for ploughing. More than 20 crops were grown in the study areas. Wheat and maize were not grown at present but can be tested in the area. The farmers' yield of each crop was much lower than that of research managed plots under farmers' condition in the area. It indicated a scope of increasing yield by changing to good management practices and variety. The yield of local variety of summer and monsoon rice was very low compared to HYV rice. HYV seeds of wheat, maize, potato, and mustard were not available to the farmers. The yield of cowpea may be increased by improving management practices.

## BENCHMARK SURVEY OF JESSORE CROPPING SYSTEM RESEARCH SITE

# S. M. Elias and A. K. M. H. Haque

A benchmark survey was carried out in few villages of Jessore district as one of the sites of defined area 'Cropping System Research' of BARI to have the knowledge of existing socioeconomic and agro-climatic situation and constraints to affecting the present cropping systems. Primary data were collected from 117 farmers selected at random, stratified by size of holding in eight villages under Begerpara Thana of Jessore district. Secondary source of data included different government offices, official records, and published materials. The average size of farm was 1.32 hectare of land. The intensity of cropping in the area was 164 percent which varies from village to village. Most of the farmers did not use fertilizer at balanced dose, the average use being 133.5 kg per hectare over the year. The small and medium farmers used more fertilizers in summer season, while large farmers used more in monsoon season. Large farmers used more fertilizers per unit area than small or medium farmers. More than 25 crops were grown in the study areas. The yield of each crop was much lower than that of research managed plot. In spite of diversified farming, farmers had to purchase rice, wheat, potato, mustard etc. to a large extent. Farmers were more progressive in adoption of modern technology and interested in revised cropping patterns.

#### Abstract 1979-1980

# AN ECONOMIC PROFILE OF WHEAT CULTIVATION IN BANGLADESH

#### C. G. Swenson, P. E. Church, A. U. Ahmed, M. Alam, A. K. M. H. Haque and J. Ahmed

This study was conducted to evaluate wheat cultivation in Bangladesh. Data were collected through survey method by taking 89 sample farmers from Pabna and Jessore districts. The information was collected from only one wheat plot cultivated by each farmer. The average cost of production per hectare was found Tk. 3954 on full cost basis and Tk. 2471 on cash cost basis. The benefit-cost ratio suggested slightly better performance of the farmers of Pabna than Jessore. The return per day of family labour was found double in Jessore than that of Pabna and observed higher wage rate in both the districts. The most common crops cultivated during wheat season in Jessore were lentil, mustard and potato, while in Pabna it was mustard, gram, lentil and HYV rice.

### AN ECONOMIC PROFILE OF POTATO CULTIVATION IN BANGLADESH

#### S. M. Elias, J. Ahmed and N. I. Mondal

This study was undertaken to assess the economic profile of potato cultivation in Bangladesh. Eighty farmers from Munshiganj district were selected randomly. Data were collected through survey method in the crop season 1979-1980. The average cost of production per hectare was Tk.18227. It was Tk.18555 for small farmers and Tk.17169 for large farmers. Per hectare average yield was found to be 22.32 tons and the highest yield was observed in large farmers (23.98 tons). The average net return was estimated to be Tk. 6326 per hectare. The net return was the highest for large farms and the lowest for small farms. The average benefit cost ratio was 1.35. The average return on the basis of cash cost was observed Tk. 12073 per hectare. The cause for higher return in larger farms was the use of more fertilizer compared to small farms. Research on fertilizer trial, low cost storage technique, study on utilization pattern of potato and increase its demand, solving storage and pricing problems may help in the higher profitability of potato in the study areas.

#### AGRO-ECONOMIC STUDY OF ON-FARM MAIZE TRIALS IN BANGLADESH

# M. S. Hussain, C. G. Swenson, A. K. M. H. Haque, S. C. Barman and Q. M. Alam

This study was conducted to evaluate On-Farm maize trails in Bangladesh. Data were collected during 1979-1980 Rabi season from 80 On-Farm maize varietal trials conducted in five districts by On-Farm Research Division, Bangladesh Agricultural Research Institute. The results appeared to be very promising for maize cultivation as a cereal crop in Bangladesh. The average yield for the 65 trials was observed 5.1 tons per hectare. With an average cost of production Tk. 4300 per hectare, the average net income ranged from Tk. 6600 (if the total production was utilized as mature grain) to Tk. 9400 (if the total production was used as green cob). Savar variety was found to give more return than other three varieties. From these results it was indicated that the maize cultivation was profitable at farm level.

# AN ECONOMIC PROFILE OF SWEET POTATO CULTIVATION IN A SELECTED AREA OF BANGLADESH

#### S. M. Elias, J. Ahmed and N. I. Mondal

This study was conducted to evaluate economics of sweet potato cultivation in Bangladesh. Eighty sweet potato growers of Pabna district were selected randomly. The sample was drawn proportionately from small, medium, and large farms. Average cost per hectare of sweet potato was Tk. 6946. The highest cost was observed for small farmers (Tk. 7576) and the lowest for large farmers (Tk. 6277). Human labour cost covered 58.4 percent of total variable cost. The average production per hectare was observed 12.82 tons valued Tk. 15399 at market price. The production and net return found to be higher in small farms and lower in large farms. Average net return was observed Tk. 8339 per hectare and return to labour was Tk. 35.27 compared to the average prevailing wage rate at Tk. 8.50 per day. Benefit-cost ratio was found to be higher than 2 which implied the higher profitability of sweet potato cultivation. The study suggested some

future research works on variety, fertilizer, and other agronomic practices for the expansion of sweet potato cultivation.

#### Abstract 1978-1979

# AN ECONOMIC AND AGRONOMIC SURVEY ON WHEAT PRODUCTION IN JESSORE AND PABNA DISTRICT

C. C. Swenson, J. Ahmed, Q. M. Alam, S. C. Barman, A. K. M. H. Haque, S. Hussain and F. S. Sikder

This study was conducted to evaluate the economics and agronomy of wheat production. The information required for this study were collected through survey method from 80 wheat plots in Jessore and Pabna districts during 1978-1979 Rabi season. The average net income was Tk. 1667 per hectare with a normal distribution. Net cash income was negative for 62 percent of the plots because on an average 35 percent of production was consumed by the households. The average net cash cost was found to be Tk. 3304 per hectare. On an average, 50 percent of total wheat production was sold while 35 percent being consumed. The study revealed that in the study are 93 percent of wheat area was increased by replacing pulse and oilseed crops and only 6 percent came from fallow land.



# **Agricultural Economics Division**

Bangladesh Agricultural Research Institute Gazipur-1701, Bangladesh