ORC

Research Programme
2022-2023

Programme Leader
Dr. Md. Abdul Latif Akanda

OILSEED RESEARCH CENTRE
Bangladesh Agricultural Research Institute
Gazipur-1701

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CONTENTS

PROJECT I. VARIETY DEVELOPMENT

A. Rapeseed- mustard (*Brassica spp*)

Rapeseed-mustard is a major oilseed crop in Bangladesh. It contributes a lion share to the total edible oil production in the country. The Oilseed Research Centre of BARI has already developed 20 rapeseed-mustard varieties, which comprises 10 from *Brassica rapa*, 6 from *B. juncea* and 4 from *B. napus*. Most of the developed varieties take long duration to mature except a few. As a result, they do not fit well in the existing T. Aman – Mustard - Boro cropping pattern. Therefore, high yielding and short duration rapeseed and mustard varieties have to be developed to fit them in the existing rice-based cropping system. Due to crop competition, there is no scope for horizontal expansion of mustard cultivation. So, for increasing mustard production, yield must be increased per unit area basis. Hybrid varieties can play an important role in this regard. Bangladesh has been identified as a most affected country of the world due to global weather change. For adaptation to adverse weather conditions, stress tolerant and both for its oil and meal quality varieties have to be developed. Developing varieties with conventional breeding methods takes a lot of time usually 10-15 years. In some cases, biotechnological approaches can help reduce the time as well as more confirmation compared to conventional breeding methods. The existing short duration varieties are also susceptible to Alternaria leaf blight disease. Thus, to develop varieties having high yield potential, early maturity, stress tolerance, disease and insect resistance and wider adaptability, the following experiments have been undertaken.

Sub-Project I: Collection, evaluation and maintenance of oilseed crops germplasm

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-01**	**:**	**Collection of rapeseed-mustard germplasm**
04	Objective(s)	:	To enrich and widen the genetic base of the gene pool of oilseed crops
05	Rationale	:	The genes required for crop improvement are present in different lines, varieties, strains or populations of the crop species and their relatives. The various lines, varieties, strains, population of a crop species and its related wild species constitute the germplasm of the crop. Genetic variability is essential for selection. Genetic variability present in the existing germplasm is limited. Short duration, zero erucic acid and low glucosinolate varieties have to develop. So, germplasm collection is necessary.
06	Materials and methods	:	Seed samples will be collected. The collection will be enlisted with an accession number. Part of the seed sample will be preserved and another part will be used for seeding.
07	Crop/Variety	:	Rapeseed-mustard (*Brassica rapa*, *B. juncea* and *B. napus*)
08	Design	:	Not applicable
	i) Treatment	:	Not applicable
	ii) Replication	:	Non-replicated
09	Plot size	:	Not applicable
10	Planting system/spacing	:	Not applicable
11	Fertilizer dose and method of application	:	Not applicable
12	Irrigation/rainfed	:	Not applicable
13	Data to be recorded	:	Passport Data and location information. Necessary morphological data of the collection specimen will be recorded.
14	Investigator(s)	:	M Shalim Uddin, M M Kadir and M A L Akanda
15	Season	:	2022-23
16	Date of initiation	:	July, 2022
17	Date of completion	:	June, 2023
18	Expected output/ benefit	:	Genetic stock of rapeseed - mustard will be enriched.
19	Location	:	Different agro-ecological zones of Bangladesh

20	Status	:	On-going
21	Estimated cost	:	Tk. 25,000/-
22	Source of fund	:	BARI/ 'Enhance Production of Oil crops (BARI Part)' project (EPOC)
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-02**	:	**Evaluation of rapeseed-mustard germplasm**
04	Objective(s)	:	i) To explore the genetic diversity of *Brassica rapa*, *B. juncea* and *B. napus* germplasm. ii) To identify the germplasm having useful traits.
05	Rationale	:	Characterization of the collected germplasm is necessary for identification and exploration of diversity existing in the collection. Considering the objectives, the proposal has been made to characterize the germplasm morphologically.
06	Materials and methods	:	No. of *Brassica rapa* germplasm =10 No. of *B. juncea* germplasm = 12 and No. of *B. napus* germplasm = 15 with three checks as BARI Sarisha-14, BARI Sarisha-11 and BARI Sarisha-11
07	Crop/Variety	:	Rapeseed-mustard (*Brassica rapa*, *B. juncea* and *B. napus*).
08	Design	:	Augmented
	i) Treatment	:	37 germplasm + 3 checks
	ii) Replication /Block	:	4 Blocks
09	Plot size	:	3M×1.0M
10	Planting system/spacing	:	Continuous sowing in rows, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.
11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering (FRG, 2018)
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Descriptors will be followed.
14	Investigator(s)	:	D. Datta, M Shalim Uddin, and M A L Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	November, 2022
17	Date of completion	:	February, 2023
18	Expected output/ benefit	:	Desirable genotypes will be identified for future breeding programme.
19	Location	:	Gazipur
20	Status	:	On-going
21	Estimated cost	:	Tk. 25,000/-
22	Source of fund	:	BARI
23	Priority	:	1st

Sub-Project II: Development of high yielding short duration variety in *Brassica rapa* L. and *Brassica napus* L.

***Brassica rapa* L.**

<table>
<tr><td>01</td><td>Programme</td><td>:</td><td>Oilseed Crops Improvement</td></tr>
<tr><td>02</td><td>Project</td><td>:</td><td>Variety Development of Rapeseed-Mustard</td></tr>
<tr><td>03</td><td>Experiment-03</td><td>:</td><td>Hybridization in B rapa L.</td></tr>
<tr><td>04</td><td>Objective(s)</td><td>:</td><td>To incorporate earliness in B rapa existing genotypes.</td></tr>
<tr><td>05</td><td>Rationale</td><td>:</td><td>B rapa is high yield potential but it takes long time to mature. Early gene sources may be incorporate through crossing.</td></tr>
<tr><td>06</td><td>Materials and Methods</td><td>:</td><td>Set-I: Number of parents-07
<table>
<tr><td>1</td><td>BC-0837-2(Y)-Toria type, very short, high yield</td></tr>
<tr><td>2</td><td>BC-15015(Y)- Toria type, short, high yield</td></tr>
<tr><td>3</td><td>BC-17033(Y)- Toria type, short, high yield</td></tr>
<tr><td>4</td><td>BC-14016(Y)- Toria type, short</td></tr>
<tr><td>5</td><td>BC-100614(1)-6-Bold seeded, high yield</td></tr>
<tr><td>6</td><td>BC-100614(3)-1-Bold seeded, high yield</td></tr>
<tr><td>7</td><td>BC-0835-2(Y)-Toria type, early, high yield</td></tr>
</table>
Set-II: Lines=20, Testers=3 (Appendix-II)</td></tr>
<tr><td>07</td><td>Crop/Variety</td><td>:</td><td>Rapeseed</td></tr>
<tr><td>08</td><td>Design</td><td>:</td><td>Half diallel (Set-I) and Line × Tester (Set-II)</td></tr>
<tr><td rowspan="2"></td><td>i) Treatment</td><td></td><td>6 parents (Set-I) and 23 parents (Set-II)</td></tr>
<tr><td>ii) Replication</td><td>:</td><td>Not applicable</td></tr>
<tr><td>09</td><td>Plot size</td><td>:</td><td>6 rows 4m long</td></tr>
<tr><td>10</td><td>Planting system/spacing</td><td>:</td><td>Each line will be grown in 6 rows 4m long with 50 cm row spacing and 5 cm plants.</td></tr>
<tr><td>11</td><td>Fertilizer dose and Methods of application</td><td>:</td><td>260:170:90:160:5 and 10 kg/ha as urea, TSP, MOP, Gypsum, Zn oxide and baric acid. All fertilizers and half urea will applied as basal and remaining half at flower initiation.</td></tr>
<tr><td>12</td><td>Irrigation/rainfed</td><td>:</td><td>As and when necessary</td></tr>
<tr><td>13</td><td>Data to be recorded</td><td>:</td><td>No. of flower crossed and no. of cross success.</td></tr>
<tr><td>14</td><td>Investigator(s)</td><td>:</td><td>D. Datta, M Shalim Uddin, M K Alam, M I Riad, M Kadir and M A Latif Akanda</td></tr>
<tr><td>15</td><td>Season</td><td>:</td><td>Rabi 2022-2023</td></tr>
<tr><td>16</td><td>Data of initiation</td><td>:</td><td>Later part of October 2022</td></tr>
<tr><td>17</td><td>Date of completion</td><td></td><td>Last week of March 2023</td></tr>
<tr><td>18</td><td>Expected output/benefit</td><td>:</td><td>Early lines with good agronomic traits will be developed.</td></tr>
<tr><td>19</td><td>Location</td><td>:</td><td>Jamalpur (Set-1), Gazipur (Set-II)</td></tr>
<tr><td>20</td><td>Status</td><td>:</td><td>On-going</td></tr>
<tr><td>21</td><td>Estimated cost</td><td>:</td><td>15,000/- per Set × 2= 30,000/-</td></tr>
<tr><td>22</td><td>Source of fund</td><td>:</td><td>BARI/’EPOC’ Project</td></tr>
<tr><td>23</td><td>Priority</td><td>:</td><td>1st</td></tr>
</table>

<table>
<tr><td>01</td><td>Programme</td><td>:</td><td colspan="3">Oilseed Crops Improvement</td></tr>
<tr><td>02</td><td>Project</td><td>:</td><td colspan="3">Variety Development of Rapeseed-Mustard</td></tr>
<tr><td>03</td><td>Experiment-04</td><td>:</td><td colspan="3">Evaluation of segregating generation of Brassica rapa L.</td></tr>
<tr><td>04</td><td>Objective(s)</td><td>:</td><td colspan="3">i) To advance generation
ii) To select short duration plants/families having desirable traits</td></tr>
<tr><td>05</td><td>Rationale</td><td>:</td><td colspan="3">Hybridization is the most important method of crop improvement. It is one of the best techniques of incorporating desirable characters into a genotype. Selection for desirable plant types and the subsequent generations.
Selection for qualitative characters is simple and quick, but that for quantitative characters is often difficult and time-consuming. Development of homogenous line through conventional breeding is essential to advance the filial generations from F_1 to F_6.</td></tr>
<tr><td rowspan="8">06</td><td rowspan="8">Materials and methods</td><td rowspan="8">:</td><td colspan="3">The crosses will be studied in different generations</td></tr>
<tr><td>Generation</td><td>No. of crosses or progenies will be evaluated</td><td>Methods</td></tr>
<tr><td>F_1</td><td>Set-I: 45 (Gazipur) and Set-II: 15 (Jamalpur)</td><td rowspan="6">All F_1 crosses will be harvested for F_2 generation. From F_2 generation, desirable plants will be selected and grow plant to row in the next year. In F_3 to F_5 generations, the best progenies will be selected. F_6 progenies will be selected for seed yield evaluation in Observation trial (OT)</td></tr>
<tr><td>F_2</td><td>Set-I: 145 (Gazipur) and Set-II: 6 (Jamalpur)</td></tr>
<tr><td>F_3</td><td>Set-I: 30 (Gazipur)</td></tr>
<tr><td>F_4</td><td>Set-I: 12 (Gazipur)</td></tr>
<tr><td>F_5</td><td>Set-I: 8 (Gazipur)</td></tr>
<tr><td>F_6</td><td>Set-I: 3 Families; Set-II: 16 Families (Gazipur)</td></tr>
<tr><td>07</td><td>Crop/Variety</td><td>:</td><td colspan="3">Rapeseed</td></tr>
<tr><td>08</td><td>Design</td><td>:</td><td colspan="3">Not applicable</td></tr>
<tr><td></td><td>i) Treatment</td><td>:</td><td colspan="3">F_1 to F_6 generations.</td></tr>
<tr><td></td><td>ii) Replication</td><td>:</td><td colspan="3">Non-replicated</td></tr>
<tr><td>09</td><td>Plot size</td><td>:</td><td colspan="3">4 rows 3m long per cross or progeny</td></tr>
<tr><td>10</td><td>Planting system/spacing</td><td>:</td><td colspan="3">Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.</td></tr>
<tr><td>11</td><td>Fertilizer dose and method of application</td><td>:</td><td colspan="3">260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.</td></tr>
<tr><td>12</td><td>Irrigation/rainfed</td><td>:</td><td colspan="3">Irrigation-as and when necessary</td></tr>
<tr><td>13</td><td>Data to be recorded</td><td>:</td><td colspan="3">Desirable plants will be selected. Data will be recorded on days to flowering and maturity, seed colour and seed yield/plant.</td></tr>
<tr><td>14</td><td>Investigator(s)</td><td>:</td><td colspan="3">M Shalim Uddin, D. Datta, M K Alam, MI Riad, MM Kadir and M A Latif Akanda</td></tr>
<tr><td>15</td><td>Season</td><td>:</td><td colspan="3">Rabi 2022-23</td></tr>
<tr><td>16</td><td>Date of initiation</td><td>:</td><td colspan="3">1st week of November, 2022</td></tr>
<tr><td>17</td><td>Date of completion</td><td>:</td><td colspan="3">February, 2023</td></tr>
<tr><td>18</td><td>Expected output/benefit</td><td>:</td><td colspan="3">Generation will be advanced.</td></tr>
<tr><td>19</td><td>Location</td><td>:</td><td colspan="3">Joydebpur and Jamalpur</td></tr>
<tr><td>20</td><td>Status</td><td>:</td><td colspan="3">Ongoing</td></tr>
<tr><td>21</td><td>Estimated cost</td><td>:</td><td colspan="3">Tk. 10,000/- per set ×7=70000.0</td></tr>
<tr><td>22</td><td>Source of fund</td><td>:</td><td colspan="3">BARI/’EPOC’ Project</td></tr>
<tr><td>23</td><td>Priority</td><td>:</td><td colspan="3">1st</td></tr>
</table>

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-05**	:	**Observation Trial of *Brassica rapa* L.**
04	Objective(s)	:	To select short duration genotypes with better agronomic traits.
05	Rationale	:	The Oilseed Research Centre of BARI has already developed 16 rapeseed-mustard varieties. Most of the developed varieties take long duration to mature except a few. As a result, they do not fit well in the existing T. Aman – mustard – Boro rice cropping pattern. Moreover, some varieties have lodging tendency during ripening stage. As a result, the siliquae developed from the buds of later stages become empty. From these consideration, the experiment has been undertaken to develop erect type short duration high yielding varieties to fit into the existing rice based cropping pattern.
06	Materials and methods	:	No. of entries: Set-I: 13 (12-yellow seed coat + 1 check as BARI Sarisha-14) (Appendix-II) Set-II: 11 (10-brown seed coat + 1 check as BARI Sarisha-9) (Appendix-II) Set-III (Jamalpue): 17 (16-brown seed coat + 1 check as BARI Sarisha-9) Set-IV: 16 RIL lines (15-yellow seed coat + 1 check as BARI Sarisha-14) (Appendix-II) Set-V: 16 RIL lines (15-brown seed coat + 1 check as BARI Sarisha-9) (Appendix-II) Row to row distance 30 cm and plant to plant distance 5 cm after thinning.
07	Crop/Variety	:	Rapeseed
08	Design	:	RCBD
	i) Treatment	:	Different no. genotypes in different set
	ii) Replication	:	Two
09	Plot size	:	3 rows 3m long
10	Planting system/spacing	:	Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.
11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to 50% flowering, days to maturity, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plot, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	M Shalim Uddin, U. Kulsum, D. Datta, M K Alam, MI Riad, MM Kadir and M A Latif Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	1st week of November, 2022
17	Date of completion	:	February, 2023
18	Expected output/ benefit	:	Short duration and high yielding lines will be selected.
19	Location	:	Joydebpur (Set-I, Set-II, Set-IV & Set-V) and Jamalpur (Set-III)
20	Status	:	2nd year (Set-I & Set-II), 1st year (Set-V & Set-VI) and 2st year (Set-III)
21	Estimated cost	:	Tk. 10,000/-× 5 = 50000.0
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-06**	:	**Preliminary Yield Trial of *Brassica rapa* L.**
04	Objective(s)	:	To select short duration genotypes with better agronomic traits.
05	Rationale	:	The Oilseed Research Centre of BARI has already developed 16 rapeseed-mustard varieties. Most of the developed varieties take long duration to mature except a few. As a result, they do not fit well in the existing T.Aman–mustard–Boro rice cropping pattern. Moreover, some varieties have lodging tendency during ripening stage. As a result, the siliquae developed from the buds of later stages become empty. From these consideration, the experiment has been undertaken to develop erect type short duration high yielding varieties to fit into the existing rice based cropping pattern.
06	Materials and methods	:	Set-I (Gazipur): 12 (11 -yellow seed coat + 1 check as BARI Sarisha-14 (Appendix-II) Set-II (Jamalpur): 13 (12 -yellow seed coat + 1 check as BARI Sarisha-14 (Appendix-II) Set-III(Jamalpur): 12 (12 -brown seed coat + 1 check as BARI Sarisha-9 (Appendix-II) Row to row distance 30 cm and plant to plant distance 5 cm after thinning.
07	Crop/Variety	:	Rapeseed
08	Design	:	RCB
	i) Treatment	:	38 genotypes
	ii) Replication	:	3
09	Plot size	:	4 rows 3m long
10	Planting system/ spacing	:	Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.
11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to 50% flowering, days to maturity, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plot, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	M. Shalim Uddin, M Kadir, D. Datta, M K Alam, M I Riad, M R Humauan, M H Rahman, M A Momin, S Ghosh and Md M Hasan Khan
15	Season	:	Rabi 2022-23
16	Date of initiation	:	1st week of November, 2022
17	Date of completion	:	February, 2023
18	Expected output/benefit	:	Short duration and high yielding lines will be selected.
19	Location	:	Set-I: Joydebpur, Ishurdi, Jashore, Rahmathpur, Rangpur and Hathazari Set-II: Joydebpur, Jamalpur, Ishurdi Set-III: Joydebpur, Jamalpur, Jashore
20	Status	:	2nd year
21	Estimated cost	:	Tk. 10,000/-x12= 120000.0
22	Source of fund	:	BARI/EPOC project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-07**	:	**Regional yield trial of *Brassica rapa* L.**
04	Objective(s)	:	i) To select short duration high yielding lines with better agronomic traits and wider adaptability. ii) To develop short duration variety to fit in between T. aman and Boro rice.
05	Rationale	:	The Oilseed Research Centre of BARI has already developed 16 rapeseed-mustard varieties. Most of the developed varieties take long duration to mature except a few. As a result, they do not fit well in the existing T. Aman – mustard – Boro rice cropping pattern. Moreover, some varieties have lodging tendency during ripening stage. As a result, the siliquae developed from the buds of later stages become empty. From these consideration, the experiment has been undertaken to develop erect type short duration high yielding varieties to fit into the existing rice based cropping pattern.
06	Materials and methods	:	Set-I (Gazipur): 9 (8 advanced lines + 1 check) BC-100614(1)-6, BC-100614(3)-1, BC-100614(8)-4, BC-100614(4)-7, BC-120114, BC-110714(7)-2, BS-15 YF-01, BC-20-GS-1 and BARI Sarisha-14 (ch) Set-II (Jamalpur): 11 (10 advanced lines + 1 Check) 1. BC-14016(Y), 2. BC-14031(Y), 3. BC-17033(Y), 4. BC-15022(Y), 5. BC-15015(Y), 6. BC-15015(Y), 7. BC-18024(Y), 8. BC-18315(Y), 9. BC-18.22(Y), 10. BC-22079(Y), 11. BARI Sarisha- 14).
07	Crop/Variety	:	Rapeseed
08	Design	:	RCB
	i) Treatment	:	20 genotypes
	ii) Replication	:	3
09	Plot size	:	6 rows 3m long
10	Planting system/ spacing	:	Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.
11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to 50% flowering, days to maturity, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plot, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	M. Shalim Uddin, M Kadir, D. Datta, A K Alam, M I Riad, M R Humauan, M H Rahman, M A Momin, S Ghosh and Md M Hasan Khan and M A L Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	1st week of November, 2022
17	Date of completion	:	February, 2023
18	Expected output/benefit	:	High yielding and short duration varieties with better performance will be developed.
19	Locations	:	Joydebpur, Ishurdi, Jamalpur, Jessore, Rahmatpur, Rangpur and Hathazari
20	Status	:	3nd year (Set-I), On-going (Set-II)
21	Estimated cost	:	Tk. 10,000/-x 7x 2= 140000.0
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

***Brassica napus* L.**

<table>
<tr><td>01</td><td>Programme</td><td>:</td><td>Oilseed Crops Improvement</td></tr>
<tr><td>02</td><td>Project</td><td>:</td><td>Variety Development of Rapeseed-Mustard</td></tr>
<tr><td>03</td><td>Experiment-08</td><td>:</td><td>Hybridization in B. napus L.</td></tr>
<tr><td>04</td><td>Objective(s)</td><td>:</td><td>To incorporate earliness in B. napus existing genotypes.</td></tr>
<tr><td>05</td><td>Rationale</td><td>:</td><td>B napus is high yield potential but it takes long time to mature. Early gene sources may be incorporate through crossing. Development of early mature Brassica napus is very important. To grow this crop in between Taman and Boro rice will help to increase area and production of oilseed crop.</td></tr>
<tr><td>06</td><td>Materials and Methods</td><td>:</td><td>Set-I (Jamalpur): Number of parents-10
<table>
<tr><td>1</td><td>Nap-15029-Very early, high yield</td><td>6</td><td>Nap-15037- Very early, high yield</td></tr>
<tr><td>2</td><td>Nap-16013- Early, high yield</td><td>7</td><td>Nap-20009- High yield</td></tr>
<tr><td>3</td><td>Nap-16036- Early, high yield</td><td>8</td><td>Nap-16064-Very early, high yield</td></tr>
<tr><td>4</td><td>Nap-20008-High yield</td><td>9</td><td>Nap-18010-High yield</td></tr>
<tr><td>5</td><td>Nap-0733-2-High yield</td><td>10</td><td>Nap-0717-1-High yield</td></tr>
</table>
Set-II(Gazipur): No. of parents-15 (12 lines and 3 Tester) (Appendix-II)</td></tr>
<tr><td>07</td><td>Crop/Variety</td><td>:</td><td>B. napus L.</td></tr>
<tr><td>08</td><td>Design</td><td>:</td><td>Half diallel (Set-1) and Line × Tester (Set-II)</td></tr>
<tr><td></td><td>i) Treatment</td><td></td><td>10 parents (Set-I) and 15 parents (Set-II)</td></tr>
<tr><td></td><td>ii) Replication</td><td>:</td><td>Not applicable</td></tr>
<tr><td>09</td><td>Plot size</td><td>:</td><td>6 rows 4m long per parent</td></tr>
<tr><td>10</td><td>Planting system/spacing</td><td>:</td><td>Each parent will be grown in 6 rows 4m long with 30 cm row spacing and 5 cm plants.</td></tr>
<tr><td>11</td><td>Fertilizer dose and Methods of application</td><td>:
:</td><td>260:170:90:160:5 and 10 kg/ha as urea, TSP, MOP, Gypsum, Zn oxide and Boric acid. All fertilizers and half urea will be applied as basal and remaining half at flower initiation.</td></tr>
<tr><td>12</td><td>Irrigation/rainfed</td><td>:</td><td>Irrigated-As and when necessary</td></tr>
<tr><td>13</td><td>Data to be recorded</td><td>:</td><td>No. of flowers cross and % of cross success.</td></tr>
<tr><td>14</td><td>Investigator(s)</td><td>:</td><td>M Shalim Uddin, D. Datta, M K Alam, MI Riad, MM Kadir and M A Latif Akanda</td></tr>
<tr><td>15</td><td>Season</td><td>:</td><td>Rabi 2022-23</td></tr>
<tr><td>16</td><td>Date of initiation</td><td>:</td><td>Later part of October 2022</td></tr>
<tr><td>17</td><td>Date of completion</td><td></td><td>February 2023</td></tr>
<tr><td>18</td><td>Expected output/benefit</td><td>:</td><td>Early lines with good agronomic traits will be developed.</td></tr>
<tr><td>19</td><td>Location</td><td>:</td><td>Gazipur and Jamalpur</td></tr>
<tr><td>20</td><td>Status</td><td>:</td><td>On-going</td></tr>
<tr><td>21</td><td>Estimated cost</td><td>:</td><td>25,000/- × 2=50000.0</td></tr>
<tr><td>22</td><td>Source of fund</td><td>:</td><td>BARI/’EPOC’ Project</td></tr>
<tr><td>23</td><td>Priority</td><td>:</td><td>1st</td></tr>
</table>

<table>
<tr><td>01</td><td>Programme</td><td>:</td><td colspan="3">Oilseed Crops Improvement</td></tr>
<tr><td>02</td><td>Project</td><td>:</td><td colspan="3">Variety Development of Rapeseed-Mustard</td></tr>
<tr><td>03</td><td>Experiment-09</td><td>:</td><td colspan="3">Evaluation of segregating generation of Brassica napus</td></tr>
<tr><td>04</td><td>Objective(s)</td><td>:</td><td colspan="3">i) To advance generation
ii) To select short duration plants/families having desirable traits</td></tr>
<tr><td>05</td><td>Rationale</td><td>:</td><td colspan="3">Hybridization is the most important method of crop improvement. It is one of the best techniques of incorporating desirable characters into a genotype. Selection for desirable plant types and the subsequent generations.
Selection for qualitative characters is simple and quick, but that for quantitative characters is often difficult and time-consuming. Development of homogenous line through conventional breeding is essential to advance the filial generations from F_1 to F_6.</td></tr>
<tr><td>06</td><td>Materials and methods</td><td>:</td><td colspan="3">The crosses will be studied in different generations
<table><tr><th>Generation</th><th>No. of crosses or progenies will be evaluated</th><th>Methods</th></tr><tr><td>F_1</td><td>Set-I: 15 (Gazipur) and Set-II: 28 (Jamalpur)</td><td rowspan="6">All F_1 crosses will be harvested for F_2 generation. From F_2 generation, desirable plants will be selected and grow plant to row in the next year. In F_3 to F_5 generations, the best progenies will be selected. F_6 progenies will be selected for seed yield evaluation in Observation trial (OT)</td></tr><tr><td>F_2</td><td>Set-I: 240 (Gazipur) and Set-II: 21 (Jamalpur)</td></tr><tr><td>F_3</td><td>Set-I: 154 (Jamalpur)</td></tr><tr><td>F_4</td><td>Set-I: 147 (Jamalpur)</td></tr><tr><td>F_5</td><td>Set-I: 37 (Jamalpur)</td></tr><tr><td>F_6</td><td>Set-I: 16 (Gazipur), Set-II: 15 (Gazipur)</td></tr></table></td></tr>
<tr><td>07</td><td>Crop/Variety</td><td>:</td><td colspan="3">Rapeseed</td></tr>
<tr><td>08</td><td>Design</td><td>:</td><td colspan="3">Not applicable</td></tr>
<tr><td></td><td>i) Treatment</td><td>:</td><td colspan="3">F_1 to F_6 generations.</td></tr>
<tr><td></td><td>ii) Replication</td><td>:</td><td colspan="3">Non-replicated</td></tr>
<tr><td>09</td><td>Plot size</td><td>:</td><td colspan="3">4 rows 3m long per cross or progeny</td></tr>
<tr><td>10</td><td>Planting system/spacing</td><td>:</td><td colspan="3">Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.</td></tr>
<tr><td>11</td><td>Fertilizer dose and method of application</td><td>:</td><td colspan="3">260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.</td></tr>
<tr><td>12</td><td>Irrigation/rainfed</td><td>:</td><td colspan="3">Irrigation-as and when necessary</td></tr>
<tr><td>13</td><td>Data to be recorded</td><td>:</td><td colspan="3">Desirable plants will be selected. Data will be recorded on days to flowering and maturity, seed colour and seed yield/plant.</td></tr>
<tr><td>14</td><td>Investigator(s)</td><td>:</td><td colspan="3">M Shalim Uddin, D. Datta, M K Alam, MI Riad, MM Kadir and M A Latif Akanda</td></tr>
<tr><td>15</td><td>Season</td><td>:</td><td colspan="3">Rabi 2022-23</td></tr>
<tr><td>16</td><td>Date of initiation</td><td>:</td><td colspan="3">1st week of November, 2022</td></tr>
<tr><td>17</td><td>Date of completion</td><td>:</td><td colspan="3">February, 2023</td></tr>
<tr><td>18</td><td>Expected output/benefit</td><td>:</td><td colspan="3">Generation will be advanced.</td></tr>
<tr><td>19</td><td>Location</td><td>:</td><td colspan="3">Joydebpur and Jamalpur</td></tr>
<tr><td>20</td><td>Status</td><td>:</td><td colspan="3">Ongoing</td></tr>
<tr><td>21</td><td>Estimated cost</td><td>:</td><td colspan="3">Tk. 15,000/- per set ×9 = 135000.0</td></tr>
<tr><td>22</td><td>Source of fund</td><td>:</td><td colspan="3">BARI/’EPOC’ Project</td></tr>
<tr><td>23</td><td>Priority</td><td>:</td><td colspan="3">1st</td></tr>
</table>

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-10**	:	**Observation Yield trial of *B napus* L.**
04	Objective(s)	:	To select high yield potential lines with early maturity those can be grown in between T. Aman and Boro rice.
05	Rationale	:	Yield potentiality of *Brassica napus* is very high but its duration is longer than existing variety. It is essential to select early mature lines of *B. napus* which can be fitted in between rice-rice cropping system. T. Aman-fallow-Boro is the major cropping pattern in Bangladesh. To fit the rapeseed in between two rice crop, early mature lines is necessary.
06	Materials and Methods	:	Set-I (Jamalpur): 30 lines including BARI Sarisha-8 & BARI Sarisha-18 as checks. Nap-20021, 2. Nap-30021, 3. Nap-50021, 4. Nap-60021, 5. Nap-80021, 6. Nap-10021, 7. Nap-12022, 8. Nap-13021, 9. Nap-14021, 10. Nap-15021, 11. Nap-16021, 12. Nap-19021, 13. Nap-21021, 14. Nap-22022, 15. Nap-25021, 16. Nap-26021, 17. Nap-27021, 18. Nap-31021, 19. Nap-32022, 20. Nap-33021, 21. Nap-35021, 22. Nap-37021, 23. Nap-38021, 24. Nap-42022, 25. Nap-44021, 26. Nap-47021, 27. Nap-49021, 28. Nap-51021, 29. BARI Sarisha-13 & 30. BARI Sarisha- 18 Set-II (Gazipur): 12 (Semi-determinate) + BARI Sarisha-13 & 30. BARI Sarisha- 18
07	Crop/Variety	:	*B. napus*
08	Design	:	RCB
	i) Treatment	:	30 lines including BARI Sarisha-8, BINA sarisha-9 and BARI Sarisha-18 as checks.
	ii) Replication	:	2
09	Plot size	:	2.1m x 3m
10	Planting system/spacing	:	Spacing 30x5cm
11	Fertilizer dose and Methods of application	:	260:170:90:160:5 and 10 kg/ha as urea, TSP, MOP, Gypsum, Zn oxide and Boric acid. All fertilizers and half urea will be applied as basal and remaining half at flower initiation.
12	Irrigation/rainfed	:	Irrigation-As and when necessary
13	Data to be recorded	:	Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plot, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	M Shalim Uddin, U. Kulsum, M Kadir, K Alam and M I Riad
15	Season	:	Rabi 2022-23
16	Date of initiation	:	Later part of October 2022
17	Date of completion	:	February 2023
18	Expected output/benefit	:	Early mature lines with high yield will be developed.
19	Location	:	Jamalpur
20	Status	:	On-going
21	Estimated cost	:	15,000/-×2=30000.0
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-11**	:	**Preliminary Yield trial of *B. napus* L.**
04	Objective(s)	:	To select high yield potential lines with early maturity those can be grown in between T. Aman and Boro rice.
05	Rationale	:	T. Aman-fallow-Boro is the major cropping pattern in Bangladesh. To fit the rapeseed in between two rice crops; early mature lines is essential. Large area remains fallow after harvest of Taman. It will help to increase oilseed area and production in Bangladesh. Early mature with high yield potential lines may be selected from this experiment which is the major objective of oilseed breeder.
06	Materials and Methods	:	16 lines including BARI Sarisha-8 & BINAsarisha-9 as checks.
07	Crop/Variety	:	*Brassica napus* L.
08	Design	:	RCB
	i) Treatment		14 lines including BARI Sarisha- 8 & BARI Sarisha- 13 as checks (1. Nap-20021, 2. Nap-50021, 3. Nap-16021, 4. Nap-19021, 5. Nap-32021, 6. Nap-33021, 7. Nap-37021, 8. Nap-38021, 9. Nap-44021, 10. Nap-47021, 11. Nap-49021 12. Nap-51021 13. BARI Sarisha- 18 & 14. BARI Sarisha -13).
	ii) Replication	:	3
09	Plot size	:	2.1x4m
10	Planting system/spacing	:	Spacing 30x5cm
11	Fertilizer dose and Methods of application	:	260:170:90:160:5 and 10 kg/ha as urea, TSP, MOP, Gypsum, Zn oxide and Boric acid. All fertilizers and half urea will be applied as basal and remaining half at flower initiation.
12	Irrigation/rainfed	:	As and when necessary
13	Data to be recorded	:	Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plot, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	M Kadir, A K Alam, M I Riad, D. Datta, M Shalim Uddin, M R Humauan, M H Rahman and M A L Akanda
15	Season	:	Rabi 2022-21
16	Date of initiation	:	Later part of October 2022
17	Date of completion	:	February 2023
18	Expected output/benefit	:	Early mature lines with high yield will be developed.
19	Location	:	Jamalpur, Joydebpur, Ishurdi and Jashore
20	Status	:	On-going
21	Estimated cost	:	15,000/-x 4= 60000.0
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-12**	:	**Regional Yield trial of *B. napus* L.**
04	Objective(s)	:	To select high yield potential lines with early maturity those can be grown in between T. Aman and Boro rice.
05	Rationale	:	Large area remains fallow after harvest of Taman. Utilization of this land by cultivating rapeseed will help to increase oilseed area and production in Bangladesh. Early mature with high yield potential lines will be selected from this experiment which is the major objective of oilseed breeder. T. Aman-fallow-Boro is the major cropping pattern in Bangladesh. To fit the rapeseed in between two rice crops; early mature lines is essential.
06	Materials and Methods	:	12 lines including BARI Sarisha- 18 & BINA Sarisha -9 as checks (1. Nap-15027, 2. Nap-15029, 3. Nap-15037, 4. Nap-16006, 5. Nap-16009, 6. Nap-16013, 7. Nap-18005, 8. Nap-18025, 9. Nap-18033, 10. Nap-19080, 11. BHS01, 12. BARI Sarisha- 18. 13. BINA sarisha -9).
07	Crop/Variety	:	*Brassica napus* L.
08	Design	:	RCB
	i) Treatment	:	12 lines including BARI Sarisha-18 & BINAsarisha-9 as checks.
	ii) Replication	:	3
09	Plot size	:	2.1x4m
10	Planting system/spacing	:	Spacing 30x5cm
11	Fertilizer dose and Methods of application	:	260:170:90:160:5 and 10 kg/ha as urea, TSP, MOP, Gypsum, Zn oxide and Boric acid. All fertilizers and half urea will be applied as basal and remaining half at flower initiation.
12	Irrigation/rainfed	:	As and when necessary
13	Data to be recorded	:	Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plot, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	M Kadir, M. Shalim Uddin, A K Alam, M I Riad, M R Humauan, M H Rahman, M A Momin, D. Datta, S Ghosh and Md M Hasan Khan and M A L Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	Later part of October 2022
17	Date of completion	:	February 2023
18	Expected output/benefit	:	Early mature lines with high yield will be developed.
19	Location	:	Jamalpur, Joydebpur, Ishurdi, Hathazari, Rahmatpur, Rangpur and Jashore
20	Status	:	On-going
21	Estimated cost	:	15,000/- x 7 = 105000.0
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project III: Development of high yielding variety in *Brassica juncea* L. and *Brassica carinata* L.

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-13**	:	**Regional Yield Trial of *Brassica juncea* L.**
04	Objective(s)	:	i) To select lines with high yield potential, better agronomic traits and wider adaptability. ii) To develop high yielding variety of *B. juncea*.
05	Rationale	:	The Oilseed Research Centre of BARI has already developed 16 rapeseed-mustard varieties. Some of the developed varieties take medium to long duration to mature. These varieties are suitable in those cropping pattern where boro rice is not mandatory after mustard cultivation. Some varieties have lodging tendency during ripening stage. As a result, the siliquae developed from the buds of later stages become empty. From these consideration, the experiment has been undertaken to develop erect type high yielding varieties.
06	Materials and methods	:	No. of entries: 9 (8 + 1 check as BARI Sarisha-11) Bj-11536(12)-1, Bj-11536(12)-5, Bj-11536(12)-6, Bj-1110(12)-1, BJ-53611(12)-8, BJ-1111(7)-7, BJDH-05, BJDH-20 and BARI Sarisha-11. Row to row distance 30 cm and plant to plant distance 5 cm after thinning.
07	Crop/Variety	:	Mustard
08	Design	:	RCB
	i) Treatment	:	9 genotypes
	ii) Replication	:	3
09	Plot size	:	6 rows 3m long
10	Planting system/ spacing	:	Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.
11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to 50% flowering, days to maturity, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plot, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	M. Shalim Uddin, M R Humauan, M H Rahman, M A Momin, S Ghosh, Md M Hasan Khan and M A L Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	1st week of November, 2022
17	Date of completion	:	February, 2023
18	Expected output/benefit	:	High yielding varieties with better performance would be developed.
19	Location	:	Joydebpur, Ishurdi, Jamalpur, Jashore, Rahmatpur, Rangpur and Hathazari
20	Status	:	3nd year
21	Estimated cost	:	Tk. 15,000/-x 7 = 105000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

***Brassica carinata* L**.

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-14**	:	**Interspecific Hybridization in *B. napus L.; B. rapa and B. carinata***
04	Objective(s)	:	To create genetic variability in rapeseed-mustard. To broadening of genetic diversity
05	Rationale	:	Interspecific hybridization is one of the best techniques of incorporating desirable characters into a genotype. Early gene sources may be incorporate through crossing. Development of early mature *Brassica napus* is very important. To grow this crop in between Taman and Boro rice will help to increase area and production of oilseed crop.
06	Materials and Methods	:	Set-I(Gazipur): No. of parents-8 (3 lines and 5 Tester) (Appendix-II)
07	Crop/Variety	:	Rapeseed-Mustard
08	Design	:	Line × Tester (Set-II)
	i) Treatment		8 parents
	ii) Replication	:	Not applicable
09	Plot size	:	6 rows 4m long per parent
10	Planting system/spacing	:	Each parent will be grown in 6 rows 4m long with 30 cm row spacing and 5 cm plants.
11	Fertilizer dose and Methods of application	: :	260:170:90:160:5 and 10 kg/ha as urea, TSP, MOP, Gypsum, Zn oxide and Boric acid. All fertilizers and half urea will be applied as basal and remaining half at flower initiation.
12	Irrigation/rainfed	:	Irrigated-As and when necessary
13	Data to be recorded	:	No. of flowers cross and % of cross success.
14	Investigator(s)	:	M Shalim Uddin, D. Datta, M K Alam, MI Riad, MM Kadir and M A Latif Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	Later part of October 2022
17	Date of completion		February 2023
18	Expected output/benefit	:	Early lines with good agronomic traits will be developed.
19	Location	:	Gazipur and Jamalpur
20	Status	:	On-going
21	Estimated cost	:	25,000/- × 2=50000.0
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-15**	:	**Evaluation of segregating generation of interspecific crosses**
04	Objective(s)	:	i) To advance generation ii) To select short duration plants/families having desirable traits
05	Rationale	:	Interspecific hybridization is one of the best techniques of incorporating desirable characters into a genotype. It is one of the best techniques of incorporating desirable characters into a genotype. Selection for desirable plant types and the subsequent generations. Selection for qualitative characters is simple and quick, but that for quantitative characters is often difficult and time-consuming. Development of homogenous line through conventional breeding is essential to advance the filial generations from F_1 to F_6.

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<tr><td>06</td><td>Materials and methods</td><td>:</td><td colspan="3">The crosses will be studied in different generations</td></tr>
<tr><td></td><td></td><td></td><td>Generation</td><td>No. of crosses or progenies will be evaluated</td><td>Methods</td></tr>
<tr><td></td><td></td><td></td><td>F_1</td><td>Set-I: 10</td><td rowspan="6">All F_1 crosses will be harvested for F_2 generation. From F_2 generation, desirable plants will be selected and grow plant to row in the next year. In F_3 to F_5 generations, the best progenies will be selected. F_6 progenies will be selected for seed yield evaluation in Observation trial (OT)</td></tr>
<tr><td></td><td></td><td></td><td>F_2</td><td>Set-I: 55</td></tr>
<tr><td></td><td></td><td></td><td>F_3</td><td>Set-I: -</td></tr>
<tr><td></td><td></td><td></td><td>F_4</td><td>Set-I: -</td></tr>
<tr><td></td><td></td><td></td><td>F_5</td><td>Set-I: -</td></tr>
<tr><td></td><td></td><td></td><td>F_6</td><td>Set-I: 10</td></tr>
<tr><td>07</td><td>Crop/Variety</td><td>:</td><td colspan="3">Rapeseed</td></tr>
<tr><td>08</td><td>Design</td><td>:</td><td colspan="3">Not applicable</td></tr>
<tr><td></td><td>i) Treatment</td><td>:</td><td colspan="3">F_1 to F_6 generations.</td></tr>
<tr><td></td><td>ii) Replication</td><td>:</td><td colspan="3">Non-replicated</td></tr>
<tr><td>09</td><td>Plot size</td><td>:</td><td colspan="3">4 rows 3m long per cross or progeny</td></tr>
<tr><td>10</td><td>Planting system/spacing</td><td>:</td><td colspan="3">Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.</td></tr>
<tr><td>11</td><td>Fertilizer dose and method of application</td><td>:</td><td colspan="3">260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.</td></tr>
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<tr><td>14</td><td>Investigator(s)</td><td>:</td><td colspan="3">M Shalim Uddin, D. Datta, M K Alam, MI Riad, MM Kadir and M A Latif Akanda</td></tr>
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<tr><td>18</td><td>Expected output/benefit</td><td>:</td><td colspan="3">Generation will be advanced.</td></tr>
<tr><td>19</td><td>Location</td><td>:</td><td colspan="3">Joydebpur and Jamalpur</td></tr>
<tr><td>20</td><td>Status</td><td>:</td><td colspan="3">Ongoing</td></tr>
<tr><td>21</td><td>Estimated cost</td><td>:</td><td colspan="3">Tk. 20,000/- per set ×3=60000.0</td></tr>
<tr><td>22</td><td>Source of fund</td><td>:</td><td colspan="3">BARI/’EPOC’ Project</td></tr>
<tr><td>23</td><td>Priority</td><td>:</td><td colspan="3">1st</td></tr>
</table>

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-16**	:	**PYT of entries developed from back cross generation of interspecific crosses among *B. carinata, B. rapa* and *B. napus***
04	Objective(s)	:	i) Utilization of genetic variability of inter specific cross. ii) To find out genotypes suitable for cultivation in Bangladesh.
05	Rationale	:	Interspecific hybridization is one of the best techniques of incorporating desirable characters into a genotype.
06	Materials and methods	:	
07	Variety	:	
08	Treatment	:	10 accessions along with checks
09	Replication	:	3
10	Design	:	RCB

11	Plot size	:	3 rows-plot 3m long per parent
12	Fertilizer dose/rates	:	Appendix-I
13	Fertilizer application method	:	Appendix-I
14	Irrigation/rainfed	:	Irrigation-as and when necessary
15	Data to be recorded	:	Data will be recorded on no. of plants crossed, no. of buds crossed, no. of siliquae obtain, no. of seeds obtain, days to flower and days to maturity.
16	Investigator(s)	:	U. Kulsum, M. Shalim Uddin, S Ghosh, Md M Hasan Khan and M. M. Ali
17	Date of initiation	:	1st week of November, 2022
18	Date of completion	:	February, 2023
19	Expected output/benefit	:	High yielding stress tolerant variety will be developed.
20	Location	:	Joydebpur, Ishurdi, Jessore, Rangpur, Hathazari and Rahmatpur
21	Status	:	3rd year
22	Estimated cost	:	Tk. 30,000 ×6=180000.0
23	Source of fund	:	BARI
24	Priority	:	1st

Sub-Project IV: Development of hybrid variety in *Brassica rapa* L. and *Brassica napus* L.

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-17**	:	**Maintenance of CMS, restorer and maintainer lines of *Brassica napus* L.**
04	Objective(s)	:	i) To maintain the male sterile and maintainer lines. ii) To use in future breeding programme.
05	Rationale	:	Exploitation of heterosis utilizing pollination mechanisms like cytoplasmic-genetic male sterility (CMS) and self-incompatibility (SI) for development of hybrid variety is the usual practice in many crops including oilseeds in China and other countries of the world. Ogura and Polima CMS systems are being used for development of hybrid variety of *Brassica napus*. For designing future breeding programme of hybrid development, maintenance of male sterile lines and maintainer lines is essential.
06	Materials and methods	:	Two CMS lines, CMSZ1 (248) and CMSZ2 (179), two maintainer lines, Nap-248 and Nap-179. CMS lines and one restorer line, Nap-14-01R. CMS lines will be crossed with maintainer line (B-line) by hand pollination. B-line and R-line will be maintained through selfing by hand pollination. Row to row distance 30 cm and plant to plant distance 5 cm after thinning.
07	Crop/Variety	:	*Brassica napus*
08	Design	:	Not applicable
	i) Treatment	:	Four CMS lines, CMSZ1 (248) and CMSZ2 (179), two maintainer lines, Nap-248 and Nap-179. CMS lines and one restorer line, Nap-14-01R
	ii) Replication	:	Non-replicated
09	Plot size	:	9 rows 3m long per CMS, maintainer and restorer line
10	Planting system/ spacing	:	Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.
11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary

13	Data to be recorded	:	Days to 50% flowering, days to maturity, no. of buds cross and self, no. of siliqua obtain and no. of seed obtain.
14	Investigator(s)	:	M Shalim Uddin, D. Datta and M A Latif Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	1st week of November, 2022
17	Date of completion	:	February, 2023
18	Expected output/benefit	:	Male sterile, restorer and maintainer lines will be maintained.
19	Location	:	Joydebpur
20	Status	:	Ongoing
21	Estimated cost	:	Tk. 15,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-18**	**:**	**Development of hybrid variety in rapeseed** **I. Development of short duration parental lines** **II. Development of test cross hybrids** **III. Evaluation of test cross hybrids**
04	Objective(s)	:	i) To develop short duration parental lines. ii) To develop and evaluate test cross hybrids.
05	Rationale	:	There is a limited scope of horizontal expansion of cultivation of rapeseed. So, for increasing rapeseed production, seed yield must be increased per unit area. Hybrid variety can play an important role in this regard. Hybrid varieties of rapeseed are being cultivated in some countries. Hybrid varieties of rapeseed have already been cultivated in India and China. Exploitation of heterosis utilizing pollination mechanisms like cytoplasmic-genetic male sterility (CMS) and self-incompatibility (SI) for development of hybrid variety is the usual practice in many crops including oilseeds in China and other countries of the world. Ogura and Polima CMS systems are being used for development of hybrid variety of rapeseed. For development of hybrids, three parental lines like CMS, maintainer and restorer lines, are pre-requisite.
06	Materials and methods	:	I. Short duration parental lines (restorer and CMS) development: Two CMS lines, CMSZ1 (248) and CMSZ2 (279) will be crossed with three short duration *B. napus* lines to develop BC_5. Restorer line will be crossed with three short duration *B. napus* varieties/lines to develop BC_4. II & III. Test cross hybrids development and evaluation: Test cross hybrids will be developed by crossing between CMS and restorer line and hybrids will be evaluated.
07	Crop/Variety	:	Rapeseed (*Brassica napus*)
08	Design	:	Not applicable
	i) Treatment	:	One restorer line, two CMS lines, $CMSZ_1$ (248) and $CMSZ_2$ (179) and three short duration *B. napus* lines, Nap-205, Nap-0876 and Nap-0869.
	ii) Replication	:	Non-replicated
09	Plot size	:	-
10	Planting system/ spacing	:	Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.
11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary

13	Data to be recorded	:	Days to 50% flowering, days to maturity, no. of buds cross and self, no. of siliqua obtain and no. of seed obtain, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plant, disease and insect reaction.
14	Investigator(s)	:	M Shalim Uddin, D. Datta and M A Latif Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	1st week of November, 2022
17	Date of completion	:	February, 2023
18	Expected output/benefit	:	Short duration parental lines and hybrids will be developed.
19	Location	:	Joydebpur
20	Status	:	Ongoing
21	Estimated cost	:	Tk. 30,000/-x3= 90,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-19**	**:**	**Heterosis study of hybrids developed through selected restorer**
04	Objective(s)	:	i) To select commercial hybrid
05	Rationale	:	In Bangladesh, there is no hybrid in Brassica sp. Commercial hybrids produce more seed yield compare to the standard variety existing. Exploitable level of standard heterosis depends on an effective male sterility and fertility system which is the most important prerequisites for the development of commercially viable hybrids. Oilseed Research Centre already developed CMS systems using Polima CMS systems and trying to develop suitable effective restorer lines. In the meantime, the Centre selected several restorers and also produced hybrids using the selected restorer. The present experiment has been taken to evaluate the performance of the suitable hybrids developed for commercial production.
06	Materials and methods	:	15 hybrids along with a standard check BARI Sarisha-13 will be planted. Unite plot size 5 lines 3 m long with 30 cm row spacing. Standard heterosis will be calculated.
07	Crop/Variety	:	Parents: CMS-248 and 15 selected R lines.
08	Design	:	RCB
	i) Treatment	:	15 hybrid along with 1 check BARI Sarisha-13.
	ii) Replication	:	3
09	Plot size	:	5 rows plot 3m long
10	Planting system/spacing	:	Row to row 30 cm and continuous sowing
11	Fertilizer dose and method of application	:	FRG, 2018
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (gm), seed yield/plot, seed yield (kg/ha) and heterosis.
14	Investigator(s)	:	U. Kulsum, M M Ali ,M. Kadir and M A Latif Akanda
15	Season		Rabi
16	Date of initiation	:	1st week of November 2022
17	Date of completion	:	February 2023
18	Expected output/benefit	:	Identification of commercial hybrid
19	Location	:	Joydebpur and Jamalpur
20	Status	:	Ongoing
21	Estimated cost	:	Tk. 25,000 x 2 = 50,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project V: Development of double low (canola) variety in rapeseed

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-20**	:	**Hybridization in double low (canola) *B. napus* L.**
04	Objective(s)	:	To develop double low short duration genotypes through crossing between *Brassica rapa* and *Brassica napus*.
05	Rationale	:	In its original form, Brassica oil, was harmful to humans due to its relatively high level of erucic acid. Erucic acid is commonly present in native cultivars in concentrations of 30-50% by weight based upon the total fatty acid content. “Double-low" varieties (low in erucic acid in the oil as well as low in glucosinolates in the solid meal after oil extraction) were developed in many countries, which have an erucic acid content of less than 2% by weight based upon the total fatty acid content, and a glucosinolate content of less than 30 µmol/gram of the oil-free meal. These high quality forms of rape, first developed in Canada, are known as ‘Canola’. Existing varieties of rapeseed-mustard have high quantity of erucic acid (30-40%). The experiment has been undertaken to develop double low genotypes through crossing between *Brassica rapa* and *Brassica napus*.
06	Materials and Methods	:	Set-I (Gazipur): No. of parents-15 (15 double low lines and 2 Tester) (Appendix-II)
07	Crop/Variety	:	double low (canola) *B. napus* L.
08	Design	:	Line × Tester (Set-I)
	i) Treatment		17 parents (Set-I)
	ii) Replication	:	Not applicable
09	Plot size	:	6 rows 4m long per parent
10	Planting system/spacing	:	Each parent will be grown in 6 rows 4m long with 30 cm row spacing and 5 cm plants.
11	Fertilizer dose and Methods of application	: :	260:170:90:160:5 and 10 kg/ha as urea, TSP, MOP, Gypsum, Zn oxide and Boric acid. All fertilizers and half urea will be applied as basal and remaining half at flower initiation.
12	Irrigation/rainfed	:	Irrigated-As and when necessary
13	Data to be recorded	:	No. of flowers cross and % of cross success.
14	Investigator(s)	:	M Shalim Uddin, D. Datta and M A Latif Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	Later part of October 2022
17	Date of completion	:	February 2023
18	Expected output/benefit	:	Early lines with good agronomic traits will be developed.
19	Location	:	Gazipur
20	Status	:	On-going
21	Estimated cost	:	25,000/- × 1=25000.0
22	Source of fund	:	BARI/’EPOC’ Project
23	Priority	:	1st

<table>
<tr><td>01</td><td>Programme</td><td>:</td><td colspan="3">Oilseed Crops Improvement</td></tr>
<tr><td>02</td><td>Project</td><td>:</td><td colspan="3">Variety Development of Rapeseed-Mustard</td></tr>
<tr><td>03</td><td>Experiment-21</td><td>:</td><td colspan="3">Evaluation of segregating generation of Brassica napus</td></tr>
<tr><td>04</td><td>Objective(s)</td><td>:</td><td colspan="3">i) To advance generation
ii) To select short duration plants/families having desirable traits</td></tr>
<tr><td>05</td><td>Rationale</td><td>:</td><td colspan="3">Hybridization is the most important method of crop improvement. It is one of the best techniques of incorporating desirable characters into a genotype. Selection for desirable plant types and the subsequent generations.
Selection for qualitative characters is simple and quick, but that for quantitative characters is often difficult and time-consuming. Development of homogenous line through conventional breeding is essential to advance the filial generations from F_1 to F_6.</td></tr>
<tr><td>06</td><td>Materials and methods</td><td>:</td><td colspan="3">The crosses will be studied in different generations
<table><tr><th>Generation</th><th>No. of crosses or progenies will be evaluated</th><th>Methods</th></tr><tr><td>F_1</td><td>Set-I: -</td><td rowspan="6">All F_1 crosses will be harvested for F_2 generation. From F_2 generation, desirable plants will be selected and grow plant to row in the next year. In F_3 to F_5 generations, the best progenies will be selected. F_6 progenies will be selected for seed yield evaluation in Observation trial (OT)</td></tr><tr><td>F_2</td><td>Set-I: -</td></tr><tr><td>F_3</td><td>Set-I:-</td></tr><tr><td>F_4</td><td>Set-I: -</td></tr><tr><td>F_5</td><td>Set-I: 8</td></tr><tr><td>F_6</td><td>Set-I: 15</td></tr></table></td></tr>
<tr><td>07</td><td>Crop/Variety</td><td>:</td><td colspan="3">Rapeseed</td></tr>
<tr><td>08</td><td>Design</td><td>:</td><td colspan="3">Not applicable</td></tr>
<tr><td></td><td>i) Treatment</td><td>:</td><td colspan="3">F_1 to F_6 generations.</td></tr>
<tr><td></td><td>ii) Replication</td><td>:</td><td colspan="3">Non-replicated</td></tr>
<tr><td>09</td><td>Plot size</td><td>:</td><td colspan="3">4 rows 3m long per cross or progeny</td></tr>
<tr><td>10</td><td>Planting system/spacing</td><td>:</td><td colspan="3">Continuous sowing, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.</td></tr>
<tr><td>11</td><td>Fertilizer dose and method of application</td><td>:</td><td colspan="3">260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.</td></tr>
<tr><td>12</td><td>Irrigation/rainfed</td><td>:</td><td colspan="3">Irrigation-as and when necessary</td></tr>
<tr><td>13</td><td>Data to be recorded</td><td>:</td><td colspan="3">Desirable plants will be selected. Data will be recorded on days to flowering and maturity, seed colour and seed yield/plant.</td></tr>
<tr><td>14</td><td>Investigator(s)</td><td>:</td><td colspan="3">M Shalim Uddin, D. Datta, M K Alam, MI Riad, MM Kadir and M A Latif Akanda</td></tr>
<tr><td>15</td><td>Season</td><td>:</td><td colspan="3">Rabi 2022-23</td></tr>
<tr><td>16</td><td>Date of initiation</td><td>:</td><td colspan="3">1st week of November, 2022</td></tr>
<tr><td>17</td><td>Date of completion</td><td>:</td><td colspan="3">February, 2023</td></tr>
<tr><td>18</td><td>Expected output/benefit</td><td>:</td><td colspan="3">Generation will be advanced.</td></tr>
<tr><td>19</td><td>Location</td><td>:</td><td colspan="3">Joydebpur and Jamalpur</td></tr>
<tr><td>20</td><td>Status</td><td>:</td><td colspan="3">Ongoing</td></tr>
<tr><td>21</td><td>Estimated cost</td><td>:</td><td colspan="3">Tk. 25,000/- per set ×2=50000.0</td></tr>
<tr><td>22</td><td>Source of fund</td><td>:</td><td colspan="3">BARI/’EPOC’ Project</td></tr>
<tr><td>23</td><td>Priority</td><td>:</td><td colspan="3">1st</td></tr>
</table>

Sub-Project VI: Biotechnological approaches for improvement of rapeseed-mustard

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-22**	**:**	**Marker Assistance Selection (MAS) of double-low rapeseed**
04	Objective(s)	:	To identify double-low rapeseed among the germplasm using functional primers
05	Rationale	:	Occurrence of erucic acid is considered as anti-nutritional factor for human consumption as this causes toxic effects on the heart at higher enough doses. *Per se* there is an urgent need to curtail the erucic acid content and breed varieties having low erucic acid through breeding and MAS.
06	Materials and methods	:	40 genotypes of rapeseed-mustard. Genomic DNA will be extracted from fresh leaf tissue of 3-4 weeks old plants grown in the greenhouse. DNA will be isolated using modified CTAB method. Functional/ characteristics primers will be used for MAS. Amplicons will be separated on 3% agarose gel through electrophoresis and subsequently gels were subjected to documentation with UV image analyzer. The banding pattern of each set of primer will be scored separately for estimating the size of amplicon of each sample the band. The DNA samples will be amplify in PCR followed by run on gel electrophoresis system to identify corresponding bands of Functional/ characteristics primers.
07	Crop/Variety	:	Rapeseed-mustard
08	Design	:	Not applicable
	i) Treatment	:	Not applicable
	ii) Replication	:	Non replicated
09	Plot size	:	Not applicable
10	Planting system/spacing	:	Continuous sowing, spacing 30cm x 4-5 cm
11	Fertilizer dose and method of application	:	Not applicable
12	Irrigation/rainfed	:	Not applicable
13	Data to be recorded	:	Data obtained from electrophoresis of functional/ characteristics primers will be recorded.
14	Investigator(s)	:	M. Shalim Uddin and M A Latif Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	July, 2022
17	Date of completion	:	June, 2023
18	Expected output/benefit	:	Double-low rapeseed-mustard genotypes will be identified at molecular level.
19	Location	:	Molecular Breeding Lab, ORC, Joydebpur
20	Status	:	On-going
21	Estimated cost	:	Tk. 1,50,000/
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

<table>
<tr><td>01</td><td>Programme</td><td>:</td><td>Oilseed Crops Improvement</td></tr>
<tr><td>02</td><td>Project</td><td>:</td><td>Variety Development of Rapeseed-Mustard</td></tr>
<tr><td>03</td><td>Experiment-23</td><td>:</td><td>Identification of restorer line through Marker Assisted Selection (MAS)</td></tr>
<tr><td>04</td><td>Objective(s)</td><td>:</td><td>i) To identify restorer lines
ii) To select superior restorer lines for hybrid development</td></tr>
<tr><td>05</td><td>Rationale</td><td>:</td><td>Cytoplasmic male sterility (CMS) based hybrid breeding encompasses various important steps viz., an expeditious finding of potential restorers from wide and enriched germplasm; accurate introgression of Rf-containing chromosomal segments into diverse genetic backgrounds; rapid discrimination between parental lines; ensuring genetic purity in parents and hybrids. Various studies notified the prodigious relevance of MAS in tracking the introgression of desirable genomic segment and selection of various DNA markers associated with Rf genes in MAS to enhance fast recovery of lines carrying Rf gene for diverse sterile cytoplasms. DNA marker technology offers the advantage of early discrimination among parental lines</td></tr>
<tr><td>06</td><td>Materials and methods</td><td>:</td><td>100 genotypes of rapeseed. Genomic DNA will be extracted from fresh leaf tissue will collect from 3-4 weeks old plants grown in the greenhouse. DNA will be isolated using modified CTAB method. Highly polymorphic gene based 35 pair SSR markers will be used for MAS. Amplicons were separated on 3% agarose gel through electrophoresis and subsequently gels were subjected to documentation with UV image analyzer. The banding pattern of each set of primer was scored separately. For estimating the size of amplicon of each sample the band. The DNA samples will be amplify in PCR followed by run on gel electrophoresis system to identify corresponding bands of SSR markers.
<table>
<tr><td>Primer name</td><td>Sequence (5' to 3')</td></tr>
<tr><td>HF</td><td>TTGGCTAGGGTTTGTGGATTC</td></tr>
<tr><td>HR</td><td>AGTGGTGAAGGTTACGACATT</td></tr>
<tr><td>RFF</td><td>TTCATCAAATGTTTGAAACGACATG</td></tr>
<tr><td>RF rf R</td><td>AGTTCCTCTTTACTCCATAAACCAG</td></tr>
</table>
</td></tr>
<tr><td>07</td><td>Crop/Variety</td><td>:</td><td>Rapeseed</td></tr>
<tr><td>08</td><td>Design</td><td>:</td><td>Not applicable</td></tr>
<tr><td></td><td>i) Treatment</td><td>:</td><td>100 genotypes</td></tr>
<tr><td></td><td>ii) Replication</td><td>:</td><td>Non replicated</td></tr>
<tr><td>09</td><td>Plot size</td><td>:</td><td>Not applicable</td></tr>
<tr><td>10</td><td>Planting system/spacing</td><td>:</td><td>Continuous sowing, spacing 30cm x 4-5 cm</td></tr>
<tr><td>11</td><td>Fertilizer dose and method of application</td><td>:</td><td>Not applicable</td></tr>
<tr><td>12</td><td>Irrigation/rainfed</td><td>:</td><td>Not applicable</td></tr>
<tr><td>13</td><td>Data to be recorded</td><td>:</td><td>Marker polymorphism data will be recorded.</td></tr>
<tr><td>14</td><td>Investigator(s)</td><td>:</td><td>M. Shalim Uddin and M A Latif Akanda</td></tr>
<tr><td>15</td><td>Season</td><td>:</td><td>Rabi 2022-23</td></tr>
<tr><td>16</td><td>Date of initiation</td><td>:</td><td>July, 2022</td></tr>
<tr><td>17</td><td>Date of completion</td><td>:</td><td>June, 2023</td></tr>
<tr><td>18</td><td>Expected output/benefit</td><td>:</td><td>Polymorphism at molecular level will be identified.</td></tr>
<tr><td>19</td><td>Location</td><td>:</td><td>Molecular Breeding Lab, ORC, Joydebpur.</td></tr>
<tr><td>20</td><td>Status</td><td>:</td><td>On-going</td></tr>
<tr><td>21</td><td>Estimated cost</td><td>:</td><td>Tk. 3,10,000/-</td></tr>
<tr><td>22</td><td>Source of fund</td><td>:</td><td>BARI/’EPOC’ Project</td></tr>
<tr><td>23</td><td>Priority</td><td>:</td><td>1st</td></tr>
</table>

Sub-Project VII: Development of climate smart variety of Rapeseed- mustard through Speed Breeding

Developing varieties with conventional methods takes a lot of time usually 10-15 years from 1st crossing to variety release. This urges the scientists to develop a On-going methodology to hasten the breeding procedures by reducing the time required to develop On-going lines, lead to the introduction of a On-going technique called "Speed Breeding". Speed breeding-based approach utilizes continuous lights to shorten the generation time, and it can be employed by these researchers to increase the breeding speed. This method for rapid generation advancing considerable advantages for crops/rapeseed because it provides increased recombination during line development and enables selection in early generations for some traits. It is utilizing controlled temperature regimes and 22-hour light to accelerate plant growth and development. The low-cost management system enables 4 to 6 plant generations annually, uses a greenhouse/glasshouse or an artificial environment with enhanced lighting to create intense day-long regimes to speed up the search for better performing crops.

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-24**	**:**	**Development of Multi-parent advanced generation inter-cross (MAGIC) populations**
04	Objective(s)	:	i) To develop MAGIC population to accumulate all favorable genes from multi-parents into a single parent ii) To create genetic variability.
05	Rationale	:	In recent years, various mapping populations that involve crossing of more than two parental lines such as multi-parent advanced generation inter-cross (MAGIC) (Cavanagh *et al*. 2008) and nested association mapping (NAM) populations (Yu *et al*. 2008) are being developed in different crops (see Scott *et al.* 2020). The incorporation of multiple parents ensures the population is segregating for multiple genes for multiple traits and cytoplasm effects can be normalized. Further, MAGIC populations provide a platform for community-based approach for gene discovery, characterization and deployment of genes for under-standing complex traits (*Glaszmann et al*. 2010).
06	Materials and methods	:	Selected 16 parents involved in the crosses will be grown in one row 1 m long plot in greenhouse.
07	Crop/Variety	:	Parents:
			1. BARI Sarisha-9 2. BARI Sarisha -11 3. BARI Sarisha -14 4. BARI Sarisha -15 5. Selected line of *B.carinata* 6. BARI Sarisha -17 7. Wild species of rapeseed-mustard 8. Tori-7 9. BARI Sarisha -18 10. BARI Sarisha -10 11. BARI Sarisha -16 12. Kalynia 13. Nap-248R 14. BARI Sarisha -10 15. BARI Sarisha -14 and 16. BARI Sarisha -13
08	Design	:	MAGIC
	i) Treatment	:	16 parents
	ii) Replication	:	Non-replicated
09	Plot size	:	1 row-plot 1.0m long per parent
10	Planting system/spacing	:	1 row 1.0m long per parent
11	Fertilizer dose and method of application	:	FRG18
12	Irrigation/rainfed	:	Irrigation-as and when necessary

13	Data to be recorded	:	Days to flowering and maturity, no. of plants cross, no. of buds cross, no. of siliqua obtain and no. of seed obtain, % of crossing success. Days to 50% flowering, days to maturity, no. of buds cross and self, no. of siliqua obtain and no. of seed obtain, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plant, disease and insect reaction.
14	Investigator(s)	:	M Shalim Uddin, D. Datta and M A L Akanda
15	Season		-
16	Date of initiation	:	2nd week of April 2022
17	Date of completion	:	June 2023
18	Expected output/benefit	:	The novel allele rearrangements and greater genetic diversity in these MAGIC populations will be identified. Highly recombined MAGIC lines may be used directly as source materials for the extraction and development of varieties adapted to different environments.
19	Location	:	Greenhouse of Plant Breeding Division, Joydebpur
20	Status	:	On-going
21	Estimated cost	:	Tk. 120,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-25**	**:**	**Development of hexaploidy *Brassica spp***
04	Objective(s)	:	i) Incorporation of sufficient genetic diversity to form a basis for breeding and improvement of this potential crop species. ii) Improvement of agronomic traits to the level of "elite" breeding material in the diploid and allotetraploid crop species.
05	Rationale	:	The production of a On-going allohexaploid *Brassica* crop (2*n* = AABBCC) is increasingly attracting international interest: a On-going allohexaploid crop could benefit from several major advantages over the existing *Brassica* diploid and allotetraploid species, combining genetic diversity and traits from all six crop species with additional allelic heterosis from the extra genome. Although early attempts to produce allohexaploids showed mixed results, recent technological and conceptual advances have provided promising leads to follow.
06	Materials and methods	:	Crosses will made in the fashion between two of the three allotetraploids, following which will be produce hybrid crossed to the third species (e.g. AACC × BBCC → CCAB × AABB → AABBCC). The allohexaploids produce by crosses between the allotetraploid species, referring to the names of the species in the cross combination (*B. napus, B. carinata* and *B. juncea*). Crosses between allotetraploids rely on production of unreduced gametes (gametes with the somatic chromosome number, or all chromosomes present in the somatic tissue of the interspecific hybrid) in the cross to restore balanced ploidy level, while crosses between diploids rely on colchicine treatment to double the chromosome number. Both of these two methods have only ever been successfully carried out using one order of crossing. Crosses will be grown in one row 1 m long plot in greenhouse.
07	Crop/Variety	:	Parents: 1st Generation: BARI Sarisha-18 (*B. napus)* x *B. carinata* AACC x BBCC

			2nd Generation F_1 Hybrid × *B. juncea* CCAB × AABB
			3rd Generation Allohexaploids (2n=AABBCC) ↓ **Colchicine treatment to double the chromosome number** ↓ Selection for desirable plant types has to be done in F_2 and the subsequent generations.
08	Design	:	Not applicable
	i) Treatment	:	3 *Brassica spp*
	ii) Replication	:	Not applicable
09	Plot size	:	1 row-plot 1.0 m long per parent
10	Planting system/spacing	:	1 row 1.0 m long per parent
11	Fertilizer dose and method of application	:	FRG18
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to flowering and maturity, no. of plants cross, no. of buds cross, no. of siliqua obtain and no. of seed obtain, % of crossing success.
14	Investigator(s)	:	M Shalim Uddin, D. Datta and M A L Akanda
15	Season	:	-
16	Date of initiation	:	2nd week of April 2022
17	Date of completion	:	June 2023
18	Expected output/benefit	:	A stable, diverse and agronomically viable allohexaploid *Brassica* crop will be developed.
19	Location	:	Greenhouse of Plant Breeding Division, Joydebpur
20	Status	:	On-going
21	Estimated cost	:	Tk. 100,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-26**	**:**	**Development of nested association mapping (NAM) populations**
04	Objective(s)	:	i) To create genetic variability. ii) To phenotyping of NAM lines under short duration and multiple stresses.
05	Rationale	:	Nested association mapping (NAM) is a technique designed for identifying and dissecting the genetic architecture of complex traits. It is important to note that nested association mapping (unlike association mapping) is a specific technique that cannot be performed outside of a specifically designed population.
06	Materials and methods	:	Short duration (70-75 days) 25 inbred lines of *B. rapa* will be crossed with BARI Sarisha-14 and BARI Sarisha-17. Parents will be grown in one row 1 m long plot in greenhouse.
07	Crop/Variety		BARI Sarisha-14, BARI Sarisha-17 and 25 inbred lines of *B. rapa*
08	Design		Not applicable
	i) Treatment	:	BARI Sarisha-14, BARI Sarisha-17 and 25 inbred lines of *B. rapa*
	ii) Replication	:	Non-replicated

09	Plot size	:	1 row-plot 1.0m long per parent
10	Planting system/spacing	:	1 row 1.0m long per parent
11	Fertilizer dose and method of application	:	FRG18
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to flowering and maturity, no. of plants cross, no. of buds cross, no. of siliqua obtain and no. of seed obtain, % of crossing success.
14	Investigator(s)	:	M Shalim Uddin, D. Datta and, M A L Akanda
15	Season	:	-
16	Date of initiation	:	2nd week of April 2022
17	Date of completion	:	June 2023
18	Expected output/benefit	:	The novel allele rearrangements and greater genetic diversity in these NAM populations will be identified. The highly recombined NAM lines may be used directly as source materials for the extraction and development of varieties adapted to different environments.
19	Location	:	Greenhouse of Plant Breeding Division, Joydebpur
20	Status	:	On-going
21	Estimated cost	:	Tk. 120,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-27**	**:**	**Introgression of heat tolerance gene in rapeseed-mustard from wild relatives**
04	Objective(s)	:	i) Introgression of heat tolerance gene ii) Broadening of genetic diversity
05	Rationale	:	Crop wild relatives are widely recognized as an invaluable genetic resource for breeding, for broadening the genetic base of crops with narrow genetic diversity, and as sources of variation for traits of interest in breeding crops, including adapting them to the challenges posed by climate change (Dempewolf *et al*., 2014). Modern varieties of many important crops carry introgressions from wild species resulting from breeding programmes performed in the last 100 years (Hajjar and Hodgkin, 2007).
06	Materials and methods	:	BARI Sarisha-14 (*B. rapa*), BARI Sarisha-18 (*B. napus*) and BARI Sarisha-11 (*B. juncia*) will be crossed with wild relatives. Each variety will be grown in one row 1 m long plot in greenhouse.
07	Crop/Variety	:	BARI Sarisha-14, BARI Sarisha-18 and BARI Sarisha-11 and wild relatives.
08	Design	:	Not applicable
	i) Treatment	:	3 sets of population
	ii) Replication	:	Non-replicated
09	Plot size	:	1 row-plot 1.0m long per parent
10	Planting system/spacing	:	1 row 1.0m long per parent
11	Fertilizer dose and method of application	:	FRG18
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to flowering and maturity, no. of plants cross, no. of buds cross, no. of siliqua obtain and no. of seed obtain, % of crossing success
14	Investigator(s)	:	M Shalim Uddin, D. Datta and M A L Akanda
15	Season	:	-
16	Date of initiation	:	2nd week of April 2022

17	Date of completion	:	June 2023
18	Expected output/benefit	:	Desirable better performing high yielding heat tolerant lines will be developed.
19	Location	:	Greenhouse of Plant Breeding Division, Joydebpur
20	Status	:	On-going
21	Estimated cost	:	Tk. 50,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-28**	**:**	**Identification of Climate Smart Rapeseed-Mustard**
04	Objective(s)	:	i) To select abiotic stress tolerance line (s) ii) To explore climate smart Rapeseed-mustard
05	Rationale	:	Abiotic and biotic stresses are major regulating factor that inhabit plant growth and rigorously decrease crop productivity Abiotic stresses such as drought, water logging, high temperature, cold, low-phosphorus, and salinity have an over whelming impacts on growth and yield of crops. In the field, crop simultaneously exposed to multiple abiotic stresses, like combination of drought and heat, drought and cold, salinity and heat, salinity and water logging or any of the major abiotic stresses. The response of crop to multiple stress conditions is unique and cannot be directly extrapolated from the response to each of the different stresses applied individually. Moreover, the simultaneous occurrence of different stresses results in a high degree of complexity in plant responses, as the responses to the multiple stresses are largely controlled by different metabolic pathways, signal transduction, microRNA, transcriptional regulation, genotype environment interaction (envirotyping) and many processes related to growth and development. On the other hand, sometimes opposing signaling pathways that may interact and inhibit each other. It is necessary to select saline, drought, water logged and low-P tolerant rapeseed-mustard genotypes.
06	Materials and methods	:	120 genotypes of rapeseed-mustard with 3 checks. Hydroponic pots will be used for each treatment.
07	Crop/Variety	:	Rapeseed-Mustard
08	Design	:	Augmented RCBD
	i) Treatment	:	120 genotypes with 3 checks
	ii) Replication	:	3 replications (Check)
09	Plot size	:	One Hydroponic pot per treatment or field (3 row 4 M long per genotypes)
10	Planting system/ spacing	:	Hydroponic pots will be used.
11	Fertilizer dose and method of application	:	FRG18
12	Irrigation/rainfed	:	Irrigated
13	Data to be recorded	:	Abiotic stresses (Salinity, Drought, Waterlogged, Low-P, and Phenotyping) data will be recorded with necessary photographs. 1. Number of Green leaf (NGL) at harvesting time. 2. SPAD value at harvesting time: SPAD value measured by SPAD meter (Chlorophyll meter SPAD- 502 Plus) 3. Maximum root length (cm) (MRL): From coleoptile node to last tip of the primary root. 4. Maximum shoot length (cm) (MSL): From coleoptile node to highest tip of the leaf.

			5. Leaf area (LA): LA measured by leaf area meter (LI3100 C Area Meter) 6. Root dry weight (g): After oven dry at 65°C for 7 days weight the roots 7. Shoot dry weight (g) (SDW): After oven dry at 65°C for 7 days weight the shoots 8. Root and shoot length ratio (RSR) 9. Total dry matter (g) (TDW)
14	Investigator(s)	:	M Shalim Uddin, D. Datta and M A L Akanda
15	Season	:	Year round
16	Date of initiation	:	July, 2022
17	Date of completion	:	February, 2023
18	Expected output/benefit	:	Climate smart germplasm will be identified.
19	Location	:	Greenhouse of Plant Breeding Division, Joydebpur
20	Status	:	On-going
21	Estimated cost	:	Tk. 80,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project VIII: Maintenance breeding of rapeseed-mustard

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment No.29**	**:**	**Maintenance of released varieties and advanced lines of rapeseed-mustard**
04	Objective(s)	:	i) To maintain the genetic purity of released variety and advanced lines of rapeseed-mustard
05	Rationale	:	Natural cross pollination or outcrossing with other genotypes leads to genetic deterioration of a variety in subsequent cycles of seed multiplication. Spontaneous mutations also lead to deterioration in subsequent years. Sometimes residual variability remains in newly released varieties at the time of its release. Such variability leads to deterioration of a variety within few years. Non-genetic causes like mechanical admixture, disease infestation and adverse agro-climatic conditions also deteriorate varietal properties. Adverse agro-climatic conditions such as flood, drought, soil salinity etc. may lead to deterioration of a variety. So, it is essential to maintain genetic purity, of released varieties and advanced line of rapeseed-mustard
06	Materials and methods	:	Set-I: 20 BARI released rapeseed-mustard varieties Set-II: 11 (386 selfed plants) short duration inbred lines in *B. rapa* L. Set-III: 8 (46 selfed plant) convergent cross lines *B. rapa* L. Set-IVa: 15 double low genotypes of *Brassica napus* Set-IVb: 5 double low genotypes of *Brassica napus* (Nap-14-001, Nap-14-004, Nap-14-007, Nap-14-010 and Nap-14-011) Set-V: 13 *B. juncea* (2- yellow seed coat + 11-brown seed coat) Set-VI: 12 *B. juncea* (11 Lines) Set-VII: 06 Backcross Inbred lines (BILs) *B. rapa* (BC_2S_5 Lines) Row to row distance 30 cm and plant to plant distance 5 cm after thinning. At least 500 plants of each variety/lines would be select based on genetic purity, uniformity, and distinctness, and bulk seed will be sown in the next year. For inbred line grow plant to row and select based on genetic purity, uniformity, and distinctness, and bulk seed will be sown in the next year.

07	Crop/variety	:	Rapeseed
08	Design	:	Not applicable
	i) Treatment	:	20 BARI released rapeseed-mustard varieties
	ii) Replications	:	Not applicable
09	Plot size	:	30 rows 4m long per Variety/Lines
10	Planting system/Spacing	:	Continuous sowing, 30cm x 4-5 cm, seed rate 6-7 kg/ha. A standard cultural practice will be followed.
11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	days to flowering, days to maturity, plant height, silique/plant, seeds/siliqua, seed yield/plot (kg), seed yield (kg/ha), disease and insect reaction.
14	Investigator (s)	:	D. Datta, M. Shalim Uddin and M A L Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	Last week of October to 1st week of November, 2022
17	Date of completion	:	February, 2023
18	Expected output/benefit	:	Genetic purity of released varieties and advanced lines will be maintained
19	Locations	:	Gazipur
20	Status	:	1st year
21	Estimated cost	:	20,000/- per set ×7=140000.0
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project IX: Adaptive trial of rapeseed-mustard

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment No. 30**	**:**	**Adaptive trial of advanced lines of *Brassica rapa* L.**
04	Objective(s)	:	i) To evaluate the performance of advanced lines of *Brassica rapa* in the farmers field. ii) To develop high yielding short duration variety of *Brassica rapa*.
05	Rationale	:	Farmers mostly grow the traditional variety Tori-7 from long past for shorter duration with minimum input and low yielding type with average yield of 750kg/ha. This variety is advantageous to grow as catch crop between T. aman and boro rice. Some short duration advanced lines of rapeseed which are suitable to grow in between T. aman and boro rice showed better performance during the previous years. But before releasing these lines as varieties, performance should be tested in the farmers' field. So, this trial has been under taken.
06	Materials and methods	:	**5** (4 advanced lines + 1 check) 1. BC-100614(3)-1, 2. BC-100614(8)-4, 3. BC-100614(4)-7 & 4. BARI Sarisha-14 (check) Row to row distance 30 cm and plant to plant distance 5 cm after thinning.
07	Crop/variety	:	Rapeseed
08	Design	:	RCB (compact/dispersed)
	i) Treatment	:	4 genotypes
	ii) Replications	:	4
09	Plot size	:	10 rows 4m long per line/variety
10	Planting system/Spacing	:	Continuous sowing, 30cm x 4-5 cm, seed rate 7-8 kg/ha. A standard cultural practice will be followed.

11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Plant population/m2 (at harvest), days to maturity, plant height, silique/plant, seeds/siliqua (to be recorded from 10 randomly selected plants), seed yield/plot (kg), seed yield (kg/ha), disease and insect reaction and farmer's reaction.
14	Investigator (s)	:	Concern scientists of OFRD, M. Shalim Uddin and M A L Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	Last week of October to 1st week of November, 2022
17	Date of completion	:	February, 2023
18	Expected output/benefit	:	High yielding variety of rapeseed will be developed.
19	Locations	:	Pabna, Cumilla, Netrakona and Tangail
20	Status	:	1st year
21	Estimated cost	:	15,000/-x 4 = 60,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-31**	**:**	**Adaptive trial of advanced lines of *B napus* L.**
04	Objective(s)	:	To select high yield potential lines with early maturity those can be grown in between TAman and Boro rice.
05	Rationale	:	T. Aman-fallow-Boro is the major cropping pattern in Bangladesh. To fit the rapeseed in between two rice crop; early mature lines is essential. Some lines were selected on the basis of early mature and yield previously. These lines will be evaluated at farmers' field under rice-rice cropping pattern to select rightly and to know the response of the farmers.
06	Materials and Methods	:	6 lines along with BARI Sarisha-18 & BINA sarisha -9 as checks. (Nap-0876, Nap-15029, Nap-16064, Nap-0865, Nap-16068 and BHS01)
07	Crop/Variety	:	*Brassica napus* L.
08	Design	:	RCB (compact/dispersed)
	i) Treatment	:	6 lines along with BARI Sarisha-18 & BINA sarisha -9 as checks. (Nap-0876, Nap-15029, Nap-16064, Nap-0865, Nap-16068 and BHS01)
	ii) Replication	:	4
09	Plot size	:	3mx4m
10	Planting system/spacing	:	Spacing 30x5cm
11	Fertilizer dose and method of application	:	260:170:90:160:5 and 10 kg/ha as urea, TSP, MOP, Gypsum, Zn oxide and baric acid. All fertilizers and half urea will applied as basal and remaining half at flower initiation.
12	Irrigation/rainfed	:	As and when necessary
13	Data to be recorded	:	Plant population/m2 (at harvest), days to maturity, plant height, silique/plant, seeds/siliqua (to be recorded from 10 randomly selected plants), seed yield/plot (kg), seed yield (kg/ha), disease and insect reaction and farmer's reaction.
14	Investigator(s)	:	Concern scientist of OFRD, M Kadir and M A L Akanda
15	Season	:	Robi 2020-2022
16	Data of initiation	:	Last week of October
17	Date of completion	:	February 2023
18	Expected output/benefit	:	Early mature variety with high yield will be developed.
19	Location	:	Jamalpur, Sherpur and Cumilla

20	Status	:	On-going
21	Estimated cost	:	15,000/- x 3 = 45,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Rapeseed-Mustard
03	**Experiment-32**	**:**	**Evaluation of BARI, BINA and BAU developed rapeseed-mustard varieties at saline prone areas**
04	Objective(s)	:	i) To evaluate the performance of BARI and BAU developed rapeseed-mustard varieties at saline prone areas. ii) To select the best one (s).
05	Rationale	:	In Bangladesh, about 1.06 million ha of the cultivated lands area is affected by varying degrees of salinity. Multiple types of soluble salts are available in saline soils and each of them has different impact on growth of plants. In saline soils, soluble salt compositions differ among the locations. Oilseed Research Centre of BARI has already developed 18 varieties of rapeseed-mustard including one canola variety. From the previous results, some of them showed salt tolerant in some extend. Recently, BAU has developed three salt tolerant varieties of rapeseed-mustard including one canola variety. The experiment has been undertaken to observe the performance of BARI and BAU developed rapeseed-mustard varieties in saline affected areas in Bangladesh.
06	Materials and methods	:	7 varieties: BARI Sarisha-11, BARI Sarisha-16, BARI Sarisha-18 (canola variety), BARI Sarisha-19, BARI Sarisha-14, BAU Sarisha-1 (canola variety), BAU Sarisha-2, BHS01 and BAU Sarisha-3. Row to row distance 30 cm and plant to plant distance 5 cm after thinning.
07	Crop/Variety	:	*Brassica juncea, Brassica rapa and Brassica napus,.*
08	Design	:	RCB
	i) Treatment	:	7 varieties and 4 locations (3 saline prone areas + 1 non saline prone area)
	ii) Replication	:	3
09	Plot size	:	3m x 4m
10	Planting system/ spacing	:	Continuous sowing in rows, spacing 30cm x 4-5 cm, seed rate 7-8 kg/ha.
11	Fertilizer dose and method of application	:	260, 170, 90, 160, 5 and 10 kg/ha of Urea, TSP, MOP, Gypsum, Zinc-oxide and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of siliqua/plant, no. of seeds/siliqua, 1000-seed weight (g), seed yield/plot, seed yield (kg/ha), disease and insect reaction, salinity level at germination, seedling and vegetative stages, determination of amount of fatty acid composition and glucosinolate. Soil salinity data will be recorded
14	Investigator(s)	:	M Shalim Uddin, F Begum and M A Latif Akanda
15	Season	:	Rabi 2022-23
16	Date of initiation	:	1st week of November, 2022
17	Date of completion	:	March, 2023
18	Expected output/benefit	:	High yielding double low genotypes of *Brassica spp* will be selected particularly for saline affected areas of southern belt.
19	Location	:	Khulna (Dacope and Koyra), Satkhira, Cox's Bazar and Joydebpur
20	Status	:	1st year
21	Estimated cost	:	Tk. 90,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

B. SESAME (*SESAMUM INDICUM* L.)

Sesame is an important oilseed crop in Bangladesh. It is the major summer oilcrop. Sesame oil is good quality oil containing 42% essential linoleic acid. The major obstacle to sesame expansion is low seed yield and excessive rainfall at prematurity or maturity stage. Many factors contribute to the low yield of sesame as lack of non-shattering, water logged and disease and insect resistant variety. Oilseed Research Centre, BARI has already released four varieties of sesame like T-6, BARI Til-2, BARI Til-3 BARI Til-4, BARI Til-5 and BARI Til-6. These varieties are late in maturity and very much susceptible to excess water. It has been reported that sesame is comparatively saline tolerant. There is no any saline tolerant variety. So, it is essential to develop salt tolerant variety to expand sesame cultivation in coastal areas. For developing high yielding, early maturing, salt and water logged tolerant varieties of sesame; the following experiments have been under taken.

Sub-Project I: Collection and maintenance of sesame germplasm

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment -01**	:	**Collection and evaluation of sesame germplasm**
04	Objective(s)	:	1. To enrich and widen the genetic base of the gene pool of sesame. 2. To evaluate the collected germplasm.
05	Rationale	:	Germplasm is the basic raw material for the improvement of a crop breeding program. Plant genetic resources (PGR) are the most important components of agro-biodiversity. The PGR include primitive forms of cultivated plant species and landraces, modern cultivars, obsolete cultivars, breeding lines and genetic stocks, weedy types and related wild species. Variability present in the existing germplasm is limited. So, more germplasm should be collected from home and abroad to enrich gene pool.
06	Materials and methods	:	Seed samples will be enlisted with an accession numbers.
07	Variety	:	Collected germplasm
08	Design	:	
	Treatment	:	Collected germplasm. Part of the collected sample will be preserved and another part will be used for regeneration.
	Replication	:	-
09	Plot size	:	Depend on seed sample
10	Planting system/spacing	:	Row to row 30cm, plant to plant continuous sowing.
11	Fertilizer dose and methods of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Descriptor will be followed
14	Investigator(s)	:	M H Rashid, U Kulsum, K C Saha, T A Mujahidi, M H Rahman and M Shalim Uddin
15	Season	:	Kharif-1
16	Date of initiation	:	March, 2023
17	Date of completion	:	August, 2023
18	Expected output/ benefit	:	Genetic stock of sesame would be enriched.
19	Location	:	The germplasm will be collected from farmers from sesame growing areas like Khulna, Satkhira, Kushtia, Faridpur, Jamalpur, Hathazari. Moreover, efforts will be made to collect germplasm from exotic sources. Collected germplasm will be evaluated at Joydebpur, Jessore and Ishurdi.
20	Status	:	Ongoing
21	Estimated cost	:	Tk. 10,000/-per location×5=50000.0
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment-02**	**:**	**Maintenance of germplasm of sesame**
04	Objective(s)	:	To maintain the collected germplasm
05	Rationale	:	Unfavorable weather conditions like extended rainy period or drought during flowering stage, infestation of several insect pests and disease and indeterminate flowering habit are the major constraints of sesame cultivation. Therefore to ensure the seed viability of sesame germplasm, the accessions are grown in every year. Though ORC have the cool storage facility, the temperature in the cool room is not maintained up to the level due to interruption of electricity and viability of seed is lost. Maintenance of existing germplasm is also necessary for using in the future breeding programme.
06	Materials and methods	:	60 germplasm. Row to row 30cm, plant to plant continuous sowing. Seed rate : 8 kg/ha
07	Variety	:	60 germplasm
08	Design	:	
	Treatment	:	60 germplasm
	Replication	:	Non replicated
9	Plot size		2 rows 2m long
10	Planting system/spacing	:	Row to row 40cm, plant to plant continuous sowing
11	Fertilizer dose and methods of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation-As and when necessary
13	Data to be recorded	:	Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of pods/plant, no. of chambers/pod, no. of seeds/pod, 1000-seed weight (g) and grain yield/plot (kg).
14	Investigator(s)	:	M H Rashid, U Kulsum, K C Saha, A Monim, R humayun and M H Rahman
15	Season	:	Kharif-1
16	Date of initiation	:	March, 2023
17	Date of completion	:	August, 2023
18	Expected output/benefit	:	Desirable genotypes will be used in the future breeding programme.
19	Location	:	Joydebpur, Jessore and Ishurdi
20	Status	:	Ongoing
21	Estimated cost	:	Tk. 10,000/-x 3 = 30000/-
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

Sub-Project II: Creation of new genetic variability in sesame

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment-03**	**:**	**Creation of new genetic variability in sesame using gamma radiation** **i) Growing M_1 plant from M_o seed**
04	Objective(s)	:	i) To create genetic variability for development of stress tolerant sesame variety ii) to improve agronomic trait
05	Rationale	:	Sesame referred as 'queen of oilseeds' due to its regard by the users and owing to its oil quality (Bedigian and Harlan. 1986). In Bangladesh average sesame production is lower than other sesame producing country of the world. For any plant breeding programme, creation of genetic variation followed by selection plays an important role in developing improved crop varieties. Therefore, genetic variations in useful traits are prerequisites for any crop improvement programme. Like other breeding proramme in sesame creation of variability transpires to be primary step to get desirable types. Mutation breeding has long been known as a potential technique to unlock additional genetic variability for supplementing conventional crop breeding methodology. Mutagenesis offers a unique scope for creating variation, as it may alter even those genes that are common to all the varieties of a species. Induced mutation has been extensively and successfully used for the improvement of many crops including oilseed crop like sesame (Saikat *et al*. 2019) Henceforth an attempt was made to select desirable sesame mutant line with high yield potential.
06	Materials and methods	:	6 line/variety. Row to row 40cm, plant to plant continuous sowing. Seed rate : 8 kg/ha Seeds of sesame variety/line will irradiate with 500, 600, 700 and 800 Gy doses of gamma rays using Co60 gamma cell to create genetic variations. Irradiated seeds then sown to grow M1 generation at BARI research field, to select desirable mutants in subsequent generations. Selection will make in each of M2, M3 and M4 generation based on desired agronomic traits especially for water logging. **From M2 seed two set of experiment have to conduct one for selection of desirable trait for better yield and other for testing water logging tolerance of subsequent mutative generations.**
07	Variety	:	6 line/variety (BARI Til-3, BARI Til-4, BARI Til-5, BARI Til-6, Ses MR-20 and Ses-0570)
08	Design	:	
	Treatment	:	6 line/variety
	Replication	:	Non replicated
9	Plot size		10 rows 2m long
10	Planting system/spacing	:	Row to row 40cm, plant to plant continuous sowing
11	Fertilizer dose and methods of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation-As and when necessary
13	Data to be recorded	:	Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of pods/plant, no. of chambers/pod, no. of seeds/pod, 1000-seed weight (g) and grain yield/plot (kg).
14	Investigator(s)	:	M H Rashid, S H Habib and M Shalim Uddin
15	Season	:	Kharif-1

16	Date of initiation	:	March, 2023
17	Date of completion	:	August, 2023
18	Expected output/benefit	:	Desirable genotypes will be used in the future breeding programme.
19	Location	:	Joydebpur and Jessore
20	Status	:	Ongoing
21	Estimated cost	:	Tk. 10,000/-x 2 = 20000/-
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

Sub-Project III: Development of high yielding variety of sesame

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment-04**	:	**Hybridization in sesame**
04	Objective(s)	:	i) To create genetic variation. ii) To find out desirable genotypes.
05	Rationale	:	Hybridization is one of the best techniques of incorporating desirable characters into a genotype. Water logging and capsule shattering are serious problems for sesame cultivation. Genotypes having water logging, saline resistance genes are to be identified and water logging resistance, uniform maturity, shattering resistance, saline resistance, insect and disease resistance and short duration high yielding sesame varieties have to develop. Therefore, hybridization program have been under taken to search desired gene in the existing varieties/lines.
06	Materials and methods	:	Parents 1.Ses-2010-01R (local cultivar):white seed coat, 4-chambered 2. BINATil-1: white seed coat, 4-chambered 3. BARITil-3: brown seed coat, 4-chambered 4. BARITil-4: brown seed coat, 8-chambered 5.Ses-BR-20: white seed coat, 4-chambered 6.Ses-MR-20: white seed coat, 4-chambered
07	Variety	:	1. Ses-2010-01R 2. BINATil-1, BARITil-3, 4. BARITil-4, 5.Ses-BR-20, 6.Ses-MR-20
08	Design	:	
	Treatment	:	Ses-2011-01R(local cultivar), BINA Til-1, BARI Til-3, BARI Til-4, Ses-JP-58 and Ses-JP-47
	Replication	:	Non replicated
9	Plot size	:	4 rows-plot 4m long per parent
10	Planting system/spacing	:	Row to row 30cm, plant to plant continuous sowing
11	Fertilizer dose and methods of application	:	Appendix-I
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	No. of plants crossed, no. of buds crossed, no. of pods obtain, no. of seeds obtain, days to flowering and days to maturity.
14	Investigator(s)	:	K C Saha, M H Rashid, U Kulsum and M Shalim Uddin
15	Season	:	Kharif-1
16	Date of initiation	:	March, 2023
17	Date of completion	:	August, 2023
18	Expected output/benefit	:	F_1 generation will be obtained.
19	Location	:	Joydebpur
20	Status	:	Ongoing
21	Estimated cost	:	Tk. 20,000/-
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

<table>
<tr><td>01</td><td>Programme</td><td>:</td><td colspan="3">Oilseed Crops Improvement</td></tr>
<tr><td>02</td><td>Project</td><td>:</td><td colspan="3">Variety Development of Sesame</td></tr>
<tr><td>03</td><td>Experiment -05</td><td>:</td><td colspan="3">Evaluation of segregating generation of sesame</td></tr>
<tr><td>04</td><td>Objective(s)</td><td>:</td><td colspan="3">1. To advance generation
2. To select desirable genotypes.</td></tr>
<tr><td>05</td><td>Rationale</td><td>:</td><td colspan="3">Development of high yielding potential variety is prime objective. Water lodging is one of the major constrain to obtain desire yield in sesame. Hybridization is one of the best techniques of incorporating desirable characters into a genotype. Development of homogenous line through conventional breeding is essential to advance the filial generations from F_1 to F_6. To find out desirable genotypes, advancing and selection of plants from segregating population is necessary.</td></tr>
<tr><td>06</td><td>Materials and methods</td><td>:</td><td colspan="3">F_3 – 9 genotypes, F_5 – 20 genotypes and F_6 – 11 genotypes. Seeds of selected plants will be bulked according to cross combinations. Row to row distance 30 cm and plant to plant distance 5 cm after thinning.
<table>
<tr><th>Generation</th><th>No. of crosses or progenies will be evaluated</th><th>Methods</th></tr>
<tr><td>F_1</td><td>Set-I: -</td><td rowspan="6">All F_1 crosses will be harvested for F_2 generation. From F_2 generation, desirable plants will be selected and grow plant to row in the next year. In F_3 to F_5 generations, the best progenies will be selected. F_6 progenies will be selected for seed yield evaluation in Observation trial (OT)</td></tr>
<tr><td>F_2</td><td>Set-I: -</td></tr>
<tr><td>F_3</td><td>Set-I: 9</td></tr>
<tr><td>F_4</td><td>Set-I: -</td></tr>
<tr><td>F_5</td><td>Set-I: 20</td></tr>
<tr><td>F_6</td><td>Set-I: 11</td></tr>
</table></td></tr>
<tr><td>07</td><td>Variety</td><td>:</td><td colspan="3">F_3 – 9 genotypes, F_5 – 20 genotypes and F_6 – 11 genotypes</td></tr>
<tr><td rowspan="3">08</td><td>Design</td><td>:</td><td colspan="3"></td></tr>
<tr><td>Treatment</td><td>:</td><td colspan="3">F_3 – 9 genotypes, F_5 – 20 genotypes and F_6 – 11 genotypes</td></tr>
<tr><td>Replication</td><td>:</td><td colspan="3">-</td></tr>
<tr><td>9</td><td>Plot size</td><td>:</td><td colspan="3">2 rows 4m long</td></tr>
<tr><td>10</td><td>Planting system/spacing</td><td>:</td><td colspan="3">Row to row 30cm and plant to plant continuous sowing</td></tr>
<tr><td>11</td><td>Fertilizer dose and methods of application</td><td>:</td><td colspan="3">Appendix-1</td></tr>
<tr><td>12</td><td>Irrigation/rainfed</td><td>:</td><td colspan="3">Irrigation-As and when necessary</td></tr>
<tr><td>13</td><td>Data to be recorded</td><td>:</td><td colspan="3">Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of pods/plant, no. of chambers/pod, no. of seeds/pod and seed yield/plant (g).</td></tr>
<tr><td>14</td><td>Investigator(s)</td><td>:</td><td colspan="3">M H Rashid, U Kulsum, K C Saha and M Shalim Uddin</td></tr>
<tr><td>15</td><td>Season</td><td>:</td><td colspan="3">Kharif-1</td></tr>
<tr><td>16</td><td>Date of initiation</td><td>:</td><td colspan="3">March, 2023</td></tr>
<tr><td>17</td><td>Date of completion</td><td>:</td><td colspan="3">August, 2023</td></tr>
<tr><td>18</td><td>Expected output/benefit</td><td>:</td><td colspan="3">Desirable genotypes will be selected.</td></tr>
<tr><td>19</td><td>Location</td><td>:</td><td colspan="3">Joydebpur</td></tr>
<tr><td>20</td><td>Status</td><td>:</td><td colspan="3">Ongoing</td></tr>
<tr><td>21</td><td>Estimated cost</td><td>:</td><td colspan="3">Tk. 20,000/- X 3 = 60000.0</td></tr>
<tr><td>22</td><td>Source of fund</td><td>:</td><td colspan="3">BARI/EPOC Project</td></tr>
<tr><td>23</td><td>Priority</td><td>:</td><td colspan="3">1st</td></tr>
</table>

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment -06**	**:**	**Observation trial of sesame**
04	Objective(s)	:	1. To observe the performance of lines. 2. To select lines with desired characters.
05	Rationale	:	Maturity in unfavorable weather condition and susceptible to water logged is major constrain in sesame production. The existing varieties are comparatively low yielding, late in maturity, water logged susceptible, uneven ripening of capsules, shattering and lodging tendency and disease and insect susceptible. So, lines would be select keeping in mind the above mentioned traits so that to overcome the lacking of these traits.
06	Materials and methods	:	Number of lines/entries: 11 (10 + 1 checks as BARI Til-4) (Appendix-II). Row to row 30cm and plant to plant continuous sowing. Seed rate: 8 kg/ha
07	Variety	:	7 genotypes
08	Design	:	RCB
	Treatment	:	7 genotypes
	Replication	:	2
09	Plot size	:	3 rows 4m long
10	Planting system/spacing	:	Row to row 30cm, plant to plant continuous sowing.
11	Fertilizer dose and methods of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation-As and when necessary
13	Data to be recorded	:	Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of pods/plant, no. of chambers/pod, no. of seeds/pod, 1000-seed weight (g), seed yield/plot (kg) and seed yield (kg/ha).
14	Investigator(s)	:	M H Rashid, U Kulsum, K C Saha and M Shalim Uddin
15	Season	:	Kharif-1
16	Date of initiation	:	March, 2023
17	Date of completion	:	August, 2023
18	Expected output/benefit	:	High yielding lines with desirable agronomic traits will be selected.
19	Location	:	Joydebpur
20	Status	:	2nd year
21	Estimated cost	:	Tk. 10,000/-
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment -07**	**:**	**Preliminary yield trial of sesame**
04	Objective(s)	**:**	1.To observe the performance of lines. 2.To select lines with desired characters over locations.
05	Rationale	**:**	There is no water lodging and stem rot resistance sesame varieties in Oilseed Research Centre. BARI released varieties are very much susceptible to stem rots diseases especially at prematurity stage. Therefore, it is essential to develop varieties with water lodging and stem rot resistant/tolerant, high yielding, and fit to survive unfavorable weather condition. ORC has developed some lines through hybridization program and also selected few lines from germplasm collections with the desirable traits like water lodging and stem rot resistant/tolerant/moderately tolerant lines. These lines will be tested in different locations.
06	Materials and methods	**:**	Number of entries- : 12 (11 + 1 checks as BARI Til-4) (Appendix-II). Row to row 30cm and plant to plant continuous sowing. Seed rate : 8 kg/ha
07	Variety	:	7 genotypes
08	Design	:	RCB
	Treatment	:	7 genotypes
	Replication	:	3
09	Plot size	:	4 rows 4m long
10	Planting system/spacing	:	Row to row 30cm, plant to plant continuous sowing.
11	Fertilizer dose and methods of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation-As and when necessary
13	Data to be recorded	:	Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of pods/plant, no. of chambers/pod, no. of seeds/pod, 100-seed weight (g), seed yield/plot (kg) and seed yield (kg/ha).
14	Investigator(s)	:	M H Rashid, U Kulsum, K C Saha, R Humayon, J A Mahmud, S Ahmed, M S Huda, M A M Miah, A Monim, S H Habib and M Shalim Uddin
15	Season	:	Kharif-1
16	Date of initiation	:	March, 2023
17	Date of completion	:	August, 2023
18	Expected output/benefit	:	High yielding lines with desirable agronomic traits will be selected.
19	Location	:	Joydebpur, Ishurdi, Akbarpur, Faridpur, Kushtia, Dinajpur and Jessore
20	Status	:	2nd year
21	Estimated cost	:	Tk. 10,000/- x 7 = 70,000/-
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment -08**	**:**	**Regional yield trial of sesame (Set-I, Set-II)**
04	Objective(s)	:	1. To observe the performance of lines 2. To select lines with desired agronomic characters and wider adaptability.
05	Rationale	:	The existing varieties are comparatively low yielding, late in maturity, water logged susceptible, uneven ripening of capsules, shattering tendency and disease and insect susceptible. So water logging resistance, uniform maturity, shattering resistance, saline resistance, insect and disease resistance and short durated high yielding sesame lines will be selected keeping in mind the above mentioned traits so that to overcome the lacking of these traits.
06	Materials and methods	:	Set-I: Lines: 8 (7 + 1 checks as BARI Til-4) Set-II: Number of entries- 9 (7 [white seed coat] + 2 checks as BARI Til- 4 and BINAtil-1) (Appendix-II). Row to row 30cm and plant to plant continuous sowing. Seed rate : 8 kg/ha
07	Variety	:	7 genotypes
08	Design	:	RCB
	Treatment	:	7 genotypes
	Replication	:	3
09	Plot size	:	6 rows 4m long
10	Planting system/spacing	:	Row to row 30cm, plant to plant continuous sowing.
11	Fertilizer dose and methods of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation-As and when necessary
13	Data to be recorded	:	Days to flowering, days to maturity, plant height (cm), no. of branches/plant, no. of pods/plant, no. of chambers/pod, no. of seeds/pod, 1000-seed weight (g), seed yield/plot (kg) and seed yield (kg/ha).
14	Investigator(s)	:	M H Rashid, U Kulsum, K C Saha, S. Gosh, MMH Khan, M A M Miah, S Ahmed, J A Mahmud, A Monim, H Habib and Shalim Uddin
15	Season	:	Kharif-1
16	Date of initiation	:	March, 2023
17	Date of completion	:	August, 2023
18	Expected output/benefit	:	High yielding lines with desirable agronomic traits will be selected.
19	Location	:	Joydebpur, Ishurdi, Akbarpur, Faridpur, Kushtia, Rangpur, Dinajpur and Jessore
20	Status	:	2nd year
21	Estimated cost	:	Tk. 10,000/-x8X2 = 000/-
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

Sub-Project IV: Development of water logged tolerant variety of sesame

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment-09**	**:**	**Screening of sesame genotypes under water logged condition**
04	Objective(s)	:	1. To select water logged tolerant genotypes. 2.To develop stress tolerant sesame variety
05	Rationale	:	Sesame is only one kharif oilseed crop in our country. Oilseed Research Centre, BARI has already released five varieties of sesame like T-6, BARI Til-2, BARI Til-3, BARI Til-4, BARI Til-5 and BARI Til-6. These varieties are very much susceptible to excess water. Due to climate change heavy rainfall in kharif season is common phenomena in our country. Now water lodging is a serious constrain for sesame cultivation. Genotypes having water lodging genes are to be identified and water logging resistance high yielding sesame varieties have to be developed. So, it is essential to develop high yield potential and water logged tolerant varieties of sesame.
06	Materials and methods	:	50 genotypes along with BARI released variety T6, BARITil-2, BARITil-3, BARITil-4, BARITil-5 and BARITil-6 will use as tested germplasm. During flowering stage, artificial water logged condition will be created by applying excess water. Standing water will be remained 72 hours.
07	Variety	:	Germplasm from ORC/PGRC with 6 released varieties.
08	Design		RCBD
	Treatment	:	50 genotypes
	Replication	:	-
09	Plot size	:	
10	Planting system/spacing	:	Seed will be sown in plastic pot. Three set of 50 plastic pots will be used. One set of 50 plastic pots will be used as control/check. Plant will be grown up to late flowering stage in favorable condition. At late flowering stage (45-50 day after sowing) pot with plant will be subject to waterlogged conditions.
11	Fertilizer dose and methods of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation-As and when necessary
13	Data to be recorded	:	Duration of standing water, number of survival genotypes, days to flowering and maturity, plant height (cm), no. of branches/plant, no. of pods/plant, no. of seeds/pod, seed yield/plant (kg).
14	Investigator(s)	:	M H Rashid, K C Saha and M Shalim Uddin
15	Season	:	Kharif-1
16	Date of initiation	:	2nd week March, 2023
17	Date of completion	:	August, 2022
18	Expected output/benefit	:	Water logging resistant/tolerant genotypes will be selected.
19	Location	:	Joydebpur
20	Status	:	1st year
21	Estimated cost		Tk. 25,000/-
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

Sub-Project V: Maintenance breeding of sesame

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment-10**	**:**	**Maintenance of released varieties and advanced line of sesame**
04	Objective(s)	:	To maintain the genetic purity of varieties and advanced lines of sesame
05	Rationale	:	Natural cross pollination or outcrossing with other genotypes leads to genetic deterioration of a variety in subsequent cycles of seed multiplication. Spontaneous mutations also lead to deterioration in subsequent years. Sometimes residual variability remains in newly released varieties at the time of its release. Such variability leads to deterioration of a variety with in few years. Non-genetic causes like mechanical admixture, disease infestation and adverse agro-climatic conditions also deteriorate varietal properties. Adverse agro-climatic conditions such as flood, drought, soil salinity etc. may lead to deterioration of a variety. So, it is essential to maintain released varieties and advanced line of sesame.
06	Materials and methods	:	**Six released varieties** T6, BARI Til-2, BARI Til-3, BARI Til-4, BARI Til-5 and BARI Til-6 **Seven advanced line** Ses-265, Ses-PR-20, Ses-70, Ses-JP-25(Y), Ses-05178, Ses-05115 and Ses-JP-87. Seed rate : 8 kg/ha
07	Variety	:	Six released varieties and seven advanced line
08	Design	:	
	Treatment	:	Six released varieties and seven advanced line
	Replication	:	Non replicated
9	Plot size		6 rows 4m long
10	Planting system/spacing	:	Row to row 40cm, plant to plant continuous sowing
11	Fertilizer dose and methods of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation-As and when necessary
13	Data to be recorded	:	Grain yield/plot (kg)
14	Investigator(s)	:	M H Rashid, A Monim and R humayun
15	Season	:	Kharif-1
16	Date of initiation	:	March, 2023
17	Date of completion	:	August, 2023
18	Expected output/benefit	:	Genetic purity of released varieties and advanced lines will be maintain
19	Location	:	Joydebpur, Jessore and Ishurdi
20	Status	:	Ongoing
21	Estimated cost	:	Tk. 10,000/-x 3 = 30000/-
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

Sub-Project VI: Adaptive trial of sesame

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sesame
03	**Experiment-11**	**:**	**Adaptive trial of advanced lines of sesame**
04	Objective(s)	:	i) To evaluate the performance of advanced lines of sesame in the farmers field at different locations of Bangladesh. ii) To develop high yielding variety of sesame.
05	Rationale	:	Farmers mostly grow the traditional variety T-6 from long past with minimum input and low yielding type with average yield of 850kg/ha. There is ample scope of replacing the traditional cultivar T-6 by the modern sesame varieties having yield capacity of around 1.3- 1.5 ton/ha. Some advanced lines of sesame showed better performance during the previous years. But before releasing these lines as varieties, performance should be tested in the farmers' field. So, this trial has been under taken.
06	Materials and methods	:	1. Ses-MR-20, 2. Ses-PR-20, 3. --------, 4. BARI Til-4 (check) and 5. BARI Til-6 (check)
07	Crop/variety	:	Sesame
08	Design	:	RCB (normal/dispersed)
	i) Treatment	:	4 advanced lines and 2 checks
	ii) Replications	:	4
09	Plot size	:	10 rows 4m long
10	Planting system/Spacing	:	Spacing 30cm x 5 cm for except white seeded entries. Spacing 20cm x 5 cm for white seeded. Seed rate 7.0-7.5 kg/ha. A standard cultural practice will be followed.
11	Fertilizer dose and method of application	:	120, 140, 45, 105, 5 and 10 kg/ha of Urea, TSP, MP, Zinc sulphate and Boric acid. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation as and when necessary.
13	Data to be recorded	:	Days to maturity, plant population/m^2 (at harvest), plant height, no. of pods/plant, no. of seeds/pod, seed yield/plot (kg), seed yield (kg/ha), disease and insect reaction, farmer's reaction.
14	Investigator (s)	:	Concerned scientists of OFRD, M Shalim Uddin, M H Rashid and K C Saha
15	Season	:	Kharif, 2023
16	Date of initiation	:	Mid February to Mid March, 2023
17	Date of completion	:	May, 2023
18	Expected output/benefit	:	High yielding variety of sesame will be developed.
19	Locations	:	Joydebpur, Ishurdi, Akbarpur, Faridpur, Kushtia, Dinajpur, Jessore Khulna & Patuakhali
20	Status	:	3rd year
21	Estimated cost	:	Tk. 10000/- X 9 = 90,000/-
22	Source of fund	:	BARI/EPOC Project
23	Priority	:	1st

C. GROUNDNUT (*ARACHIS HYPOGAEA* L.)

Groundnut is an important oilseed crop in Bangladesh. Groundnut can be grown in 'Char' areas during the winter season under rainfed condition. Being a photo insensitive crop, it can be grown round the year. It is well suited as intercrop with other long duration crops and fits well in various crop rotations. It is easy to handle in maintaining seed purity due to self-pollinated crop. Groundnut as a legume crop enriches the soil by fixing nitrogen form the atmosphere. In spite of having great advantages for growing groundnut in Bangladesh, its yield is poor compared to other developed countries. Groundnut being a multipurpose crop can help in reducing the shortage of edible oil, food and fodder in the country. Apart from its rich sources of oil content (48-52%), groundnut seed is a good source of protein (22-25%), carbohydrate (20%) and vitamin B and E. Being highly digestible, the children's food made of groundnut can help in meeting part of the nutritional needs. The Oilseed Research Centre of BARI has developed 11 groundnut varieties, which comprises 7 Spanish, 3 valencia and 1 virginia type of groundnut. Most of the varieties (bold seeded) take long duration for maturity particularly in the winter season and susceptible to leaf spot and rust diseases, which reduce the yield substantially. It has another major constraint that most of the varieties have no dormancy of seed and seed viability is lost within 2/3 months. Therefore, the objective of groundnut breeding programme is to develop high yielding, early maturing, and determinate type, widely adapted, disease resistant/ tolerant, dwarf varieties suitable for kharif season and also suitable for the existing cropping systems.

Sub-Project I: Collection, evaluation and maintenance of groundnut germplasm

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Groundnut
03	**Experiment- 01**	:	**Collection of groundnut germplasm**
04	Objective(s)	:	- Collection of germplasm to enrich the gene pool of groundnut - Evaluation of the collected germplasm to use in the future breeding program
05	Rationale	:	Germplasm is the basic raw material for the improvement of a crop in breeding program. Plant genetic resources (PGR) are the main source of natural variability and which is prerequisite for plant breeding. The PGR include primitive forms of cultivated plant species and landraces, modern cultivars, obsolete cultivars, breeding lines and genetic stocks, weedy types and related wild species. Variability present in the existing germplasm is limited. So, more germplasms should be collected from home and abroad to enrich gene pool.
06	Materials and methods	:	New seed samples will be collected. The collected samples will be given an accession number, date of collection, name of agent, place of collection etc.
07	Variety	:	Collected germplasm of groundnut
08	Design	:	Not applicable
	i) Treatment	:	Not applicable
	ii) Replication	:	Non-replicated
09	Plot size	:	Not applicable
10	Planting system/spacing	:	Not applicable
11	Fertilizer dose and method of application	:	Not applicable
12	Irrigation/rainfed	:	Not applicable
13	Data to be recorded	:	Passport Data and location information. Necessary morphological data of the collection specimen will be recorded.
14	Investigator(s)	:	M M Kadir, K C Saha, M Shalim Uddin and M A L Akanda
15	Season		Rabi and kharif 1

16	Date of initiation	:	Evaluation will be initiated in December, 2022
17	Date of completion	:	June 2023
18	Expected output/benefit	:	Desirable germplasm will be used in the future breeding programme
19	Location	:	Joydebpur, Gazipur
20	Status	:	Ongoing
21	Estimated cost	:	20,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Groundnut
03	**Experiment- 02**	:	**Maintenance and evaluation of groundnut germplasm**
04	Objective(s)	:	i) To maintain and evaluate the existing germplasm. ii) Selection of different accessions for future breeding program.
05	Rationale	:	Groundnut is a recalcitrant type of seed. Seed viability is lost quickly. Therefore, to ensure the seed viability of groundnut germplasm, the accessions are grown in every year. Though ORC have the cool storage facility, the temperature in the cool room is not maintained up to the level due to interruption of electricity and viability of seed is lost. Maintenance of existing germplasm is also necessary for using in the future breeding programme
06	Materials and methods	:	241 germplasm will be grown at Joydebpur and 80 germplasm at RARS, Jamalpur. Spacing 40 cm x 15 cm, seed rate 100 kg/ha (Unshelled)
07	Variety	:	241 germplasm at Joydebpur and 80 germplasm at RARS, Jamalpur
08	Design	:	Two lines of each accession in 4 m long plot
	i) Treatment	:	241 germplasm at Joydebpur and 80 germplasm at RARS, Jamalpur
	ii) Replication	:	Non replicated
09	Plot size	:	2 rows 4 m long
10	Planting system/spacing	:	Plant to plant 15 cm and row to row 40 cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Descriptor will be followed.
14	Investigator(s)	:	M Kadir, K C Saha, M. Shalim Uddin, M K Alam and M I Riad
15	Season		Rabi and kharif 1
16	Date of initiation	:	Evaluation will be initiated in November, 2022
17	Date of completion	:	June 2023
18	Expected output/benefit	:	Desirable germplasm will be used in the future breeding programme
19	Location	:	Joydebpur, Gazipur and RARS, Jamalpur
20	Status (New or 1st year/ 2nd year/.)	:	Ongoing
21	Estimated cost	:	30,000/-(Joydebpur) and 25,000/-(Jamalpur)
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project II: Development of high yielding short duration variety of groundnut especially for char land

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Groundnut
03	**Experiment- 03**	:	**Hybridization in groundnut**
04	Objective(s)	:	i) To create genetic variability. ii) To develop short duration and bold seeded variety of groundnut. iii)To incorporate high oleic acid, earliness and large kernel size into existing groundnut varieties.
05	Rationale	:	Flash-flood is one of the major problems for groundnut cultivation in char land. So, farmers are being cultivated Dhaka-1 for its earliness. Most of the high yielding existing varieties are long duration compared to Dhaka-1. Therefore, short duration high yielding varieties of groundnut have to be developed. Hybridization is one of the best techniques of incorporating desirable characters into a genotype. Therefore, hybridization program have been under taken to incorporate earliness in the existing high yielding varieties..
06	Materials and methods	:	Set-I (Gazipur): Parents: ICGV 36-1, ICGV-07219, Galachipa, BARI Chinabadam 8, BARI Chinabadam 9 and BARI Chinabadam 11 Set-II (Jamalpur): Parents: ICGV-15003, ICGV-171039, G-1, G-2, P-02, P-04 and NMUS-23 Immature buds will be emasculated at afternoon and pollination will be done at the morning of the next day.
07	Variety	:	Set-I: Parents: ICGV 36-1, ICGV-07219, Galachipa, BARI Chinabadam 8, BARI Chinabadam 9 and BARI Chinabadam 11 Set-II: Parents: ICGV-15003, ICGV-171039, G-1, G-2, P-02, P-04 and NMUS-23
08	Design	:	Half Diallel
	i) Treatment	:	Set-I: Parents: ICGV 36-1, ICGV-07219, Galachipa, BARI Chinabadam 8, BARI Chinabadam 9 and BARI Chinabadam 11 Set-II: Parents: ICGV-15003, ICGV-171039, G-1, G-2, P-02, P-04 and NMUS-23
	ii) Replication	:	Non replicated
09	Plot size	:	4 rows 4m long
10	Planting system/spacing	:	Plant to plant 15 cm and row to row 40 cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Number of buds crossed and number of pods at harvest from crossed buds.
14	Investigator(s)	:	M Kadir, K C Saha, M S Uddin, M K Alam & M I Riad
15	Season		Rabi and kharif 1
16	Date of initiation	:	November, 2022
17	Date of completion	:	June, 2023
18	Expected output/benefit	:	F1 seeds of all possible crosses will be obtained.
19	Location	:	Set-I in Joydebpur and Set-II in Jamalpur
20	Status	:	New
21	Estimated cost	:	25,000/- x 2=50,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

<table>
<tr><td>01</td><td>Programme</td><td>:</td><td colspan="3">Oilseed Crops Improvement</td></tr>
<tr><td>02</td><td>Project</td><td>:</td><td colspan="3">Variety Development of Groundnut</td></tr>
<tr><td>03</td><td>Experiment- 04</td><td>:</td><td colspan="3">Evaluation of segregating generation of groundnut</td></tr>
<tr><td>04</td><td>Objective(s)</td><td>:</td><td colspan="3">To confirm the F1 generation
To advance generation.
To select short duration plants having desirable traits.</td></tr>
<tr><td>05</td><td>Rationale</td><td>:</td><td colspan="3">Groundnut is high yield potential oilcrop but it takes long time to mature. Short duration groundnut variety is very much important for increasing oil crop production area.</td></tr>
<tr><td>06</td><td>Materials and methods</td><td>:</td><td colspan="3"></td></tr>
<tr><td></td><td></td><td></td><td>Generation</td><td>No. of crosses or progenies will be evaluated</td><td>Methods</td></tr>
<tr><td></td><td></td><td></td><td>F_1</td><td>Set-I (Gazipur): 15+ 6 parents, and Set-II (Jamalpur): 15+ 6 parents</td><td rowspan="6">All F_1 crosses will be harvested for F_2 generation. From F_2 generation, desirable plants will be selected and grow plant to row in the next year. In F_3 to F_5 generations, the best progenies will be selected. F_6 progenies will be selected for seed yield evaluation in Observation trial (OT)</td></tr>
<tr><td></td><td></td><td></td><td>F_2</td><td>Set-I: -22 (Gazipur)</td></tr>
<tr><td></td><td></td><td></td><td>F_3</td><td>Set-I: 5 (Gazipur)</td></tr>
<tr><td></td><td></td><td></td><td>F_4</td><td>Set-I: 8 (Gazipur) and Set-II: 11 (Jamalpur)</td></tr>
<tr><td></td><td></td><td></td><td>F_5</td><td>Set-I: 20 (Gazipur) and Set-II: 14(Jamalpur)</td></tr>
<tr><td></td><td></td><td></td><td>F_6</td><td>Set-I: 12 Families; Set-II: 16 Families (Gazipur)</td></tr>
<tr><td>07</td><td>Variety</td><td>:</td><td colspan="3">N/A</td></tr>
<tr><td>08</td><td>Design</td><td>:</td><td colspan="3">-</td></tr>
<tr><td></td><td>i) Treatment</td><td>:</td><td colspan="3">Set-I: 15 F1 + parents Set-II: 15 F1 seeds+ 6 parents</td></tr>
<tr><td></td><td>ii) Replication</td><td>:</td><td colspan="3">-</td></tr>
<tr><td>09</td><td>Plot size</td><td>:</td><td colspan="3">1 row 4 m long</td></tr>
<tr><td>10</td><td>Planting system/spacing</td><td>:</td><td colspan="3">Plant to plant 15 cm and row to row 40 cm</td></tr>
<tr><td>11</td><td>Fertilizer dose and method of application</td><td>:</td><td colspan="3">As per FRG, 2018</td></tr>
<tr><td>12</td><td>Irrigation/rainfed</td><td>:</td><td colspan="3">Irrigation as and when necessary</td></tr>
<tr><td>13</td><td>Data to be recorded</td><td>:</td><td colspan="3"></td></tr>
<tr><td>14</td><td>Investigator(s)</td><td>:</td><td colspan="3">M Kadir, K C Saha, M S Uddin, M K Alam & M I Riad</td></tr>
<tr><td>15</td><td>Season</td><td></td><td colspan="3">Rabi 2022-23</td></tr>
<tr><td>16</td><td>Date of initiation</td><td>:</td><td colspan="3">November, 2022</td></tr>
<tr><td>17</td><td>Date of completion</td><td>:</td><td colspan="3">June, 2023</td></tr>
<tr><td>18</td><td>Expected output/benefit</td><td>:</td><td colspan="3">F_1 will be confirmed, and Desirable plants will be selected. Data will be recorded on days to flowering and maturity, seed colour and seed yield/plant.</td></tr>
<tr><td>19</td><td>Location</td><td>:</td><td colspan="3">Set-I in Joydebpur and Set-II in Jamalpur</td></tr>
<tr><td>20</td><td>Status</td><td>:</td><td colspan="3">New</td></tr>
<tr><td>21</td><td>Estimated cost</td><td>:</td><td colspan="3">25,000/- x 10=250000/-</td></tr>
<tr><td>22</td><td>Source of fund</td><td>:</td><td colspan="3">BARI/’EPOC’ Project</td></tr>
<tr><td>23</td><td>Priority</td><td>:</td><td colspan="3">1st</td></tr>
</table>

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Groundnut
03	**Experiment-05**	:	**Observation trial of groundnut (Set-I, Set-II, Set-III and Set-IV)**
04	Objective(s)	:	i) To select high yielding and early maturing lines. ii) To select bold seeded and early maturing lines. iii) To develop high oleic acid content and high yield potential lines ii) To select disease resistance lines with desirable agronomic traits.
05	Rationale	:	Majority of the varieties of Oilseed Research Centre take long duration for maturity grown in winter season. Therefore, it is necessary to develop high yielding, early maturing, disease resistant/tolerant varieties and also suitable for the existing cropping systems. The centre has developed few lines through the hybridization program and also collected germplasm from ICRISAT which would be included in the trial to achieve the objectives Bold seeded varieties of Oilseed Research Centre take long duration for maturity grown in winter season. These varieties are also susceptible to leaf spot and rust diseases Therefore, it is necessary to develop bold seeded, early maturing, high yielding varieties and also suitable for the existing cropping pattern. Different food items are produced by groundnut. Oleic acid helps to store that food item long term. High oleic groundnut variety is time demanding.
06	Materials and methods	:	Set-I: 20 entries (ISD 1314, ICGV 284, ICGV 92229, ICGV 93416, JL-24, ICGV 9118, ICGV 3479, ICGV 01105, ICGV 07220, ICGV 00351, BDGN 14, ISD 3014, ICGV 07210,BDGV 9112-2-1-2 Bom 115, TG51Bom15, TG37115, F3-5, Dhaka-1 and BARI Chinabadam-8 checks) Set-II: 19 entries (ICGV 93471, ICGV 1352, SM-14, ICGV 910168, ICGV 4514, Mahshwa, ICGV 88409, ICGV 88388, ICGV 864017, TMV-2, ICGV 92269, ICGV 98377, ICGV 07406, BDGV 7112-2-2-1 , BDGV 9112-2-1-1, BDGV 9112-5-1-1, Beijing-3, Dhaka-1 and BARI Chinabadam-8 checks) Set-III: 25 entries (1.ICGV-06139, 2.ICGV-02673, 3.ICGV-06194, 4.ICGV-06178, 5.ICGV-07210, 6.ICGV-07235, 7.ICGV-07390 8.ICGV-07392, 9.ICGV-07395, 10.ICGV-07396, 11.ICGV-07405, 12.ICGV-07406, 13.G-1, 14.G-2, 15.G-3, 16.G-4, 17.G-5, 18.G-6, 19.G-8, 20.L-10, 21.L-25, 22.L-27, 23.L-29, 24.BARI Chinabadam-8 and 25.BARI Chinabadam-9) Set-IV: 20 entries (1.NMUS-4, 2.NMUS-5, 3.NMUS-7, 4.NMUS-8, 5.NMUS-11, 6.NMUS-13, 7.NMUS-14, 8.NMUS-15, 9.NMUS-16, 10.NMUS-17, 11.NMUS-18, 12.NMUS-19, 13.NMUS-20, 14.NMUS-21, 15.NMUS-22, 16.NMUS-23, 17.NMUS-24, 18. NMUS-25, 19. Dhaka-1 and 20. BARI Chinabadam-10) Each entry will be grown in 2 rows 4 m long plots (Set-I and Set-II) and 4 rows 4 m long plots (Set-III and Set-IV) with 40 cm x 15 cm spacing. Seed rate:100 kg/ha (unshelled pod)
07	Variety	:	-
08	Design	:	RCB
	i) Treatment	:	-
	ii) Replication	:	3
09	Plot size	:	2 rows 4m long (Set-I and Set-II), 4 rows 4m long (Set-III and Set-IV)
10	Planting system/spacing	:	Plant to plant 15 cm and row to row 40 cm

11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Days to emergence, initial plant population after 20 days of germination, final plant population at harvest, days to flowering (50%), days to maturity, plant height (cm), no. of primary branches/plant, no. of mature pods/plant, no. of immature pods/plant, 100-pod weight (g), 100-kernel weight (g), plot yield (kg), shelling percentage, disease and insect reaction.
14	Investigator(s)	:	M Kadir, K C Saha, M. Shalim Uddin, M K Alam and M I Riad
15	Season		Rabi and kharif 1
16	Date of initiation	:	October, 2022
17	Date of completion	:	June, 2023
18	Expected output/benefit	:	Set-I, Set-III and Set-IV: High yielding short duration groundnut lines will be selected. Set-II: Bold seeded and early maturing groundnut lines will be selected.
19	Location	:	Sey-I, Set-II at Joydebpur and Set-III, Set-IV at Jamalpur
20	Status	:	New (Set-III & Set-IV) and 2nd year (Set-I & Set-II)
21	Estimated cost	:	25,000/-x 4=100,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Groundnut
03	**Experiment-06**	:	**Preliminary yield trial of groundnut (Set-I and Set-II)**
04	Objective (s)	:	i) To develop high oleic acid groundnut line(s) and high yield potential genotypes. ii) To select the early mature and large kernel genotypes with high yield. iii) To select disease resistance lines with desirable agronomic traits.
05	Rationale	:	Groundnut lines which will be suitable for growing in the char area will be selected. Specially, high oleic acid content, high yield potential and early maturing lines are needed for these areas.
06	Materials and methods	:	Set-I: 16 lines (1. ICGV-15003, 2. ICGV-15304, 3. ICGV-15307, 4. ICGV-15266, 5. ICGV-15270, 6. ICGV-15273, 7. ICGV-15074, 8. ICGV-15080, 9. ICGV-16705, 10. ICGV-16669, 11. ICGV-171011, 12. ICGV-171012, 13. ICGV-171014, 14. ICGV-171015, 15. ICGV-171051 and 16. BARI Chinabadam -8) Set-II: 14 lines (1. PN-01, 2. PN-02, 3. PN-04, 4. PN-05, 5. PN-06, 6. PN-07, 7. PN-08, 8. PN-10, 9. PN-14, 10. PN-15, 11. PN-16) and 2 checks (BARI Chinabadam -6 and BARI Chinabadam -7) Each entry will be grown in 4 rows 4 m long plots with 40 cm x 15 cm spacing. Seed rate:100 kg/ha (unshelled pod)
07	Variety	:	-
08	Design	:	RCB
	i) Treatment	:	-
	ii) Replication	:	3
09	Plot size	:	4 rows 4m long
10	Planting system/spacing	:	Plant to plant 15 cm and row to row 40 cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Days maturity, no pods/plant, 100 seed wt, Shelling%, colour of seed, yield/plant and yield/ha.
14	Investigator(s)	:	M K Alam, M Kadir, M I Riad and concern scientist of Burirhat

15	Season		Rabi and kharif 1
16	Date of initiation	:	October, 2022
17	Date of completion	:	May, 2023
18	Expected output/benefit	:	i) High oleic acid content and high yielding groundnut lines will be selected ii) Bold seeded and early maturating groundnut lines will be selected
19	Location	:	RARS, Jamalpur (Set-I) and RARS, Jamalpur and Burirhat (Set-II)
20	Status	:	New
21	Estimated cost	:	25,000/ (Set-I), 25,000/-x 2 = 50,000/- (Set-II)=75000.0
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Groundnut
03	**Experiment-07**	:	**Regional yield trial of Groundnut (Set-I, Set-II and Set-III)**
04	Objective(s)	:	i) To select high yielding and early maturing variety ii) To select disease resistance lines with desirable agronomic traits.
05	Rationale	:	Majority of the varieties of Oilseed Research Centre take long duration for maturity grown in winter season. These varieties are also susceptible to leaf spot and rust diseases and have no seed dormancy. Therefore, it is necessary to develop disease resistant/tolerant varieties and also suitable for the existing cropping systems. Selection of entries on the basis of high yield, short duration and desirable traits which is the direct need of groundnut farmers.
06	Materials and methods	:	Set-I: No. of entries: 17 (6112-6-1, 602-7-4-2, 702-6-2-1, 502-4-3-1, ISD 0414, Choko 0314, Jhaldhaka, PK-1, 14-103, 14-403, ISD 2914, ICGVS SL-1, ICGVS 38-3, Tridana Cox'sbazar, Galachipa, Dhaka-1 and BARI Chinabadam-8 checks) Set-II: Number of entries-18 (ICGV 87073, 14-203, ICGV 93420, ISD 4114, ISD 3814, TG 51, TG 37, ICGV 02841, ICGV 91176, ICGV 0107, ICGV 0704, ICGV 0207, ICGV 09516, ICGV 35-1, ICGV-95090, Dhaka -1, BINA Chinabadam-4 and BARI Chinabadam 8 (checks) Set-III: Number of entries-12 (9 lines and 3checks) 1. TG-51, 2. ICGV-07214, 3. ICGV-07245, 4. ICGV-93280, 5. ICGV-97232, 6. ICGV-14303, 7. BAG-19005, 8. BAG-19007, 9. BAG-19011, 10. BARI Chinabadam-8, 11. BINA Chinabadam-4 and 12. Dhaka -1. Each entry will be grown in 4 rows 4 m long plots with 40 cm x 15 cm spacing. Seed rate:100 kg/ha (unshelled pod)
07	Variety	:	Groundnut
08	Design	:	RCB
	i) Treatment	:	-
	ii) Replication	:	3
09	Plot size	:	4 rows 4m long
10	Planting system/spacing	:	Plant to plant 15 cm and row to row 40 cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Days to emergence, initial plant population after 20 days of germination, final plant population at harvest, days to flowering (70%), days to maturity, plant height (cm), no. of primary branches/plant, no. of mature pods/plant, no. of immature pods/plant, no. of seeds/pod, 100-pod weight (g), 100-kernel weight (g), plot yield (kg), pod yield (kg/ha), shelling percentage, disease and insect reaction.
14	Investigator(s)	:	M Kadir, K C Saha, M S Uddin, M K Alam, M I Riad, S Ghosh and Concerned scientist of Hathazari
15	Season		Rabi and kharif 1
16	Date of initiation	:	October, 2022

17	Date of completion	:	June, 2023
18	Expected output/benefit	:	High yielding short duration lines will be selected.
19	Location	:	Set-I and Set-II (Joydebpur, Jamalpur and Burirhat) Set-III (Jamalpur, Hathazari and Burirhat)
20	Status	:	2nd year (Set-I & Set-II) and New(Set-III)
21	Estimated cost	:	25,000/-x 3 x 3 = 2,25,000/-
22	Source of fund	:	BARI/'EPOC' project
23	Priority	:	1st

Sub-Project III: Maintenance breeding of groundnut

01	Programme	:	VARIETY DEVELOPMENT
02	Project	:	Varietal Development of Groundnut
03	**Experiment-08**	:	**Maintenance of released variety and advanced lines of groundnut**
04	Objective(s)	:	i) To maintain the genetic purity of released variety and advanced lines of groundnut
05	Rationale	:	Natural cross pollination or outcrossing with other genotypes leads to genetic deterioration of a variety in subsequent cycles of seed multiplication. Spontaneous mutations also lead to deterioration in subsequent years. Sometimes residual variability remains in newly released varieties at the time of its release. Such variability leads to deterioration of a variety within few years. Non-genetic causes like mechanical admixture, disease infestation and adverse agro-climatic conditions also deteriorate varietal properties. Adverse agro-climatic conditions such as flood, drought, soil salinity etc. may lead to deterioration of a variety. So**,** it is essential to maintain genetic purity, of released varieties and advanced line of soybean
06	Materials & Methods	:	Set-I:11 BARI released groundnut varieties Set-I: Number of entries-7 advanced lines (ICGV 07219, ICGV 06423, ICGV 06285, NCGV 04096, ICGVS 36-1, NCGV 02096 and NCGV 0504) At least 300 plants of each variety/line**s** based on genetic purity, uniformity, and distinctness, the bulk seed will be sown the next year.
07	Crop/Variety	:	11+7 groundnut varieties/lines
08	Design	:	Not applicable
	i. Treatment		Not applicable
	ii. Replication	:	Not applicable
09	Plot size	:	15 rows 4m long
10	Planting system	:	Each entry will be grown in 8 rows 4m long with 30 cm row to row spacing and 15 cm plant to plant.
11	Fertilizer dose & method of application		12: 32: 43:54: 1.8 and 1 kg/ha of N: P_2O_5: K_2 O: S Zn and B respectively. All fertilizers and half of the urea will be applied as basal and remaining half at flower initiation.
12	Irrigation/rainfed	:	As and when necessary
13	Data to be recorded	:	Days to flower, days to maturity, plant height (cm), no. of primary branches/plant, no. of mature pods/plant, 100-kernel weight (g), plot yield (kg/ha), shelling percentage, disease and insect reaction.
14	Investigator(s)	:	K C Saha
15	Season	:	Rabi, 2022-2023
16	Date of initiation	:	Last week of October, 2022
17	Date of Completion		June, 2023
18	Expected output/benefit	:	Genetic purity of released varieties and advanced lines will be maintain

19	Location	:	Gazipur
20	Status	:	1st year
21	Estimated cost	:	20,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project IV: Adaptive Trial

01	Programme	:	VARIETY DEVELOPMENT
02	Project	:	Varietal Development of Groundnut
03	**Experiment-09**	:	**Adaptive trial of groundnut (Set-I and Set-II)**
04	Objective(s)	:	To know the performance of advanced lines and their adaptation in farmers' field.
05	Rationale	:	Adaptation and performances of advanced lines in farmers' field and compare their yield with existing varieties under field condition.
06	Materials & Methods	:	Set-I: Number of entries-5: ICGV-07219, ICGV 36-1, ICGV-06285, Dhaka-1 and BARI Chinabadam -8 Set-II: Number of entries-8: 1. ICGV-00338, 2. ICGV-07214, 3. ICGV-07219, 4. ICGV-07220 5. BAG-19005, 6. ICGV-93280, 7. ICGV-07245 and 8. BARI chinabadam-8
07	Crop/Variety	:	Groundnut
08	Design	:	-RCB
	i. Treatment		-5 and 8
	ii. Replication	:	-3
09	Plot size	:	8 rows 4m long
10	Planting system	:	Each entry will be grown in 8 rows 4m long with 30 cm row to row spacing and 15 cm plant to plant.
11	Fertilizer dose & method of application		12: 32: 43:54: 1.8 and 1 kg/ha of N: P_2O_5: K_2 O: S Zn and B respectively. All fertilizers and half of the urea will be applied as basal and remaining half at flower initiation.
12	Irrigation/rainfed	:	As and when necessary
13	Data to be recorded	:	Days to flower, days to maturity, plant height (cm), no. of primary branches/plant, no. of mature pods/plant, 100-kernel weight (g), plot yield (kg/ha), shelling percentage, disease and insect reaction.
14	Investigator(s)	:	Concerned scientists of OFRD, M Kadir, M S Uddin, K C Saha, M A L Akanda, M K Alam and M I Riad
15	Season	:	Rabi, 2022-2023
16	Date of initiation	:	Last week of October, 2022
17	Date of Completion		June, 2023
18	Expected output/benefit	:	High-yielding and short duration lines will be identified.
19	Location	:	Set-I: Manikgonj, Noakhali, Tangail and Rangpur Set-II: Nowbhangarchar, Jamalpur and Char Belgachha, Islampur
20	Status	:	2nd year (Set-I), New (Set-II)
21	Estimated cost	:	Set-I: 20,000/- for each locationX4=80000.0 Set-II: 25,000/- for each locationX4=100000.0
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

D. SOYBEAN (*Glycine max* L.)

Soybean is one of the most important oilseed crops in Bangladesh. Soybean oil is very popular as cooking oil in the country. The extraction of soybean oil from the seed is not yet possible by the traditional method. So, most of the soybean produced in the country is used for making nutritious food items. The food items are soya dal, soya khechuri, soya misty, soya polao, soya milk, soya cake, soya biscuits, and soya bread, etc. Seed of soybean contains 42-45% protein and 20-22% edible oil. Recently, the crop has gained popularity for its meal used as an important ingredient of poultry and fish feed as a source of protein. Therefore, the following experiments have been undertaken to develop high yielding, YMV resistant/tolerant varieties with other desirable characters.

Sub-Project I: Collection, evaluation, and maintenance of soybean germplasm

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Soybean
03	**Experiment -01**	:	**Maintenance and Evaluation of soybean germplasm**
04	Objective(s)	:	To maintain and evaluate the germplasm of soybean.
05	Rationale	:	Soybean is a leguminous and sub-tropical crop. It is considered to be a native of China. Maintenance and evaluation of soybean germplasm are essential for utilization in the future breeding programme.
06	Materials and methods	:	Existing **100** germplasm (Appendix I) will be maintained and evaluated. Two-three times roughing will be done to maintain genotypic purity. Row to row distance 40 cm and plant to plant 10 cm.
07	Variety	:	Existing germplasms (Appendix I)
08	Design	:	Augmented
	i) Treatment	:	**100** germplasms + 3 checks (BARI Soybean 5, BARI Soybean 6 and BARI Soybean 7)
	ii) Replication	:	Non replicated
09	Plot size	:	3 rows 4 m long
10	Planting system/spacing	:	Plant to plant 10 cm and row to row 40 cm
11	Fertilizer dose and method of application	:	FRG, 2018
12	Irrigated/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Days to flower, days to maturity, final plant stand, plant height, Root length, branches/plant, pods/plant, seeds/pod, 100 seed wt., seed yield/plant, seed yield/plot in kg, disease and insect reaction.
14	Investigator(s)	:	U. Kulsum (Rabi), Suprio Ghosh (Kharif-II) and M Shalim Uddin
15	Season	:	Rabi and Kharif-II
16	Date of initiation	:	Last week of December 2022 and Last week of August 2022
17	Date of completion	:	May, 2023
18	Expected output/benefit	:	Selection of germplasms will be done based on disease and insect susceptibility, pods/plant, 100-seed weight and yield/plot for future breeding programs.
19	Location	:	Joydebpur
20	Status	:	Ongoing
21	Estimated cost	:	60,000/- per location
22	Source of fund	:	BARI
23	Priority	:	1st

Project II: Development of a high yielding variety of soybean for coastal areas

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Soybean
03	**Experiment- 02**	:	**Hybridization in soybean**
04	Objective(s)	:	i) To create genetic variability. ii)To develop short duration and bold seeded variety of Soybean. iii)To produce soybean variety resistance to soybean rust, soybean cyst nematode and Phytophthora root rot. iv)To produce soybean variety with high yield, oil and protein content.
05	Rationale	:	The soybean (*Glycine max* (L.) Merr.) is an economically important leguminous crop for feed, oil, and soyfood products. Despite its economic importance, the genetic base for soybean cultivars is narrow compared to most other crop species. The indigenous cultivars and landraces in South-East Asia are on the verge of extinction which are enriched with genes for abiotic and biotic stresses, hybridization is one of the best techniques of incorporating desirable characters into a genotype. Therefore, hybridization program has been under taken to combine desirable genes found in two or more different varieties and to produce pure-breeding progeny superior in many respects to the parental types.
06	Materials and methods	:	Parents: 7 (Shohag, Bangladesh Soybean-4, BARI Soybean-6, BARI Soybean-7, MTD-453, ST-1 and Richmond) Immature flowers will be emasculated at afternoon before the anthers are dehisce and stigma is likely to become fully receptive. Care must be taken not to injure the gynoecium and pollination will be done in the morning hours of the next day to give higher seed setting.
07	Variety	:	Parents: 7 (Shohag, Bangladesh Soybean-4, BARI Soybean-6, BARI Soybean-7, MTD-453, ST-1 and Richmond)
08	Design	:	Half Diallel
	i) Treatment	:	Parents: 7 (Shohag, Bangladesh Soybean-4, BARI Soybean-6, BARI Soybean-7, MTD-453, ST-1 and Richmond)
	ii) Replication	:	Non replicated
09	Plot size	:	35 rows 3m long
10	Planting system/spacing	:	Plant to plant 10 cm and row to row 40 cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Number of pods at harvest from crossed buds.
14	Investigator(s)	:	Suprio Ghosh, U. Kulsum and M Shalim Uddin
15	Season		Kharif II
16	Date of initiation	:	September 2022
17	Date of completion	:	June, 2023
18	Expected output/benefit	:	F1 seeds of all possible crosses will be obtained.
19	Location	:	Rangpur
20	Status	:	New
21	Estimated cost	:	15,000/-
22	Source of fund	:	BARI
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Soybean
03	**Experiment 03**	:	**Development of recombinant inbred lines (RIL) of soybean**
04	Objective(s)	:	i) To develop RIL population, ii) To create genetic variability.
05	Rationale	:	Soybean is one of the most important oilseed crops in Bangladesh. Recently, the crop has gained popularity for its meal used as an important ingredient of poultry and fish feed as a source of protein. recombinant inbred lines (RIL) develop for identifying and dissecting the genetic architecture of complex traits. It is important to note that association mapping is a specific technique that cannot be performed outside of a specifically designed population.
06	Materials and methods	:	The hybridization between BARI Soybean-7 and BARI Soybean-6 was done in kharif, 2019-2020 and in 2020-21, F1 generation was grown. This year F_3 with 2 checks (BARI Soybean-6, BARI Soybean-7) will be planted and evaluated. Row to row distance 40 cm and plant to plant distance 10 cm.
07	Variety	:	Selected F_3 Population
08	Design	:	Augmented
	i) Treatment	:	F_3 Population + 2 parents (BARI Soybean-6, BARI Soybean-7)
	ii) Replication	:	Non replicated
09	Plot size	:	2 rows of 4m long
10	Planting system/spacing	:	Plant to plant 10 cm and row to row 40 cm
11	Fertilizer dose and method of application	:	FRG, 2018
12	Irrigated/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Days to flower, days to maturity, final plant stand, plant height, branches/plant, pods/plant, seeds/pod, 100-seed wt., seed yield/plant, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	M. Shalim Uddin, U. Kulsum
15	Season		Rabi
16	Date of initiation	:	Last week of December 2022
17	Date of completion	:	April, 2023
18	Expected output/benefit	:	F_3 population with potential characters will be selected.
19	Location	:	Joydebpur
20	Status	:	3rd year
21	Estimated cost	:	30,000/-
22	Source of fund	:	BARI/'EPOC' project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement	
02	Project	:	Variety Development of Soybean	
03	**Experiment -04**	:	**Observation trial of soybean**	
04	Objective(s)	:	To select high yielding genotypes.	
05	Rationale	:	Soybean is one of the most important oilseed crops in Bangladesh. Recently, the crop has gained popularity for its meal used as an important ingredient of poultry and fish feed as a source of protein. Soybean is being cultivated mainly in coastal areas of Noakhali and Luxmipur. Therefore, varieties have to develop suitable for coastal areas.	
06	Materials and methods	:	No. of entries: 12 including 2 check variety as BARI Soybean-7 will be grown. Row to row distance 40 cm and plant to plant distance 10 cm will be maintained.	
07	Crop/Variety	:	1. LG-92P-1825	7.USDA 44
			2. VIETKHAI	8. USDA 46
			3. Richmond	9. BD-2333
			4. Australia-1	10.MTD-16
			5. B2	11. BARI Soybean-6(check)
			6. USDA 50	12. BARI Soybean-7(check)
08	Design	:	RCB	
	i) Treatment	:	**12** genotypes including 2 check variety	
	ii) Replication	:	3	
09	Plot size	:	3 rows of 4 m long	
10	Planting system/spacing	:	Plant to plant 10 cm and row to row 40 cm	
11	Fertilizer dose and method of application	:	FRG, 2018	
12	Irrigated/rainfed	:	Irrigation as and when necessary	
13	Data to be recorded	:	Days to flower, days to maturity, final plant stand, plant height, root length, branches/plant, pods/plant, seeds/pod, 100-seed wt., seed yield/plant, seed yield (kg/ha), disease and insect reaction.	
14	Investigator(s)	:	U. Kulsum and M Shalim Uddin	
15	Season		Rabi	
16	Date of initiation	:	Last week of December 2022	
17	Date of completion	:	May, 2023	
18	Expected output/benefit	:	High yielding genotypes with desirable characters viz. pod/plant, 100 seed weight will be selected. Disease and insect susceptibility will also be considered.	
19	Location	:	Joydebpur	
20	Status	:	1st year	
21	Estimated cost	:	40,000/-	
22	Source of fund	:	BARI/'EPOC' project	
23	Priority	:	1st	

01	Programme	:	Oilseed Crops Improvement	
02	Project	:	Variety Development of Soybean	
03	**Experiment -05**	:	**Preliminary yield trial of soybean**	
04	Objective(s)	:	To select high yielding genotypes.	
05	Rationale	:	Soybean is one of the most important oilseed crops in Bangladesh. Recently, the crop has gained popularity for its meal used as an important ingredient of poultry and fish feed as a source of protein. Soybean is being cultivated in coastal areas of Luxmipur, Chandpur, Noakhali, Barisal and Bhola. Therefore, varieties have to develop suitable for coastal areas.	
06	Materials and methods	:	No. of entries: **10** including 2 check varieties as BARI Soybean-6 and BARI Soybean-7 will be planted and evaluated in Joydebpur and Noakhali. Row to row distance 40 cm and plant to plant 10 cm.	
07	Crop/Variety	:	1. USDA 95-2	6. USDA 107
			2. GMOT-13	7. USDA 3
			3. USDA 4	8. KADSING
			4. USDA 40	9. BARI Soybean-6 (Check)
			5. USDA 53	10. BARI Soybean-7(Check)
08	Design	:	RCB	
	i) Treatment	:	10 genotypes including 2 check variety	
	ii) Replication	:	3	
09	Plot size	:	4 rows of 4 m long	
10	Planting system/spacing	:	Plant to plant 10 cm and row to row 40 cm	
11	Fertilizer dose and method of application	:	FRG, 2018	
12	Irrigated/rainfed	:	Irrigation as and when necessary	
13	Data to be recorded	:	Days to flower, days to maturity, final plant stand, plant height, root length, branches/plant, pods/plant, seeds/pod, 100-seed wt. (gm), seed yield/plant, seed yield (kg/ha), disease and insect reaction.	
14	Investigator(s)	:	U. Kulsum, M Shalim Uddin and Concern Scientists of Noakhali, Cumilla OFRD.	
15	Season		Rabi	
16	Date of initiation	:	Last week of December 2022	
17	Date of completion	:	May, 2023	
18	Expected output/benefit	:	High yielding and short duration genotypes with desirable characters viz. pod/plant, 100 seed weight will be selected. Disease and insect susceptibility will also be considered.	
19	Location	:	Joydebpur, Rangpur and Noakhali	
20	Status	:	1st year	
21	Estimated cost	:	30,000/-X 3 = 90000/-	
22	Source of fund	:	BARI/'EPOC' project	
23	Priority	:	1st	

01	Programme	:	Oilseed Crops Improvement	
02	Project	:	Variety Development of Soybean	
03	**Experiment -06**	:	**Regional yield trial of soybean**	
04	Objective(s)	:	To select high yielding genotypes.	
05	Rationale	:	Soybean is one of the most important oilseed crops in Bangladesh. Recently, the crop has gained popularity for its meal used as an important ingredient of poultry and fish feed as a source of protein. Soybean is being cultivated in coastal areas of Luxmipur, Chandpur, Noakhali, Barisal and Bhola. Therefore, varieties have to develop suitable for coastal areas. And for that multiplication and evaluations of promising lines are necessary in different areas.	
06	Materials and methods	:	No. of entries: **8** including 2 check varieties as BARI Soybean-6 and BARI Soybean-7 will be planted and evaluated in Joydebpur and Noakhali. Row to row distance 40 cm and plant to plant 10 cm.	
07	Crop/Variety	:	1. ST-1	5. USDA-53
			2. Hayman	6. USDA-72
			3. MTD-453	7. BARI Soybean-6 (Check)
			4. Richmond	8. BARI Soybean-7(Check)
08	Design	:	RCB	
	i) Treatment	:	8 genotypes including 2 check variety	
	ii) Replication	:	3	
09	Plot size	:	6 rows of 4 m long	
10	Planting system/spacing	:	Plant to plant 10 cm and row to row 40 cm	
11	Fertilizer dose and method of application	:	FRG, 2018	
12	Irrigated/rainfed	:	Irrigation as and when necessary	
13	Data to be recorded	:	Days to flower, days to maturity, final plant stand, plant height, root length, branches/plant, pods/plant, seeds/pod, 100-seed wt. (gm), seed yield/plant, seed yield (kg/ha), disease and insect reaction.	
14	Investigator(s)	:	U. Kulsum, M Shalim Uddin and Concern Scientists of RARS, Burirhat, (Bhola, and Cumilla), OFRD.	
15	Season		Rabi	
16	Date of initiation	:	Last week of December 2022	
17	Date of completion	:	May, 2023	
18	Expected output/benefit	:	High yielding and short duration genotypes with desirable characters viz. pod/plant, 100 seed weight will be selected for adaptive trail. Disease and insect susceptibility will also be considered.	
19	Location	:	Joydebpur, Burirhat , Bhola, and Cumilla (Chandpur)	
20	Status	:	1st year	
21	Estimated cost	:	30,000/-X 4 = 120000/-	
22	Source of fund	:	BARI/'EPOC' project	
23	Priority	:	1st	

Project II: Maintenance breeding of soybean

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Soybean
03	**Experiment -06**	:	**Maintenance of released variety and advanced lines of soybean**
04	Objective(s)	:	i) To maintain the genetic purity of released variety and advanced lines of soybean
05	Rationale	:	Natural cross pollination or outcrossing with other genotypes leads to genetic deterioration of a variety in subsequent cycles of seed multiplication. Spontaneous mutations also lead to deterioration in subsequent years. Sometimes residual variability remains in newly released varieties at the time of its release. Such variability leads to deterioration of a variety within few years. Non-genetic causes like mechanical admixture, disease infestation and adverse agro-climatic conditions also deteriorate varietal properties. Adverse agro-climatic conditions such as flood, drought, soil salinity etc. may lead to deterioration of a variety. So**,** it is essential to maintain genetic purity, of released varieties and advanced line of soybean
06	Materials and methods	:	7 BARI released soybean varieties **S**electing at least 300 plants of each variety/lines based on genetic purity, uniformity, and distinctness, the bulk seed will be sown the next year.
07	Crop/Variety	:	7 BARI released soybean varieties
08	Design	:	Not applicable
	i) Treatment	:	7
	ii) Replication	:	Not applicable
09	Plot size	:	15 rows of 4 m long
10	Planting system/spacing	:	Plant to plant 10 cm and row to row 40 cm
11	Fertilizer dose and method of application	:	FRG, 2018
12	Irrigated/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Days to flower, days to maturity, final plant stand, plant height, root length, branches/plant, pods/plant, seeds/pod, 100-seed wt. (gm), seed yield/plant, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	U. Kulsum
15	Season		Rabi
16	Date of initiation	:	Last week of December 2022
17	Date of completion	:	June, 2023
18	Expected output/benefit	:	Genetic purity of released varieties and advanced lines will be maintain
19	Location	:	Joydebpur
20	Status	:	1st year
21	Estimated cost	:	10,000/-
22	Source of fund	:	BARI/'EPOC' project
23	Priority	:	1st

E. SUNFLOWER (*Hellanthus annus* L.)

Sunflower is an important minor oilseed crop in Bangladesh. The crop can be grown throughout the year due to its photo insensitive nature. But rabi (winter) season is the best. The crop is suitable for growing after harvesting T.aman rice especially in the northern districts. There are two open-pollinated varieties of sunflower *viz*. Kironi & BARI Surjomukhi-2 developed by Oilseed Research Centre, BARI. The existing sunflower varieties are tall and susceptible to lodging and it is the main constraint for its extension at the farmers' level. Keeping all these ideas in mind, the following experiments have been undertaken.

Sub-Project I: Maintenance and evaluation of germplasm

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sunflower
03	**Experiment-01**	:	**Maintenance of sunflower germplasms**
04	Objective(s)	:	i) To maintain the sunflower germplasm for utilizing in the future breeding program
05	Rationale	:	Sunflower is a recalcitrant type of seed. Seed viability is lost quickly. Therefore, to ensure the seed viability of sunflower germplasm, the accessions are need to be grown every year. Maintenance of existing germplasm is also done for using in the future breeding programme
06	Materials and methods	:	Around 43 sunflower accessions including two released variety. Proper bagging will be done to protect out crossing. Crossing by hand pollination within same genotype will be done to maintain heterozygosity. Spacing of 50cm x 25cm row to row and plant to plat, respectively will be maintained.
07	Crop/Variety	:	Sunflower.
08	Design	:	-
	i) Treatment	:	43 accessions.
	ii) Replication	:	-
09	Plot size	:	2 rows of 4 m long for each entry
10	Planting system/spacing	:	Plant to plant 25 cm and row to row 50 cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigated/rainfed	:	Irrigated (Irrigation as and when necessary)
13	Data to be recorded	:	-
14	Investigator(s)	:	S H Habib
15	Season	:	Rabi
16	Date of initiation	:	November 2022
17	Date of completion	:	April 2023
18	Expected output/benefit	:	Sunflower germplasm will be maintained and the desired genotypes will be used in the breeding programme
19	Location	:	ORC Research field, BARI, Joydebpur
20	Status	:	On going
21	Estimated cost	:	30,000/-
22	Source of fund	:	BARI/ 'Enhance Production of Oil crops (BARI Part)' project (EPOC)
23	Priority	:	1st

Sub-Project II: Development of dwarf sunflower variety

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sunflower
03	**Experiment-02**	:	**Regional yield trial of sunflower**
04	Objective(s)	:	i) To select high yielding variety ii) To select medium dwarf variety with desirable agronomic traits.
05	Rational	:	Tall sunflower varieties have lodging tendency. Lodging susceptibility due to tallness is one of the major constraints for extension of sunflower varieties at the farmer's field. So, development of dwarf to medium dwarf sunflower variety is necessary to expand the sunflower cultivation. ORC has developed some composite and open pollinated lines with desirable traits like dwarf to medium dwarf plant stature and high yield. These selected lines will be tested different sunflower cultivation regions.
06	Materials and methods	:	No. of entries 12 including two check variety BARI Surjamukhi 2 & BARI Surjamukhi 2. S7GP01002, S7GP01009, S7GP04015, S7GP04017, S7GP04026, S7GP04028, S7GP04016(P16), S7GP04016(SP), BUZZY DWARF, COMP-5, BARI Surjomukhi 2 and BARI Surjomukhi 3. Spacing 50cm x 25cm will be maintained.
07	Variety	:	10 lines + 2 check as BARI Sujamukhi 2 & BARI Surjomukhi 3
08	Design	:	RCB
	i) Treatment	:	10 lines + 2 check as BARI Sujamukhi 2 & BARI Surjomukhi 3
	ii) Replication	:	3
09	Plot size	:	6 rows 4m long
10	Planting system/spacing	:	Plant to plant 25 cm and row to row 50 cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Initial no. of plants/plot, no. of plants harvested/plot, days to flowering, days to maturity, plant height (cm), stem diameter (cm), head diameter (cm), no. of seeds/head, seed yield/head (g), 1000-seeds weight (g), seed yield/plot (g), seed yield (t/ha), disease and insect reaction.
14	Investigator(s)	:	S H Habib, M A L Akanda, and concern scientists of OFRD
15	Season	:	Rabi
16	Date of initiation	:	November, 2022
17	Date of completion	:	April, 2023
18	Expected output/benefit	:	Medium dwarf high yielding varieties of sunflower will be selected.
19	Location	:	Joydebpur, Ishurdi, Jessore and Kumilla
20	Status (New or 1st year/ 2nd year/....)	:	1st yr
21	Estimated cost	:	Tk. 15,000/-x 4 = 60,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project III: Development of synthetic variety in sunflower

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sunflower
03	**Experiment-03**	:	**Development of synthetic sunflower variety**
04	Objective(s)	:	i) To develop synthetic variety of sunflower
05	Rational	:	The tall varieties of sunflower are not suitable to grow in farmer's field. As a result, development of high yielding dwarf sunflower variety is of important to fulfill farmers need. The synthetic and composite variety can be developed with desire characteristics such as high yield and dwarf plant stature from open pollinated inbred lines. The scientists of ORC have developed some inbred lines and took initiative to develop synthetic and composite sunflower varieties from these open pollinated inbred lines.
06	Materials and methods	:	8 inbred lines: P-S-2-OP1, P-S-2-OP2, P-S-2-OP3, P-S-2-OP4, P-S-2-OP6, P-S-2-OP8, P-S-2-OPa, P-S-2-OPb. **For synthetic: 3rd Year:** To develop Syn-3 generation, the selected single heads from Syn-2 generation will be mix, grown and evaluated for yield and other yield contributing characters to develop Syn-3 generation.
07	Crop/Variety	:	Sunflower
08	Design	:	-
	i) Treatment	:	bulked seeds from composite-5 and selected single heads from Syn-1 generation
	ii) Replication	:	non-replicated
09	Plot size	:	1000 m^2 each
10	Planting system/spacing	:	Spacing 50cm x 30cm (line X row)
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigated/rainfed	:	Irrigated (Irrigation as and when necessary)
13	Data to be recorded	:	days to flowering, days to maturity, chlorophyll content, plant height (cm), stem diameter (cm), head diameter (cm), no. of seeds/head, seed weight/head (g), 1000 seed weight (g), yield (kg/h), % oil content
14	Investigator(s)	:	S H Habib
15	Season	:	Rabi
16	Date of initiation	:	November, 2022
17	Date of completion	:	April, 2023
18	Expected output/benefit	:	Syn-3 generations will be developed
19	Location	:	Joydebpur
20	Status (New or 1st year/ 2nd year/....)	:	3rd year
21	Estimated cost	:	Tk. 30,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project IV: Creation of genetic variability in sunflower

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sunflower
03	**Experiment-04**	:	**Creation new genetic variability in sunflower using induced mutation.** **i) Evaluation of M6 mutant's family created by Gamma Radiation.**
04	Objective(s)	:	To create genetic variability in sunflower for development of high yielding dwarf sunflower variety
05	Rational	:	Genetic variability among plants in population is a basic prerequisite for successful plant breeding. The collection of sunflower germplasms in ORC, BARI is very narrow. Moreover, variability present in the existing cultivated sunflower and sunflower germplasms is also limited. Because of the narrowed germplasm of cultivated sunflower new approaches, induced mutagenesis might be an additional possibility to enrich genetic variability in this crop. Induced mutation have been applied for the past 40 years to produce mutant cultivars in sunflower by changing plant characters for significant increase in plant productivity (Jain, 2005). Mutagenic treatments on seed have induced high-oleics, semi dwarfs and dwarfs, male-sterile plants, earliness and seed with thin hull (Cvejić et al., 2009). However, induced mutations on sunflower to produce mutant cultiver in Bangladesh have not been reported yet. Therefore, the objective of this research is to create genetic variation within the variety BARI Sunflower-2 and sunflower inbred lines of ORC, BARI, Gazipur by mutagenesis.
06	Materials and methods	:	Selected M5 mutants from different group of BARI Surjamukhi -2 along with non-irradiated control plants will be grown to develop M6 mutant family.
07	Crop/Variety	:	Sunflower (gamma radiation treated M5 mutants)
08	Design	:	Not applicable
	i) Treatment	:	gamma radiation treated BARI Surjamukhi-2
	ii) Replication	:	Not applicable
09	Plot size	:	All seeds
10	Planting system/spacing	:	Spacing 50cm x 30cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigated/rainfed	:	Irrigated (Irrigation as and when necessary)
13	Data to be recorded	:	days to flowering, days to maturity, chlorophyll content, plant height (cm), stem diameter (cm), head diameter (cm), no. of seeds/head, seed weight/head (g), 1000 seed weight (g), No. of brunch, and other changed agronomic traits will be recorded
14	Investigator(s)	:	S H Habib
15	Season	:	Rabi
16	Date of initiation	:	November, 2022
17	Date of completion	:	April, 2023
18	Expected output/benefit	:	M6 mutants family will be developed
19	Location	:	Joydebpur
20	Status	:	**6th** yr
21	Estimated cost	:	Tk. 50,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sunflower
03	**Experiment-05**	:	**Creation of sunflower mutant through EMS** **i) Evaluation of M4 mutant's family**
04	Objective(s)	:	To create & detect genetic variability in sunflower for development of dwarf high yielding sunflower variety
05	Rational	:	Exploitation of natural and induced genetic diversity is the basic requirement of plant breeding in developing plant varieties for sustainable food production. However, genetic variability within the sunflower is limited, as its genetic base of available inbred lines is narrow. Genetic variability can be broadened by interspecies hybridization with wild species and mutation breeding. Mutation breeding has been successfully used in sunflower breeding by changing plant characteristics and productivity (Cvejic et al., 2011). EMS (Ethyl Methane Sulfonate), as a chemical mutagen, can be used as a supplementary approach to improve desired identifiable characters such as plant height and yield. However, induced mutations using EMS on sunflower in Bangladesh have not been reported yet. Therefore, the objective of this research is to create and detect genetic variation within the variety BARI Sunflower-2 of ORC, BARI, and Gazipur by chemical mutagenesis.
06	Materials and methods	:	**4th Year:** EMS treated M4 mutated seeds of different groups from BARI Surjamukhi-2 along with non-treated control plants will be grown to develop M5 mutant family. Plant height and other morphological attributes will be determined during the growth period. Total chlorophyll content will be determined according to the method described by Moran and Porath (1980).
07	Crop/Variety	:	Sunflower (Mutants of EMS treated BARI Surjamukhi-2)
08	Design	:	Not applicable
	i) Treatment	:	EMS treated M4 mutant seeds of BARI Sunflower-2
	ii) Replication	:	Not applicable
09	Plot size	:	
10	Planting system/spacing	:	Spacing 50cm x 30cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	days to flowering, days to maturity, chlorophyll content, plant height (cm), stem diameter (cm), head diameter (cm), no. of seeds/head, seed weight/head (g), 1000 seed weight (g), No. of brunch, and other changed agronomic traits will be recorded
14	Investigator(s)	:	S H Habib
15	Season	:	Rabi
16	Date of initiation	:	November, 2022
17	Date of completion	:	April, 2023
18	Expected output/benefit	:	M4 generations will be develop
19	Location	:	Joydebpur
20	Status	:	4th yr
21	Estimated cost	:	Tk. 50,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project V: Molecular study of oilseed crops

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sunflower
03	**Experiment-06**	:	**Molecular characterization of sunflower dwarf mutants (i) by the expression analysis of genes regulating Gibberalic Acid (GA) pathway**
04	Objective(s)	:	To analyze sunflower dwarf mutant molecularly
05	Rational	:	Gibberellins (GAs) are a class of essential hormones controlling a variety of growth and developmental processes during the entire life cycle of plants. Plants defective in GA biosynthesis show typical GA-deficient phenotypes, such as dwarfism, small dark green leaves, prolonged germination dormancy, inhibited root growth, defective flowering, reduced seed production, and male sterility. Biosynthetic pathway of GAs is reported to be hampered by the alteration in *ent-kaurenoic acid oxidase1* gene sequence. Therefore, an attempt has been taken to find out any alteration in *ent-kaurenoic acid oxidase1 gene sequence* of *mutant sunflower and its wild type one.*
06	Materials and methods	:	Material: Both EMS and Gamma Radiated dwarf mutants and non-treated plants of BARI Sunflower-2. Method: Total RNA will be extracted using Trizol Total RNA extraction kit from frozen leaves of 40 day old both non-treated and mutated plant. First strand cDNA will be derived from Total RNA using Quantitect Reverse Transcription kit. Then semi-quantitative RT-PCR will be carried out using gene specific primer$_s$.
07	Crop/Variety	:	Sunflower
08	Design	:	Not applicable
	i) Treatment	:	Non-treated and dwarf mutant sunflower of BARI Surjamukhi-2.
	ii) Replication	:	Not applicable
09	Plot size	:	As required
10	Planting system/spacing	:	Spacing 50cm x 30cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Seedling height will be taken when cotyledons emerged above the soil and split up (12 days after sowing) and other agronomic traits also will be evaluated.
14	Investigator(s)	:	S H Habib and MD MOTIAR RAHMAN
15	Season	:	Rabi
16	Date of initiation	:	November, 2022
17	Date of completion	:	June, 2023
18	Expected output/benefit	:	Analysis of Gibberalic Acid (GA) pathway genes in mutant sunflower and its non-treated plantS
19	Location	:	ORC field and ORC Molecular Biology Laboratory, Joydebpur
20	Status (New or 1st year/ 2nd year/....)	:	New
21	Estimated cost	:	Tk. 1,00,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sunflower
03	**Experiment-07**	:	**Molecular characterization of sunflower mutants (i) by the expression analysis of *FAD, SAD* and *Oleic* gene sequences**
04	Objective(s)	:	To analyze sunflower dwarf mutant molecularly
05	Rational	:	Oil with high total unsaturated fatty acid level is healthier for human consumption and helps in regulating blood cholesterol ratios by reducing low density lipoprotein levels. FADs and SAD have key roles in unsaturated fatty acid biosynthesis. FA desaturase (FAD) enzymes introduce double bonds into the mono-unsaturated OLE (oleic). While, the enzyme stearoyl-ACP desaturase (SAD) introduces a double bond at the position of stearoyl-ACP to convert it to oleoyl-ACP and thereby increases the unsaturated FA content of plants. Therefore, an attempt has been taken to analyze the expression of FAD and SAD genes in sunflower mutant created by Gy and EMS. Increase of oleic acid content has become one of the major goals to improve vegetable oil quality (Lacombe et al. 2004). Researchers have developed many markers to distinguished high and low oleic sunflower genotypes. Therefore, an attempt has been taken to analyze the expression of *Oleic* genes in sunflower mutant created by Gy and EMS.
06	Materials and methods	:	Material: EMS and Gamma Radiation treated mutants and non-treated plants of BARI Sunflower-2 Method: Genomic DNA will be extracted from 3rd and 4th leaf of mutants and non-treated plants and a chosen target will be amplified from extracted DNA using PCR primers for genes of *FatA* and *SAD and oleic*.
07	Variety	:	Sunflower
08	Design	:	Not applicable
	i) Treatment	:	Mutants of BARI Surjamukhi-2.
	ii) Replication	:	Not applicable
09	Plot size	:	As required
10	Planting system/spacing	:	Spacing 50cm x 30cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	Seedling height will be taken when cotyledons emerged above the soil and split up (12 days after sowing) and other agronomic traits also will be evaluated.
14	Investigator(s)	:	S H Habib and MD MOTIAR RAHMAN
15	Season	:	Rabi
16	Date of initiation	:	November, 2022
17	Date of completion	:	June, 2023
18	Expected output/benefit	:	Analysis of *FAD, SAD* and *oleic* gene sequence of mutant sunflower and its wild type
19	Location	:	ORC field and ORC Molecular Biology Laboratory, Joydebpur
20	Status	:	New
21	Estimated cost	:	Tk. 1,00,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sunflower
03	**Experiment-08**	:	**Screening of diverse genotypes of Oilseed crops using SSR primers. (i) Assessment of genetic diversity in *Brassica rapa* genotypes using SSR markers**
04	Objective(s)	:	To estimate the genetic diversity of oilseed genotypes using SSR markers
05	Rational	:	Genetic distance among the breeding materials has significant implications for the improvement of crop plants. Knowledge on genetic diversity could help breeders and geneticists to understand the structure of germplasm, facilitate to widen the genetic basis of breeding material for selection as well as predict which combinations would produce the best offsprings (Hu *et al.*, 2007; Qi, Yang & Zhang, 2008). To determine the genetic diversity among individuals or populations, morphological, biochemical and molecular approaches have been used **(**Mohammadi & Prasanna, 2003). Among various markers available for genetic analysis in plants, molecular markers are more efficient, precise and reliable in discriminating closely related species and cultivars (Mishra *et al*., 2011. There is increasing number of reports where molecular markers like Simple Sequence Repeats (SSRs; Abbas, Farhatullah, Marwat, Khan & Munir, 2009; Wang et al., 2009; Redden, Vardy, Edwards, Raman & Batley, 2009) have been used to study genome organization, varietal differences and diversity analysis. SSRs are co-dominant, highly polymorphic PCR-based markers and are very powerful in cultivar discrimination. For developing variety of oilseed crops, Oilseed research Centre, BARI dealing with eight different oilseed crops. Each oilseed crop has a number of varieties and sufficient number of germplasms. To identify the varietal differences and diversity present in the existing germplasm, molecular markers based analysis is needed. Therefore, the present study has been taken to estimate the genetic diversity of variety and germplasm using SSRs markers which will be helpful in identifying genetically diverse genotypes.
06	Materials and methods	:	Material: Twenty-five genotypes including 9 varieties and 16 germplasm belonging to *Brassica rapa* will be used in this study. Actively growing leaf samples from all the genotypes will be harvested and stored at −80 °C in the deep freezer. **25** germplasm (selected based on phenotypic performance) of *Brassica rapa* Method: Genomic-DNA from fresh and young leaves will be isolated and purified following appropriate protocol. The quality of the extracted DNA will be evaluated by determination of A260/A280 absorbance ratio by spectrophotometer. DNA concentration and purity will be estimated by 0.8% agarose gel electrophoresis. A portion of DNA will be diluted in molecular grade water to a concentration of 25-50 ng/µl and stored at −20 °C. SSR Primer sequences for majority of SSR markers will be obtained from http://www.brassica.info and journal article search. Then the genomic DNA will be amplified using appropriate PCR protocol.
07	Crop/Variety	:	*Brassica rapa*

08	Design	:	Not applicable
	i) Treatment	:	**25** germplasm belonging to *Brassica rapa*
	ii) Replication	:	Not applicable
09	Plot size	:	Single row in 2m long plot
10	Planting system/spacing	:	Spacing 50cm x 30cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	PCR amplification will be determined from the presence or absence of bands on agarose gels
14	Investigator(s)	:	S H Habib, Pryanka Roy, Umme Kulsum
15	Season	:	Rabi
16	Date of initiation	:	November, 2022
17	Date of completion	:	June, 2023
18	Expected output/benefit	:	To Identify genetically diverse genotypes, this then can be utilized in creating valuable selectable variation.
19	Location	:	ORC field and ORC Molecular Biology Laboratory, Joydebpur
20	Status	:	New
21	Estimated cost	:	Tk. 2,00,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project VI: Maintenance breeding of sunflower

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Sunflower
03	**Experiment-09**	:	**Maintenance of released varieties and advanced lines of sunflower**
04	Objective(s)	:	i) To maintain the genetic purity of released variety and advanced lines of sunflower
05	Rational	:	Natural cross pollination or outcrossing with other genotypes leads to genetic deterioration of a variety in subsequent cycles of seed multiplication. Spontaneous mutations also lead to deterioration in subsequent years. Sometimes residual variability remains in newly released varieties at the time of its release. Such variability leads to deterioration of a variety within few years. Non-genetic causes like mechanical admixture, disease infestation and adverse agro-climatic conditions also deteriorate varietal properties. Adverse agro-climatic conditions such as flood, drought, soil salinity etc. may lead to deterioration of a variety. So, it is essential to maintain genetic purity, of released varieties and advanced line of sunflower.
06	Materials and methods	:	No. of lines: Around sixteen lines of sunflower: P1: P-S-2-OP1, P2: P-S-2-OP3, P6: P-S-2-OP2, P8: P-S-2-OPb, **BUZZY, GP04017, GP04026 and composiye-5**. Proper bagging will be done to protect out crossing. Crossing by hand pollination within same genotype will be done to maintain heterozygosis. Spacing 50cm x 25cm will be maintained.
07	Crop/Variety	:	Sunflower lines
08	Design	:	Not applicable
	i) Treatment	:	5 inbred lines
	ii) Replication	:	Not applicable

09	Plot size	:	10 rows X 4 m long plot
10	Planting system/spacing	:	Spacing 50cm x 30cm
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation as and when necessary
13	Data to be recorded	:	days to flowering, days to maturity, plant height (cm), stem diameter (cm), head diameter (cm), no. of seeds/head, seed weight/head (g), 1000 seed weight (g), yield (kg/h)
14	Investigator(s)	:	S H Habib
15	Season	:	Rabi
16	Date of initiation	:	November, 2022
17	Date of completion	:	April, 2023
18	Expected output/ benefit	:	Seed of selected lines will be increased
19	Location	:	Joydebpur
20	Status	:	2nd year
21	Estimated cost	:	Tk. 20,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

Sub-Project VII: Adaptive trial

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of Linseed
03	**Experiment-10**	**:**	**Adaptive trial of advanced lines of sunflower**
04	Objective(s)	:	1. To evaluate the performance of advanced lines of sunflower in the farmers field. 2. To develop dwarf high yielding sunflower variety
05	Rationale	:	To increase both the area and production of oil seed crops it is necessary to develop more high yielding oilseed crop. The Oilseed Research Centre has developed few sunflower varieties. These varieties are tall and had lodging tendency. The farmers do not like these varieties due to the tallness of the varieties. So, medium dwarf variety development of sunflower is necessary. The scientists of ORC have developed some inbred lines with desirable traits like medium dwarf plant stature and high yield. But before releasing these lines as varieties, performance of these lines should be tested in the farmers' field. So, this trial has been under taken.
06	Materials and methods	:	5 (3 advanced lines + 2 check) 1. SPGP04017 2. SPGP04026, 3. COMP-5 4. BARI Surjamukhi-2 (check) 5. BARI Surjamukhi-3 (check) Row to row distance 50 cm and plant to plant distance 25 cm
07	Variety	:	Sunflower lines
08	Design	:	RCBD
	i)Treatment	:	5 sunflower genotypes
	ii)Replication	:	3
09	Plot size	:	20 rows 5m long per line/entry
10	Planting system/spacing	:	Continuous sowing, 50cm x 25cm, seed rate 12-15 kg/h. A standard cultural practice will be followed

11	Fertilizer dose and methods of application	:	200, 180, 170, 170, 10, 12, and 100 kg/h of Urea, TSP, MP, Gypsum, Zinc sulfate, Boric acid and Magnesium sulfate, respectively. Half of the urea and all other fertilizers will be used as basal dose and rest of the urea will be applied just before flowering.
12	Irrigation/rainfed	:	Irrigation- as and when necessary
13	Data to be recorded	:	Initial no. of plants/plot, no. of plants harvested/plot, days to flowering, days to maturity, plant height (cm), stem diameter (cm), head diameter (cm), no. of seeds/head, 1000-seeds weight (g), seed yield/plot (g), seed yield (t/ha), disease and insect reaction.
14	Investigator(s)	:	S H Habib, M A L Akanda, and concern scientists of OFRD
15	Season	:	Rabi
16	Date of initiation	:	November, 2022
17	Date of completion	:	April, 2023
18	Expected output/benefit	:	Medium dwarf high yielding sunflower variety will be selected
19	Location	:	Satkhira. Patuakhali, Sylhet and Khulna
20	Status	:	1st year
21	Estimated cost	:	Tk. 15000/-X4=60,000/-
22	Source of fund	:	BARI/'EPOC' Project
23	Priority	:	1st

MINOR OILSEEDS

F. LINSEED (*Linum usitatissimum*)

Linseed is one of the important oilseed crops in Bangladesh. Its oil is mainly used for industrial purpose. To develop varieties of linseed, maintenance of germplasm and evaluation of advance lines, the following experiments have been undertaken.

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of linseed
03	**Experiment-01**	:	**Maintenance of linseed germplasms**
04	Objective(s)	:	To maintain the collected germplasm for future breeding programme.
05	Rationale	:	Germplasm is the basic raw material for the improvement of a crop breeding program. Plant genetic resources (PGR) are the most important components of agro-biodiversity. The PGR include primitive forms of cultivated plant species and landraces, modern cultivars, obsolete cultivars, breeding lines and genetic stocks, weedy types and related wild species. So, maintenance of existing germplasms is essential for using in future breeding programme.
06	Materials and methods	:	
07	Variety	:	40 germplasms
08	Design		
	Treatment	:	40 germplasm.
	Replication	:	-
09	Plot size	:	4 rows x 4m long
10	Planting system/spacing		Row to row distance 30cm and continuous sowing.
11	Fertilizer dose and methods of application		Appendix-1
12	Irrigation/rainfed	:	Irrigation- as and when necessary
13	Data to be recorded	:	
14	Investigator(s)	:	T A Mujahidi
15	Season	:	Rabi
16	Date of initiation	:	1st week of November 2022
17	Date of completion	:	April, 2023
18	Expected output/benefit	:	Germplasm will be maintained.
19	Location	:	Joydebpur
20	Status	:	On going
21	Estimated cost	:	Tk. 15000/-
22	Source of fund	:	BARI
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of linseed
03	**Experiment-2**	**:**	**Regional yield trial of linseed**
04	Objective(s)	:	i) To select genotypes with high yield potential and better agronomic traits for different locations of Bangladesh. ii) To develop high yielding variety of Linseed.
05	Rationale	:	Linseed is one of the important minor oilseed crops in Bangladesh. The seed contain about 32-43% oil. The color of the oil is yellow to brown, has acrid test and smell. In industries it has huge demand. Linseed oil is used in paint and varnishes industries. The oil cake can be used as cattle feed. Now a days it is consumed for its medicinal value also. The plant is adapted to a wide range of environment.
06	Materials and methods	:	4 genotypes, such as Lin-T-17, Lin-1503/2, Lin (H)-18 and BARI Tishi-2 (as check)
07	Crop/Variety	:	Linseed
08	Design	:	RCBD
	i) Treatment	:	4 genotypes
	ii) Replication	:	3
09	Plot size	:	4rows x 4m long
10	Planting system/ spacing	:	Row to row distance 30 cm and continuous sowing.
11	Fertilizer dose and method of application	:	75, 120, 46, 100, 5 and 5 kg/ha of Urea, TSP, MP, Gypsum and Boric acid respectively. Half of urea and all other fertilizers will be used as basal dose and rest half of urea just before flowering.
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to 50% flowering, days to maturity, plant height (cm), no. of branches/plant, no. of pod/plant, no. of seeds/pod, 1000-seed weight (g), seed yield/plot, yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	T A Mujahidi, , concern scientists of RARS, Hathazari, Rahmatpur snd Jamalpur
15	Season	:	Rabi 2022-23
16	Date of initiation	:	1st week of November, 2022
17	Date of completion	:	April, 2022
18	Expected output/benefit	:	Short duration and high yielding lines will be selected.
19	Location	:	Joydebpur, Hathazari, Rahmatpur snd Jamalpur
20	Status	:	2nd year
21	Estimated cost	:	Tk.3x8000 = 32,000/-
22	Source of fund	:	BARI/'EPOC' project
23	Priority	:	1st

G. NIGER (*Guizotica abyssinica* Cass.)

Niger is a minor oilseed crop in Bangladesh. It is an advantageous crop because it can be cultivated in marginal land with minimum inputs. It is essential to maintain the germplasm of niger for future breeding programme.

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of niger
03	**Experiment no. 01**	**:**	**Maintenance of niger germplasm**
04	Objective(s)	:	To maintain the collected germplasm for future breeding programme.
05	Rationale	:	Germplasm is the basic raw material for the improvement of a crop breeding program. Plant genetic resources (PGR) are the most important components of agro-biodiversity. The PGR include primitive forms of cultivated plant species and landraces, modern cultivars, obsolete cultivars, breeding lines and genetic stocks, weedy types and related wild species. Variability present in the existing germplasm is limited. So, more germplasms should be collected from home and abroad to enrich gene pool.
06	Materials and methods	:	20 germplasm. Each germplasm will be grown in 4 rows 4m long plot.
07	Variety	:	20 germplasm.
08	Design	:	
	Treatment	:	20 germplasm
	Replication	:	
09	Plot size	:	4 rows x 4m long
10	Planting system/spacing	:	Row to row distance 30cm and continuous sowing.
11	Fertilizer dose and methods of application	:	Appendix-I
12	Irrigation/rainfed	:	Appendix-I
13	Data to be recorded	:	Irrigation-as and when necessary
14	Investigator(s)	:	T A Mujahidi
15	Season	:	Rabi
16	Date of initiation	:	1st Week of November 2022
17	Date of completion	:	April, 2023
18	Expected output/benefit	:	Germplasm will be maintained.
19	Location	:	Joydebpur
20	Status	:	On going
21	Estimated cost	:	Tk. 15000/-
22	Source of fund	:	BARI
23	Priority	:	1st

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of niger
03	**Experiment no. 02**	**:**	**Observation trial of niger**
04	Objective(s)	:	i) To select genotypes with high yield potential and better agronomic traits. ii) To develop high yielding variety of Niger.
05	Rationale	:	Niger is another minor oilseed crops in Bangladesh. It is an advantageous crop because it can be cultivated in marginal land with minimum inputs. At present there is no statistics of area and production of this crop. Shova is the only released variety of safflower developed by Oilseed Research Centre, BARI, Gazipur.
06	Materials and methods	:	Six genotypes
07	Crop/Variety	:	Niger
08	Design	:	RCBD
	i) Treatment	:	6 genotypes
	ii) Replication	:	3
09	Plot size	:	4rows x 4m long
10	Planting system/ spacing	:	Row to row distance 30cm and continuous sowing.
11	Fertilizer dose and method of application	:	Appendix-1
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	Days to 50% flowering, days to maturity, plant height (cm), no. of branches/plant, no. of pod/plant, no. of seeds/pod, 1000-seed weight (g), seed yield/plot, seed yield (kg/ha), disease and insect reaction.
14	Investigator(s)	:	T A Mujahidi and M H Rashid
15	Season	:	Rabi 2020-21
16	Date of initiation	:	1st week of November, 2022
17	Date of completion	:	April, 2023
18	Expected output/benefit	:	Short duration and high yielding lines will be selected.
19	Location	:	Joydebpur
20	Status	:	1st year
21	Estimated cost	:	Tk. 30000/-
22	Source of fund	:	BARI
23	Priority	:	1st

H. SAFFLOWER

Safflower is a minor oilseed crop in Bangladesh. It is an advantageous crop because it can be cultivated in marginal land with minimum inputs. It is essential to maintain the germplasm of safflower for future breeding programme.

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Variety Development of safflower
03	**Experiment-01**	**:**	**Maintenance of safflower germplasm**
04	Objective(s)	:	To maintain the collected germplasm for future breeding programme.
05	Rationale	:	Germplasm is the basic raw material for the improvement of a crop breeding program. Plant genetic resources (PGR) are the most important components of agro-biodiversity. The PGR include primitive forms of cultivated plant species and landraces, modern cultivars, obsolete cultivars, breeding lines and genetic stocks, weedy types and related wild species. Variability present in the existing germplasm is limited. So, more germplasms should be collected from home and abroad to enrich gene pool.
06	Materials and methods	:	6 germplasm. Each germplasm will be grown in 4 rows plot of 4m long.
07	Variety	:	6 germplasm.
08	Design	:	
	Treatment	:	6 germplasm
	Replication	:	-
09	Plot size	:	4 rows x 4m long
10	Planting system/spacing	:	Row to row distance 30cm and continuous sowing.
11	Fertilizer dose and methods of application	:	Appendix-I
12	Irrigation/rainfed	:	Irrigation-as and when necessary
13	Data to be recorded	:	-
14	Investigator(s)	:	T A Mujahidi
15	Season	:	Rabi
16	Date of initiation	:	November 2022
17	Date of completion	:	April, 2023
18	Expected output/ benefit	:	Germplasm will be maintained.
19	Location	:	Joydebpur
20	Status	:	On-going
21	Estimated cost	:	Tk. 15000/-
22	Source of fund	:	BARI
23	Priority	:	1st

Project II: CROP AND SOIL MANAGEMENT

Rapeseed- mustard, groundnut, sesame and soybean are major and sunflower, linseed, niger, safflower and are minor oilseed crops in Bangladesh. Perilla is a new minor oilseed crops in Bangladesh. Rapeseed-mustard is the principal oilseed crop in our country. But mostly traditional varieties of rapeseed-mustard, groundnut, seseme are being cultivated and their productivity are not so satisfactory. Previous studies showed that even Tori-7, the traditional variety of rapeseed can produce the yield 1.40 t/ha under optimum management situation. Oilseed crops are facing various problems in the farmer field. The area is decreasing day by day and has been pushed to marginal lands having no irrigation facility. Farmers do not apply fertilizers; and take less care of their oilseed crops in such marginal lands. Therefore, there exist a big gap between yield of the research station and the farmer's field. Leguminous oilseed crops like groundnut and soybean when grown as intercrop with non-leguminous crops like lalshak, spinach, indian spinach, danta, fenugreek, carrot, onion,garlic etc can contribute to their economic viability along with maintenance of fertility and organic matter contents of soils. With a view to develop a package of crop production technology for each of the oilseed crops the following experiments on crop and soil management have been undertaken.

Sub-Project I: Multiple Cropping

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment. 01**	:	**Intercropping bunching onion (pata peaz) with groundnut at different row arrangement**
04.	Objective (s)	:	To find out the suitable row arrangement of leafy onion with groundnut for higher productivity and profitability
05.	Rationale	:	Groundnut (*Arachis hypogaea* L.) is the second important oilseed crop that covered a considerable area in Bangladesh and it is a long durated crop. On the other hand, onion is a very important and valuable spices crop which is usually grown as sole and in some cases as intercrop in farmers field at various parts of Bangladesh. BARI released leafy onion variety has high potentiality to incorporate as a intercrop with groundnut due to its growth behaviour. Although its duration is 150 days but we can harvest earlier in around 100 days. In this life time we can harvest around 4 to 5 times from leafy onion as vegetables. However, yield of BARI leafy onion-1 is 14-15t/ha as leafy vegetable. As the spacing for groundnut cultivation is 40 cm X 15 cm, so there is a scope to intercrop leafy onion as a spice crop with groundnut. This may be economically profitable for the farmers. Hence this experiment will be undertaken to find out the optimum row arrangement of leafy onion for intercropping with groundnut for higher productivity and return.
06.	Materials and methods	:	
07.	Crop/ varieties	:	Groundnut (var. BARI Chinabadam-8) and Green Onion (BARI Pata Peaz-1))
08.	Design	:	RCB
	Treatment	:	Treatment : 5 T_1= Sole groundnut T_2 =One row of green onion (15cmX10cm) in between two normal rows of groundnut (40cmX15cm) T_3 = Two rows of green onion in between two normal rows of groundnut T_4 = Two groundnut rows alternate with two rows of green onion T_5 = Green onion broad cast in between two normal rows of groundnut (40cmX15cm) T_6 = Sole green onion
	Replication		3

09.	Plot Size	:	4 m x 5 m
10.	Planting system/spacing	:	Groundnut will be planted with 40 cm × 15 cm spacing.
11.	Fertilizer dose & application method	:	For sole groundnut & intercrop: 45-36-75-30-2-1-.6 kg/ha NPKSZnBMo ½ N and full quantity of other fertilizers will be applied as basal. Remaining N will be top dressed at flowering stage and covered with soil followed by irrigation.
12.	Irrigation/rainfed	:	Irrigated
13.	Data To be recorded	:	Yield and yield component of groundnut and onion, groundnut equivalent yield, cost benefit analysis
14.	Investigators	:	P.Roy, F.Begum and M.M.Karim
15.	Season	:	Rabi
16.	Date of initiation	:	November, 2022
17.	Date of completion		May, 2023
18.	Expected Output/Benefit	:	Optimum row arrangement for groundnut green onion intercropping will be determined for maximum yield and economic return. Farmers will be benefited in terms of total productivity
19.	Location	:	Joydebpur
20.	Status	:	2nd year
21.	Estimated Cost	:	Tk. 20,000/-
22.	Sources of Fund	:	EPOC Project
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment. 02**	:	**Development of Mustard (var. BARI Sarisha-18) - T.Aus (var. BRRI dhan 87) - T. aman (var. BRRI dhan75) cropping pattern for increasing cropping intensity and productivity**
04.	Objective (s)	:	i) Increase cropping intensity and productivity through crop intensification in rice based cropping system. ii) Increase farmer's income, access to food and nutrition, employment opportunity and livelihood improvement.
.	Rationale	:	Bangladesh predominantly rice growing country and rice occupies about 80% of the total cropped area which is cultivated in three seasons in a year. In rice based cropping system, T.aman-Fallow-Boro-Fallow is a dominant cropping pattern where cropping intensity is 200%. In the pace of per capita land availability decrease and production shortage the existence of fallow land in rice based cropping system is very inconsistent to national perspective. Potential adoption of these improved cropping patterns intensifying oilseed, pulse and vegetable in T.aman-Fallow-Boro-Fallow cropping pattern would generate employment and additional income for the rural poor. The farm level adoptions of improved oilseeds, pulses and vegetables in rice based cropping system have already been created a wide range of socio-economic impacts that need to be evaluated properly to understand the output of all system. This information could be useful for both government and donor agencies in investing more on sustainable food production programs in Bangladesh. Considering the above issues, the study will be undertake to find out the suitability of four crop based cropping pattern.
06.	Materials and methods	:	Materials : **Cropping pattern** = **T.Aman** (var. BRRI dhan75) **–** **Mustard** (var. BARI Sarisha-18) **- T.Aus** (var. BRRI dhan 87)

07.	Crop/ varieties	:	Mustard : BARI Sarisha-18 T.aus : BRRI dhan87 T.aman : BRRI dhan 75
08.	Design	:	RCB
	Treatment	:	
	Replication	:	3
09.	Plot Size	:	0.50ha
10.	Planting system/spacing	:	Line sowing
11.	Fertilizer dose & application method	:	As per FRG-2012 for each crop As recommended for each crop
12.	Irrigation/rainfed	:	Irrigated
13.	Data To be recorded	:	i) Yield, crop duration, turn around time and yield contributing characters, ii) Biomass yield, iii) Cost and return analysis v) Rice equivalent yield, vi) production efficiency
14.	Investigators	:	F. Begum, M. M. Karim, P.Roy and concern scientist RARS Jamalpur and concern scientist OFRD Tangail
15.	Season	:	
16.	Date of initiation	:	July 2022
17.	Date of completion		June, 2023
18.	Expected Output/Benefit	:	Increased cropping intensity and productivity and improved economic condition of farmers. By involving Four crops in the existing pattern
19.	Location	:	Jamalpur and Tangail
20.	Status	:	2nd year
21.	Estimated Cost	:	Tk. 1,00,000/- x 2 = 200000/-
22.	Sources of Fund	:	EPOC Project
23	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and soil management
03.	**Experiment 3**	:	**Development of cropping pattern for increasing cropping intensity and productivity**
04.	Objective (s)	:	i) Increase cropping intensity and productivity through crop intensification in rice based cropping system. ii) Increase farmer's income, access to food and nutrition, employment opportunity and livelihood improvement.
05.	Rationale	:	Bangladesh predominantly a rice growing country and rice occupies about 80% of the total cropped area which is cultivated in three seasons in a year. In rice based cropping system, T.aman-Fallow-Boro-Fallow is a dominant cropping pattern where cropping intensity is 200%. In the pace of per capita land availability decrease and production shortage the existence of fallow land in rice based cropping system is very inconsistent to national perspective. Potential adoption of these improved cropping patterns intensifying oilseed, pulse and vegetable in T.aman-Fallow-Boro-Fallow cropping pattern would generate employment and additional income for the rural poor. The farm level adoptions of improved oilseeds, pulses and vegetables in rice based cropping system have already been created a wide range of socio-economic impacts that need to be evaluated properly to understand the output of all system. This information could be useful for both government and donor agencies in investing more on sustainable food production programs in Bangladesh. Considering the above issues, the study will be undertake to find out the suitability of four crop based cropping pattern.

06.	Materials and methods	:	Materials : 5 cropping patterns CP_1 = Mustard (var. BARI Sarisha-16) – Indian Spinach+Okra - T. aman (var. BRRI dhan 75) CP_2= (Groundnut + Fenugreek) –T.aus (var. BRRI dhan82) - T. aman (var. BRRI dhan 75) CP_3 = (Groundnut + Lentil) –T.aus (var. BRRI dhan82)- T. aman (var. BRRI dhan 75) CP_4= Sunflower+Garden pea – Sesame +Gimakalmi (var.BARI Till-4) – T. aman (var. BRRI dhan75) CP_5 = Fallow – Boro (var. BRRI dhan 89) – Fallow (Control)- T. aman (var. BRRI dhan 75).
07.	Crop/ varieties	:	Mustard : BARI Sarisha-16 T.aus : BRRI dhan82 T.aman : BRRI dhan75 Boro : BRRI dhan 89 Sesame : BARI Til-4 Groundnut : BARI Chinabadam-8 Lentil : BARI Mosur-4 Sunflower : BARI Shurjomukhi-3 Indian Spinach : BARI Puishak-1 Kangkong : BARI Gimakolmi-1
08.	Design	:	RCB
	Treatment	:	
	Replication	:	3
09.	Plot Size	:	6m x 4m
10.	Planting system/spacing	:	Line sowing:
11.	Fertilizer dose & application method	:	As per FRG-2018 for each crop As recommended for each crop
12.	Irrigation/rainfed	:	Irrigated
13.	Data To be recorded	:	i) Yield, crop duration, turn around time and yield contributing characters, ii) Biomass yield, iii) Cost and return analysis v) Rice equivalent yield.
14.	Investigators	:	F. Begum, M. M. Karim and P. Roy
15.	Season	:	
16.	Date of initiation	:	October, 2022
17.	Date of completion	:	September, 2023
18.	Expected Output/Benefit	:	Increased cropping intesity and productivity and improved economic condition of farmers. By involving Four crops in the existing pattern
19.	Location	:	Joydebpur
20.	Status	:	2nd year
21.	Estimated Cost	:	Tk. 1,00,000/-
22.	Sources of Fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment. 4**	:	**Development of Mustard (var. BARI Sarisha-18) - Sesame (var. BARI Til-5) - T. aman (var. BRRI dhan75) cropping pattern for increasing cropping intensity and productivity**
04.	Objective (s)	:	i) Increase cropping intensity and productivity through crop intensification in rice based cropping system. ii) Increase farmer's income, access to food and nutrition, employment opportunity and livelihood improvement.
05.	Rationale	:	Bangladesh predominantly rice growing country and rice occupies about 80% of the total cropped area which is cultivated in three

			seasons in a year. In rice based cropping system, T.aman-Fallow-Boro-Fallow is a dominant cropping pattern where cropping intensity is 200%. In the pace of per capita land availability decrease and production shortage the existence of fallow land in rice based cropping system is very inconsistent to national perspective. Potential adoption of these improved cropping patterns intensifying oilseed, pulse and vegetable in T.aman-Fallow-Boro-Fallow cropping pattern would generate employment and additional income for the rural poor. The farm level adoptions of improved oilseeds, pulses and vegetables in rice based cropping system have already been created a wide range of socio-economic impacts that need to be evaluated properly to understand the output of all system. This information could be useful for both government and donor agencies in investing more on sustainable food production programs in Bangladesh. Considering the above issues, the study will be undertake to find out the suitability of three crop based cropping pattern.
06.	Materials and methods	:	Materials : **Cropping pattern** = **T.Aman** (var. BRRI dhan75) **–** **Mustard** (var. BARI Sarisha-18) **- Sesame** (var. BARI Til-5)
07.	Crop/ varieties	:	Mustard : BARI Sarisha-18 Sesame : BARI Til-5 T.aman : BRRI dhan 75
08.	Design	:	RCB
	Treatment	:	
	Replication	:	3
09.	Plot Size	:	6mx5m
10.	Planting system/spacing	:	Line sowing
11.	Fertilizer dose & application method	:	As per FRG-2012 for each crop As recommended for each crop
12.	Irrigation/rainfed	:	Irrigated
13.	Data To be recorded	:	i) Yield, crop duration, turn around time and yield contributing characters, ii) Biomass yield, iii) Cost and return analysis v) Rice equivalent yield, vi) production efficiency
14.	Investigators	:	P.Roy and F. Begum
15.	Season	:	
16.	Date of initiation	:	July 2022
17.	Date of completion		June, 2023
18.	Expected Output/Benefit	:	Increased cropping intensity and productivity and improved economic condition of farmers. By involving three crops in the existing pattern
19.	Location	:	Joydebpur
20.	Status	:	1st year
21.	Estimated Cost	:	Tk. 1,00,000/-
22.	Sources of Fund	:	EPOC Project
23	Priority	:	1st

01.	Programme	:	Oilseed crop Improvement
02.	Project	:	Crop and soil Management
03.	**Experiment 5**	**:**	**Effect of relaying maize with mustard**
04.	Objective(s)	:	To determine the optimum relaying time of maize for better growth and yield of mustard.
05.	Rationale	:	Climate change, limited use of cultivable land are becoming the most prominent challenges for oil crop production. Only 3% of cultivable land can be used for oil crop cultivation. Oil crop cultivate mainly in winter season. In this season farmers don't sacrifice their land due to they cultivate high value crop. We have to search an option to grow

			oil crop. Relay cropping is a method of multiple cropping where one crop is seeded into standing second crop. Relay cropping may solve a problem of limited land of oil crop cultivation. Presently maize is a promising crop in Bangladesh because of it's multipurpose use. If we can relaying maize into the mustard field cropping intensity will be increase. With the point of view the experiment was undertaken to identify the suitable relaying time of maize into the mustard field.
06.	Materials and methods	:	5 sowing timer of relay maize.
07.	Crop/variety	:	BARI sarisha-14 and BARI Maize-7
08.	Design	:	RCB
	i) Treatment	:	**i) Treatments-5** 1. Sowing mustard and maize together 2. Sowing maize after 30 days of mustard sowing 3. Sowing maize after 40 days of mustard sowing 4. Sowing maize after 50 days of mustard sowing 5. Sowing maize after 60 days of mustard sowing
	ii) Replications	:	**ii) Replication-3** 1. Plot size: 4m x 3m. 2. Planting: Mustard: Broadcast Maize: Line sowing (60cm x 60cm) 3. Fertilizer dose and application: Urea, TSP, MoP, Zypsum, Znso4, Boric acid, 300,180,100,180,7,10 kg/ha. and Cowdung-10 ton/ha.
09.	Plot size	:	4m×3m
10.	Planting system /spacing	:	Line and Broadcasting sowing.
11.	Fertilizer dose and methods of application	:	Fertilizer at the rate of (N_{138} P_{35} K_{50} S_{32} $Zn_{2.5}$ B_7) kg/ha in the form of Urea, TSP, MoP, Zypsum, Zinc sulphate & Boric acid, will be applied. Full amount of TSP, Mop, Zypsum, Zic sulphate, boric acid and half of urea will be broadcasted in the plot at the time of final land preparation. The rest half of urea will be applied 40 days after seedling emergence.
12.	Irrigated/rainfed	:	Irrigated.
13.	Data to be recorded	:	Plant height, No. of leaf, Growth and yield contributing characters
14.	Investigator(s)	:	M.M.Karim, F. Begum, P. Roy
15.	Season	:	Rabi
16.	Date of initiation	:	November 2022
17.	Date of completion	:	February 2023
18.	Expected output/benefit	:	Cropping intensity and production will be increase.
19.	Location	:	Gazipur
20.	Status	:	New
21.	Estimated cost	:	25,000/-
22.	Source of fund	:	BARI
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 06**	:	**Performances of mustard based different cropping patterns in Barishal region**
04.	Objective(s)	:	To examine the performances of mustard based different cropping patterns in Barishal region.
05.	Rationale	:	Bangladesh has to spend a huge amount of foreign exchange on imports of edible oils and oilseeds to meet the increasing demand of its population. Edible oils play vital roles in human nutrition by providing calories and aiding in digestion of several fat soluble

			vitamins, for example Vitamin A (National Research Council, 1989). Among oilseeds in Bangladesh, mustard dominates with 67%, followed by sesame (10.88%), groundnuts (11.55%) and others (sunflower, linseed) respectively. Area under mustard and rapeseed cultivation in Bangladesh only 2.70 lac hectare (2.78% of total cultivated land) and annual production is 3.12 metric ton (BBS, 2020). Bangladesh predominantly a rice growing country and rice occupies about 80% of the total cropped area is cultivated in three seasons a year (Kabir *et al*., 2016). Under the rice based cropping systems in Barishal region, most of the lands remain fallow during winter season. In the coastal saline area, only 100% cropping intensity is existed where only the T.*aman*-Fallow-Fallow is practiced. Rahman (2015) reported that about 29.45% and 55.10% lands remain fallow in *Rabi* and *Kharif*-1 seasons, respectively after harvesting of previous T.*aman* rice mainly due to delaying harvest of T.*aman* rice, salinity, drought, tidal flooding, lacking of suitable adaptation technologies and so on. Bangladesh Agricultural Research Institute (BARI) has developed a good number of modern varieties of oilseed crops (mustard, sesame, sunflower, groundnut, soybean, linseed etc.) that can be introduced in the existing rice based cropping systems for improving of existing cropping systems. Cultivation of oil crop based cropping systems will increase the production oilseed crops and save a huge amount of foreign exchange every year. In considering the above facts, the experiment has been undertaken to examine the performances of mustard based different cropping patterns in Barishal region of Bangladesh.
06.	Materials and methods	:	The experiment will be conducted all the year round at RARS, Rahmatpur, Barishal.
07.	Crop/Variety	:	Mustard: BARI Sarisha-18 (Canola type), Sesame: BARI Til-6/7, Jute: BJRI Deshi Pat-7, Maize: BARI Maize-9, T.*aus* rice: BRRI dhan82, T.*aman* rice: BRRI dhan87/BINA Dhan-17
08.	Design	:	RCBD (Factorial)
	Treatments	:	Cropping pattern: 7 (seven) CP_1 = Mustard-Sesame-T.*aman* CP_2 = Mustard-Mungbean-T.*aman* CP_3 = Mustard-Jute-T.*aman* CP_4 = Mustard-Maize-T.*aman* CP_5 = Mustard-T.*aus*-T.*aman* CP_6 = Mustard-Fallow-T.*aman* CP_7 = Fallow-Fallow-T.*aman* rice (control)
	Replications	:	4 (Four)
09.	Plot Size	:	6m × 5m
10.	Planting system/spacing	:	Mustard: Line sowing with row to row distance 30 cm Sesame: Line sowing with row to row distance 30 cm Jute: Broadcasting with seed rate 7.0 kg/ha Mungbean: Line sowing with row to row distance 30 cm Maize: Line sowing with plant spacing 50 cm x 25 cm T.*aus* rice: Line transplanting with plant spacing 20 cm x 15 cm T.*aman* rice: Line transplanting with plant spacing 25 cm x 15 cm
11.	Fertilizer dose & methods of application	:	Mustard: Urea-TSP-MP-Gypsum-Zinc Sulphate-Boric acid @ 250-170-85-150-5-10 kg/ha, respectively + 8 t/ha cowdung. Fifty percent urea and full amount of other fertilizers will be broadcasted during final land preparation. The rest amount of urea will be top dressed at 20-25 days after emergence of seedling (i.e. during flowering). Adequate soil moisture is necessary during top

			dressing. Sesame: Urea-TSP-MP-Gypsum-Zinc sulphate-Boric acid @ 125-150-50-110-5-10 kg/ha, respectively. Fifty percent urea and full dose of other fertilizers will be applied at the time of final land preparation. The rest amount of urea will be top dressed at 25-30 days after sowing i.e. before flowering. Adequate soil moisture is necessary during top dressing. Jute: Urea-TSP-MP-Gypsum-Zinc sulphate @ 166-25-30-4511 kg/ha. Fifty percent urea and full dose of other fertilizers will be applied as a basal during final land preparation. The rest amount of urea will be top dressed at 45 days after sowing. Mungbean: Urea-TSP-MP-Boric acid @ 44, 100, 40 and 7.5 kg/ha, respectively. All fertilizers will be applied as a basal during final land preparation. Maize: Urea-TSP-MP-Gypsum-Zinc sulphate-Boric acid @ 543-266-200-208-14-5 kg/ha, respectively. One third of urea and other fertilizers should be applied at the time of final land preparation. Remaining two third of urea should be applied in two installments: One-third at tassel initiation (8-10 leaf stage) and the rest at about one week before silking or grain filling stage. In case of dibbling method of sowing, initial dose of fertilizers can be applied in the hole, 10 cm apart from the plants. The second and third doses of urea can be applied at 8-10 leaf stage and one week before silking. For better yield, 5-7 ton of cowdung per hectare should be applied. T.*aus* rice: Urea-TSP-MP-Gypsum-Zinc sulphate @ 150-52-75-37-7 kg/ha, respectively. One-third urea, full amount of TSP, half MP, Gypsum and Zinc fertilizers will be applied at final land preparation. One-third urea will be applied as top dressing at 10-15 days after transplanting (DAT) and remaining one-third at 25-30 DAT. The rest amount of MP (half MP) will be applied at the time of urea top dressing. T.*aman* rice: Urea-TSP-MP-Gypsum-Zinc sulphate @ 180-82-98-68-12 kg/ha, respectively. Full amount of TSP, half MP, Gypsum and Zinc fertilizers will be applied at final land preparation. Urea will applied as top dressing into three equal installments at 10-12, 20-25 and 35-40 days after transplanting (DAT). The rest amount of MP will be applied with the 3rd installment of urea (35-40 DAT)
12.	Irrigated/Rainfed	:	Irrigated
13.	Data to be recorded	:	Phenological parameters (days to flowering, maturity and field duration), yield components and yields of the cultivated crops
14.	Investigator(s)	:	M.A. Rahman, F. Begum, M.M. Rahman and M. Ahmed
15.	Season	:	*Year round*
16.	Date of initiation	:	July, 2022
17.	Date of completion	:	June, 2024
18.	Expected output/ Benefit	:	Increased cropping intensity and economic return in Barishal region of Bangladesh
19.	Location	:	RARS, BARI, Rahmatpur, Barishal
20.	Status	:	New
21.	Estimated cost	:	1,00,000/-
22.	Source of fund	:	EPOC
23.	Priority	:	1st

Sub-Project II: Unfavourable Ecosystem

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 7**	**:**	**Performance of intercropping garlic, onion, fenugreek, fenugreek with groundnut in charland areas**
04.	Objectives	:	To find out the suitable intercrop combination of groundnut for higher productivity and profitability of charland area's stakeholders.
05.	Rationale	:	An estimated 6.5 million people, around 5% of the Bangladeshi population live on the Chars and. Of the total land area of the country, 5% is Char, which comes to about a total area of approximately 7,200 square kilometers. The Char dwellers mainly depend on agriculture and agriculture related activities. EGIS, 2000. Groundnut (*Arachis hypogaea* L.) is the second important oilseed crop that covered a considerable area in Bangladesh and it is a long durated crop. On the other hand, fenugreek is a very important and valuable spices crop which is usually grown as sole and in some cases as intercrop in farmers field in various charland areas of Bangladesh. As the spacing for groundnut cultivation is 40 cm X 15 cm, so there is a scope to intercrop fenugreek with groundnut. This might be economically profitable for the farmers. Hence this experiment will be undertaken to find out the optimum row arrangement of fenugreek for intercropping with groundnut for higher productivity and return.
06.	Procedure/methods	:	Treatment: 4
07.	Crop/Variety	:	Groundnut (BARI Chinabadam-8) fenugreek (BARI Kalozira-1), fenugreek (BARImethi-1), garlic (local) and onion(local)
08.	Design	:	RCB
	i)Treatment	:	Treatment : 5 T_1 = Sole groundnut T_2 = Two rows of fenugreek in between two normal rows of g.nut T_3 = One row of fenugreek (15cmX10cm) in between two normal rows of g.nut (40cmX15cm) T_4 = One row of garlic (15cmX10cm) in between two normal rows of g.nut (40cmX15cm) T_5 = One row of onion (15cmX10cm) in between two normal rows of g.nut (40cmX15cm)
	ii) Replications		3
09.	Planting system	:	Line sowing
10.	Plot size	:	4mX5m
11.	Fertilizer dose & Methods of application	:	For sole groundnut & intercrop: 45-36-75-30-2-1-.6 kg/ha NPKSZnBMo. ½ N and full quantity of other fertilizers will be applied as basal. Remaining N will be top dressed at flowering stage and covered with soil followed by irrigation.
12.	Irrigated/ rainfed	:	Irrigated
13.	Data to be recorded	:	Yield and yield component of groundnut and fenugreek, fenugrik, garlic and onion groundnut equivalent yield, cost benefit analysis
14.	Investigator(s)	:	F. Begum, P. Roy and Concerned scientist of RARS, Jamapur, Concerned scientist OFRD, Tangail, Gaibanda.
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2022
17.	Date of completion	:	May, 2023
18.	Expt. output/benefit	:	Total productivity will be increased and farmers will be benefited in terms of economic return

19.	Location	:	Tangail and Jamalpur
20.	Status	:	2nd year
21.	Estimated cost	:	30,000/- X 2= 60000/-
22.	Source of fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 8**	**:**	**Performance of mustard, groundnut and sunflower varieties at haor areas in Bangladesh**
04.	Objectives	:	To observe the performance of mustard groundnut and sunflower varieties for haor areas.
05.	Rationale	:	Mustard, groundnut and sunflower are an important oilseed crop. Farmers of different char areas of Bangladesh grow groundnut, sunflower and mustard after receding of flood water. They cultivate their local variety, as a result, they get poor yield. If replace their variety by BARI developed HYV, the farmers of the haor area will be benefited. Therefore, the experiment will be conducted to see the performance of groundnut, sunflower and mustard varieties for haor areas of Bangladesh.
06.	Procedure/methods	:	Treatment: 8
07.	Crop/Variety	:	Mustard, groundnut and sunflower
08.	Design	:	RCB
	i)Treatment		BARI Sarisha-14, 17 & 18 BARI Chinabadam-8, 9 &10 and BARI Surjmukhi -2, BARI Surjmukhi -3 and Hysun
	ii) Replications		3
09.	Planting system	:	Line sowing
10.	Plot size	:	5mX6m
11.	Fertilizer dose & Methods of application	:	Recommended dose (Based on FRG 2005) ½ N and full quantity of other fertilizers will be applied as basal. Remaining N will be top dressed at flowering stage and covered with soil followed by irrigation. In case of rainfed, all fertilizer will be applied as basal.
12.	Irrigated/ rainfed	:	Rainfed
13.	Data to be recorded	:	Yield and yield components of mustard, groundnut and sunflower
14.	Investigator(s)	:	F. Begum, M. M. Karim and concerned scientist of OFRD (Keshoregong and Sylhet)
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2022
17.	Date of completion	:	June, 2023
18.	Expt. output/benefit	:	Suitable varieties of mustard, groundnut and sunflower for haor will be find out.
19.	Location	:	Nikkli, Moulabhibazar and Sunamganj
20.	Status	:	2nd year
21.	Estimated cost	:	20,000/- X 3= 60000/-
22.	Source of fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and soil management
03.	**Experiment 9**	:	**Performance of soybean varieties in southern region of Bangladesh**
04.	Objective(s)	:	To identify the appropriate variety of soybean for southern region
05.	Rationale	:	Out of 2.85 million hectares of the coastal and offshore areas of Bangladesh about 1.06 million hectares are arable lands. This arable land is more than 30% of the total cultivable lands. Agricultural land use in the coastal districts is very poor. The major part of this land is affected by different gradient of salinity. Salinity causes unfavorable environment and hydrological situation that restrict normal crop production throughout the year. The cultivation of dry season crop in this situation requires suitable crops and agronomic options suitable for early planting in the excess moist soil, (more than field capacity) which is unable to plough to increase the productivity and cropping intensity. The cultivation of soybean may be suitable in this environment because of its high yield as well as its extensive adaptability and acclimation, high photosynthesis potential and high harvest index. According to water stress day index, soybean was determined as a moderately sensitive crop to salinity. With the above point of view this experiment will be to find out the suitable soybean variety for costal area.
06.	Materials and Methods	:	Variety: 4
07.	Crop/variety	:	Soybean
08.	Design	:	RCB
	i) Treatment	:	Soybean: 4 (Shohag, BARI Soybean-5 and BARI Soybean-6 and BARI Soybean-7)
	ii) Replications	:	3
09.	Plot size	:	5 m x 3 m.
10.	Planting system /spacing	:	Soybean: 40cm X 10cm
11.	Fertilizer dose and methods of application	:	Soybean:25:35:55:18 NPKS kg/ha Half of urea and all the other fertilizers should applied during final land preparation. Rest of the urea should applied in equal amounts at 25 & 50 days after emergence.
12.	Irrigated/rainfed	:	3 times irrigation at 30, 50 & 70 days after sowing
13.	Data to be recorded	:	1) Soybean: Days of first flowering, plant height, duration, no. of pod/plant, no. of seed per pod, 100 seed weight, oil content and yield 2) Salinity level at 15 days interval of sowing saline area.
14.	Investigator(s)	:	F. Begum, M. M. Karim, P.Roy and concern scientist of OFRD
15.	Season	:	Rabi
16.	Date of initiation	:	November, 2022
17	Date of completion	:	February,2023
18.	Expected output/benefit	:	Soybean production will be increased in southern region of Bangladesh.
19.	Location	:	Chadpur and Noakhali
20.	Status	:	2nd year
21.	Estimated cost	:	Tk. 20,000/location
22.	Source of fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and soil management
03.	**Experiment 10**	:	**Performance of sunflower varieties in southern region of Bangladesh**
04.	Objective (s)	:	To identify the suitable variety of sunflower for southern region.
05.	Rationale	:	Out of 2.85 million hectares of the coastal and offshore areas of Bangladesh about 0.83 million hectares are arable lands. This arable land is more than 30% of the total cultivable lands. Agricultural land use in the coastal districts is very poor. The major part of this land is affected by different gradient of salinity. Salinity causes unfavorable environment and hydrological situation that restrict normal crop production throughout the year. The cultivation of dry season crop in this situation requires suitable crops and agronomic options suitable for early planting in the excess moist soil, (more than field capacity) which is unable to plough to increase the productivity and cropping intensity. The cultivation of sunflower may be suitable in this environment because of its high yield as well as its extensive adaptability and acclimation, high photosynthesis potential and high harvest index. According to water stress day index, sunflower and soybean were determined as a moderately sensitive crop to salinity. With the above point of view this experiment was under taken to find out the suitable sunflower variety for costal area.
06.	Materials and Methods	:	Variety: 3
07.	Crop/variety	:	Sunflower
08.	Design	:	RCB
	i) Treatment	:	Sunflower varieties:2 (BARI Surjamukhi-2 & BARI Surjamukhi-3 and Hyssun
	ii) Replications	:	3
09.	Plot size	:	5 m x 3 m.
10.	Planting system /spacing	:	Sunflower: 50 cm. X25 cm.
11.	Fertilizer dose and methods of application	:	Sunflower: 90:35:80:30:3.6 NPKSZn kg/ha. Half of urea and all the other fertilizers should applied during final land preparation. Rest of the urea should applied in equal amounts at 25 & 50 days after emergence.
12.	Irrigated/rainfed	:	3 times irrigation at 30, 50 & 70 days after sowing
13.	Data to be recorded	:	3) Sunflower: Days of first flowering, plant height, duration, single head weight, no. of seed per head, head diameter, 100 seed weight, oil content and yield 4) Salinity level at 15 days interval of sowing saline area.
14.	Investigator(s)	:	F. Begum, M. M. Karim , P.Roy and concern scientist of OFRD
15.	Season	:	Rabi
16.	Date of initiation	:	November, 2022
17.	Date of completion	:	February,2023
18.	Expected output/benefit	:	Sunflower production will be increased in southern region of Bangladesh.
19.	Location	:	Barisal, Potuakhali and Shatkhira
20.	Status	:	2nd year
21.	Estimated cost	:	Tk. 30,000/location
22.	Source of fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 11**	**:**	**Performance of groundnut and sesame varieties at charland areas in Bangladesh**
04.	Objectives	:	To see the performance of groundnut and sesame varieties for charland areas.
05.	Rationale	:	Groundnut and sesame are an important oilseed crop. Farmers of different char areas of Bangladesh grow groundnut after receding of flood water and sesame cultivates in Kharif-1 season. They cultivate their local variety, as a result, they get poor yield. If replace their variety by BARI developed HYV, the farmers of the char area will be benefited. Therefore, the experiment will be conducted to see the performance of groundnut and sesame varieties for char areas of Bangladesh.
06.	Procedure/methods	:	Treatment: 6
07.	Crop/Variety	:	Groundnut and sesame
08.	Design	:	RCB
	i)Treatment	:	BARIChinabadam-8, 9 &10 and BARITil-3, BARITil-4 and BARITil-5
	ii) Replications		3
09.	Planting system	:	Line sowing
10.	Plot size	:	5mX6m
11.	Fertilizer dose & Methods of application	:	Recommended dose (Based on FRG 2005) ½ N and full quantity of other fertilizers will be applied as basal. Remaining N will be top dressed at flowering stage and covered with soil followed by irrigation. In case of rainfed, all fertilizer will be applied as basal.
12.	Irrigated/ rainfed	:	Rainfed
13.	Data to be recorded	:	Yield and yield components of groundnut and sesame
14.	Investigator(s)	:	F. Begum, M. M. Karim and concerned scientist of OFRD (Faridpur and Kustia)
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2022
17.	Date of completion	:	June,20 23
18.	Expt.out put/benefit	:	Suitable varieties of groundnut and sesame for charland areas will be find out.
19.	Location	:	Faridpur and Kustia
20.	Status	:	2nd year
21.	Estimated cost	:	20,000/- X2= 60000/-
22.	Source of fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 12**	**:**	**Validation of intercropping of fenugreek with groundnut in hilly areas**
04.	Objectives	:	To identify the suitable row arrangement of fenugreek with groundnut for higher productivity and profit in hilly areas
05.	Rationale	:	The hilly area consists of a series of anti-clinical ridges running parallel to one another and tending to the north-east direction. The climate of the region is sub-tropical monsoon. Hot and humid rainy season alternates with dry and cool winter. The prolonged winter climate might be suitable for the growth and development winter crop like groundnut. Groundnut (Arachis hypogaea L.) is the second important oilseed crop that covered a considerable area in Bangladesh

			and it is a long durated crop. On the other hand, fenugreek is a very important and valuble spices crop which is usually grown as sole and in some cases as intercrop in farmers field in various parts of Bangladesh. As the spacing for groundnut cultivation is 40 cm X 15 cm, so there is a scope to intercrop fenugreek with groundnut. This might be economically beneficial for the farmers. Hence this experiment will be undertaken to find out the optimum row arrangement of fenugreek for intercropping with groundnut for higher productivity and return.
06.	Procedure/methods	:	Treatment: 4
07.	Crop/Variety	:	Groundnut (BARI Chinabadam-8) and Fenugreek (BARI Methi -1)
08.	Design	:	RCB
	i)Treatment		Treatment : 4 T_1 = Sole groundnut T_2 = One row of Fenugreek (15cmX10cm) in between two normal rows of g.nut (40cmX15cm) T_3 = Two rows of Fenugreek in between two normal rows of g.nut T_4= Sole Fenugreek
	ii) Replications		3
09.	Planting system	:	Line sowing
10.	Plot size	:	4mX5m
11.	Fertilizer dose & Methods of application	:	For sole groundnut & intercrop: 45-36-75-30-2-1-.6 kg/ha NPKSZnBMo. ½ N and full quantity of other fertilizers will be applied as basal. Remaining N will be top dressed at flowering stage and covered with soil followed by irrigation.
12.	Irrigated/ rainfed	:	Irrigated
13.	Data to be recorded	:	Yield and yield component of groundnut and Fenugreek, groundnut equivalent yield, cost benefit analysis
14.	Investigator(s)	:	P.Roy, M.M.Karim , F. Begum and Concerned scientist of OFRD, Bandarban
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2022
17.	Date of completion	:	May, 2023
18.	Expt.out put/benefit	:	Total productivity will be increased and farmers will be benefited in terms of economic return
19.	Location	:	Bandarban
20.	Status	:	2nd year
21.	Estimated cost	:	20,000/-
22.	Source of fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 13**	**:**	**Validation of intercropping fenugreek with groundnut in haor areas**
04.	Objectives	:	To identify the suitable row arrangement of fenugreek with groundnut for higher productivity and profit in haor areas.
05.	Rationale	:	Haors with their unique hydro-ecological characteristics are large bowl shaped floodplain depressions located in the north-eastern region of Bangladesh covering about 1.99 million ha of area and accommodating about 19.37 million people. Total 373 haors cover an area of about 858,000 ha which is around 43% of the total area of the haor region. Agriculture and fisheries are the main base of the diversified economic resources of the area. A total of about 0.71 million ha of net cultivable land is available in this area, which produces more than 5.25 million tons of paddy each year. However,

			sudden intrusion of flash flood may destroy agricultural production from about 0.33million ha, worth Tk. 3,486 million or 3% of the national agricultural contribution to the GDP (UNDP,2012). Agriculture is the principal livelihood of the farmers who practice mono-agriculture. This single crop remains under the constant threat of partial to complete damage from the early onrush of flash floods. Such a situation intercropping might be a option to minimize the sudden loss of farmers doing monoculture. Groundnut (*Arachis hypogaea* L.) is the second important oilseed crop that covered a considerable area in Bangladesh and it is a long durated crop. On the other hand, fenugreek is a very important and valuable spices crop which is usually grown as sole and in some cases as intercrop in farmers field in various parts of Bangladesh. As the spacing for groundnut cultivation is 40 cm X 15 cm, so there is a scope to intercrop fenugreek with groundnut. This might be economically beneficial for the farmers. Hence this experiment will be undertaken to find out the optimum row arrangement of fenugreek for intercropping with groundnut for higher productivity and return.
06.	Procedure/methods	:	Treatment: 4
07.	Crop/Variety	:	Groundnut (BARI Chinabadam-8) and fenugreek (BARI Methi-1)
08.	Design	:	RCB
	i)Treatment		Treatment : 4 T1 = Sole groundnut T2 = Sole fenugreek T3 = 100%gnut+1 row of fenugreek in between two normal rows of g.nut at 40 cm plant to plant distance T4 = 100% gnut+1 row of fenugreek in between two rows of g.nut at 60 cm plant to plant distance
	ii) Replications		3
09.	Planting system	:	Line sowing
10.	Plot size	:	5m X 6m
11.	Fertilizer dose & Methods of application	:	Recommended dose (Based on FRG 2018) ½ N and full quantity of other fertilizers will be applied as basal. Remaining N will be top dressed at flowering stage and covered with soil followed by irrigation.
12.	Irrigated/ rainfed	:	Irrigated
13.	Data to be recorded	:	Yield and yield component of groundnut and fenugreek, groundnut equivalent yield, cost benefit analysis
14.	Investigator(s)	:	F. Begum, M.M.Karim, P. Roy and Concerned scientist of OFRD (Moulabhibazar, Keshoregonj and Sunamganj)
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2020
17.	Date of completion	:	May, 2022
18.	Expt. out put/benefit	:	Total productivity will be increased and farmers will be benefited in terms of economic return
19.	Location	:	Keshoregonj, Sunamganj and Moulovibazar
20.	Status	:	2nd year
21.	Estimated cost	:	15,000/- X3= 45000/-
22.	Source of fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 14**	:	**Effect of different tillage conditions on growth and yield of soybean varieties in southern region of Bangladesh**
04.	Objective(s)	:	i) To identify the suitable tillage practices on BARI developed soybean varieties ii) To increase the yield and farmers' income from soybean cultivation in southern region of Bangladesh.
05.	Rationale	:	The agro-ecosystem of the southern region of Bangladesh is comprised of both saline and non saline tidal wetlands. Rahman (2015) reported that about 29.45% and 55.10% lands remain fallow in *Rabi* and *Kharif*-1 seasons, respectively after harvesting of previous T.*aman* rice mainly due to delaying harvest of T.*aman* rice, salinity, drought, tidal flooding, lack of suitable adaptation technologies and so on. Cropping intensity may be increased in very slight and slightly saline areas by adopting proper soil and water management practices with the introduction of different salt tolerant crop or varieties. Soybean (*Glycine max* L) is also one of the most important oilseed crops and the area under this crop is increasing in the coastal region. The major cropping pattern in southern coastal region is T.*aman*–Fallow/*Rabi* crops-Fallow. Cultivation of long duration local T.*aman* rice varieties (e.g. *Sadamota, Lalmota* etc.) need more time (even upto the mid week of January) to become maturity. Nevertheless, after recession of tidal water, conventional tillage only possible when it attains at the field capacity (*joh* condition) but it is needed more time for proper land preparation before sowing of subsequent *Rabi* crops. Delay planting of *Rabi* crops produces cause poor yields and economic return due to increasing temperature, soil salinity and drought stress conditions. The crop experiences high temperature with the advancement of growth stages which reduces the duration for grain-filling and dry matter accumulation resulting in small grain size (Thompson, 1986). On the other hand, the natural calamities (like cyclone, heavy rainfall, hail storm etc.) affect the delay planting *Rabi* crops that deteriorates the crop yield severely. Zero tillage sowing is very ideal for transplanting of sunflower seedling especially for the low-lying areas for saving the tillage cost and timely establishment of the crop. Under zero tillage condition sunflower seedling can be transplanted in moist soil in optimum time just after receding of excess water. By reducing the turnaround time to a minimum, zero-tillage can get crop planted on time and thus increase yield without greater input cost (Hobbs and Gupta, 2003). Zero or minimum tillage will ensure the timely establishment of soybean crop plant, which may increase the yield and farmers' income. Early establishment would protect the crop from the impacts of severe soil salinity, drought and natural calamities at its terminal growth stage. Zero or minimum tillage will also reduce the turn-around period (from harvest of previous T.*aman* rice to make conventional tillage). Bangladesh Agricultural Research Institute (BARI) has developed a good number of soyben varietes like BARI Soybean-5, 6 etc. that can be introduced in the existing cropping systems in southern region. However, the performances of varieties are yet to be examined under different tillage conditions in terms of phenology, growth and yield. Keeping the above view in mind, an experiment will be undertaken to evaluate the performances of soybean varieties under different tillage conditions under rice based cropping systems in southern region of Bangladesh.

06.	Materials and methods	:	The experiment will be conducted during *Rabi* season under zero tillage condition at RARS, Rahmatpur, Barishal.
07.	Crop/variety	:	Soybean: Bangladesh Soybean-4, BARI Soybean-5 and 6
08.	Design :	:	RCBD (Factorial)
	i) Treatment	:	Factor A. Tillage condition: 3 (three) T_1 = Conventional tillage T_2 = Minimum tillage T_3 = Zero tillage (relay cropping with T.*aman* rice) Factor B. Soybean varieties: 3 (three) V_1 = Shohag V_2 = BARI Soybean-5 V_3 = BARI Soybean-6
	ii) Replications	:	3 (Three)
09.	Plot size	:	4m × 3m
10.	Planting system /spacing	:	Relay cropping: Seeds will be sown through broadcasting at the rate of 30 kg/ha. Minimum/conventional tillage: Seeds will be sown in rows following row to row distance 30 cm and plant to plant 5 cm.
11.	Fertilizer dose and methods of application	:	60-175-120-115-10 kg/ha urea, TSP, MoP, gypsum and boric acid, respectively along with 5 t/ha cowdung (BARI, 2020). All type of chemical fertilizers and cowdung will be applied as basal. Seeds will be treated with Provex 200 @ 3g/kg seed to control seed borne disease before sowing.
12.	Irrigated/rainfed	:	Irrigated
13.	Data to be recorded	:	Phenological parameters: Days to flowering and maturity Growth parameters: Leaf area and dry matter partitioning at 15 days interval, photosynthess, light interception etc Yield parameters: Yield components and yield
14.	Investigator(s)	:	M.A. Rahman, F. Begum and R.R. Saha
15.	Season	:	Rabi
16.	Date of initiation	:	November 2022
17.	Date of completion	:	May 2023
18.	Expected output/ benefit	:	Increased yield and farmers' income from soybean cultivation.
19.	Location	:	RARS, BARI, Rahmatpur, Barishal
20.	Status	:	2nd year
21.	Estimated cost	:	Tk. 80,000/-
22.	Source of fund	:	BARI
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 15**	**:**	**Effect of sowing time and methods on the yield of Mustard in south-western saline areas**
04.	Objectives	:	i. To find out optimum sowing time for the selected mustard cultivars in saline areas ii. To observe the effect of different sowing methods on mustard yield in saline areas iii. To know the performance of mechanized mustard production
05.	Rationale	:	The constraints of oilseed expansion are largely related to use of long duration aman varieties, and inadequate knowledge of crop management under saline conditions. In coastal Bangladesh, planting of dry season crops is often delayed until January or even February because water remains on the land until December, at which time the weather becomes cold and foggy, and it is only after the weather starts to warm up in the later part of January that significant soil drying starts to take place. On the other hand, it is also seen that grain yield

			reduced gradually with the advancement of delay of sowing. Production of any crops is influenced by several factors, of which sowing method is very important. Deep tillage improves the physical, chemical and biological properties of soil carried out an experiment on mustard in saline field at Agricultural Research Institute (ARI), Pakistan. Sarkees (2013) reported that maximum total yield of 1091.9 kg ha^{-1} was obtained when crop was grown by drill-row sowing, which was significantly higher (140.9%) than broadcasting method. In coastal areas of Bangladesh, excessive tillage results in late planting and reduces yields of mustard. This ploughing takes time and often results in late planting and decline in mustard yield potential, plus many other negative effects (Hobbs & Gupta 2003, 2004). Cultivation using a two-wheel, tractor operated power tiller is only possible once the topsoil has dried below field capacity. As a result, valuable soil moisture is lost while waiting for the soil to dry, and the late planted crops are exposed to damaging levels of soil and water salinity in March and April. Further, these late planted crops are at risk of being damaged by pre-monsoon rains that start from early May. Early planting, preferably in November and December, is essential to prevent the crops from exposure to increasing soil salinity and the pre-monsoon rains. In the case of small seeded crops like mustard, early planting can be achieved by broadcast sowing shortly prior to rice harvest.(Rashid et al. 2012a). The relay cropping of mustard in moist soil on 10- 12 days before of t. aman harvest may create opportunity to reduce the cost of land preparation and timely planting mustard and boro (Rashid et al. 2012a). Mustard can be relayed with T.aman to ensure the right sowing time. The productivity and quality of mustard and rapeseeds can be improved by proper adjustment of variety, sowing time and technique. Keeping this view in mind the present experiment will be undertaken.
06.	Materials and methods	:	Treatment combination: 12 (Factor A :3; Factor B :3)
07.	Crop/Variety	:	BARI Sharisha -11
08.	Design	:	RCB (two factor)
	i)Treatment		**Main plot (Factor A)** **Sub plot (Factor B)** S_1=Farmers practice (Sowing after tillage) T_1 = 30th November S_2 = Broadcasting at zero tillage T_2 = 15th December S_3 = Sowing by PTOS T_3 = 30th December
	ii) Replications		03 (Three)
09.	Plot size	:	5m x 6m
10.	Planting system	:	Line sowing
11.	Fertilizer dose & Methods of application	:	As per STB following FRG 2018
12.	Irrigated/ rainfed	:	Irrigated
13.	Data to be recorded	:	Initial plant population/m^2, final plant population/ m^2, 2. Growth parameter (data will be collected at 15 days interval after seed germination): plant height (cm), no of leaves, days to flowering & days to maturity, LAI, CGR, TDM, SPAD, 3.Yield and yield attributing data: silique length (cm), seeds/siliqua, siliqua/plant, 1000 seeds wt.(g), seed yield (t/ha), stover yield (t/ha).
14.	Investigator (s)	:	O. A. Fakir, F. Begum, M.M.Karim and M. M. Hossain
15.	Season	:	Rabi
16.	Date of initiation	:	November, 2022
17.	Date of completion	:	February, 2023
18.	Expt. out put/benefit	:	Yield sustainability for mustard by managing planting time and method in saline soil
19.	Location	:	ARS, BARI, Satkhira.

20.	Status	:	2nd year
21.	Estimated cost	:	50000/-
22.	Source of fund	:	BARI
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03	**Experiment 16**	**:**	**Performance of mustard varieties in Barind tract areas**
04	Objectives	:	To select suitable genotype of mustard for Barind areas.
05	Rationale	:	Rapeseed-Mustard is a principal oilseed crop, which play a significant role in the national economy of Bangladesh and it is grown widely in tropical and subtropical areas (Ashri 2010; Bedigian and Harlan 1986). It is mainly grown in rabi season in dry-wet transition period. In Barind area, generally farmers grow T.aman rice under rainfed condition. It was observed that after harvest of T.aman most of the area remains fallow. After T.aman harvest, we can easily introduce mustard variety. So that there is a scope of cultivation mustard to increase crop productivity and cropping intensity. BARI has already released some mustard varieties. Therefore, the experiment will be conducted to select mustard varieties suitable for barind areas of Bangladesh.
06	Procedure/methods	:	Treatment: Varieties/lines: 3
07	Crop/Variety	:	Mustard
08	Design	:	RCB
	i)Treatment	:	Mustard: BARI Sarisha- 18, BARI Sarisha- 19 & BARI Sarisha- 20
	ii) Replications	:	3
09	Planting system	:	Line sowing Mustard: 30 cm x 5 cm
10	Plot size	:	4 m x 5 m
11	Fertilizer dose & Methods of application	:	For Mustard:120-34-45-30-1.8 NPKSB kg/ha, ½ N and full quantity of other fertilizers will be applied as basal. Remaining N will be top dressed at flowering stage and covered with soil followed by irrigation. In case of rainfed, all fertilizer will be applied as basal.
12	Irrigated/ rainfed	:	Rainfed
13	Data to be recorded	:	Yield and yield components of Mustard as well as flowering behavior, pod setting.
14	Investigator(s)	:	F. Begum, P. Roy, S. Hossain and concerned scientists of OFRD, Bogura
15	Season		Rabi
16	Date of initiation	:	October, 2022
17	Date of completion		February, 2023
18	Expt. out put/benefit	:	Suitable genotypes of mustard for barind will be screened out for higher productivity
19	Location	:	Joypurhat and Rajshahi
20	Status	:	1st year
21	Estimated cost	:	40,000/-
22	Source of fund	:	BARI
23	Priority	:	1st

Sub-Project III: Yield Maximization

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Crop Management
03	**Experiment 17**	:	**Performance of selected linseed genotypes under salinity condition in pot culture**
04	Objective(s)	:	To select salt tolerant linseed genotypes under salinity condition
05	Rationale	:	In Bangladesh coastal areas occupy almost thirty percent of the net cultivable land. Almost 0.84 million hectares of coastal land is affected by salinity of varying degrees (Karim *et al*., 1990). Linseed is one of the minor oil crops in Bangladesh which can be grown in the coastal area. Linseed is getting its popularity day by day in saline region of Bangladesh. In Oilseed Research Centre, around 30 genotypes were screened under hogland solution from last 2 years. From this 30 genotypes, five genotypes of linseed performed better under saline condition in hogland solution. So, it is necessary to observe their performance in saline area. Keeping this in mind, the experiment will be conducted in salinity under pot culture to examine the variation in salt tolerance of selected linseed genotypes up to maturity.
06	Materials and methods	:	Materials (5)
07	Crop/Variety	:	Selected genotypes of linseed
08	Design	:	RCB
	i) Treatment	:	No. of genotypes: (5)
	ii) Replications	:	3
09	Plot Size	:	3mX4m
10	Planting system/spacing	:	Row to row distance 30cm, continuous sowing
11	Fertilizer dose & methods of application	:	35-25-25 NPK kg/ha ½ N and all other fertilizer will be applied as basal and remaining N will be top dressed at pre-flowering stage (20-22 DAE).
12	Irrigated/Rainfed	:	Irrigated
13	Data to be recorded	:	Soil salinity levels at 15 days interval, plant height, TDM, yield and yield components of linseed
14	Investigator(s)	:	F. Begum and P.Roy
15	Season	:	Rabi
16	Date of initiation	:	November, 2022.
17	Date of completion	:	March, 2023
18	Expected output/ Benefit	:	Selection of salt tolerant linseed line/variety will be explored under saline condition
19	Location	:	ORC,BARI
20	Status	:	2nd year
21	Estimated cost	:	Tk. 25,000/-
22	Source of fund	:	BARI
23	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 18**	:	**Effect of seed priming on the yield and seed quality of groundnut (*Arachis hypogaea* L.)**
04.	Objective(s)	:	To find out the suitable seed priming method for better crop establishment and shortening the crop growth period of groundnut at field condition.
05.	Rationale	:	Groundnut (*Arachis hypogaea* L.) is one of the important oilseed crops of Bangladesh. The overall productivity of this crop is low. The poor vigour and viability of seeds with adverse environmental conditions and improper storage facilities may result in poor crop establishment and non availability of certified fresh seed and use of low quality seeds ultimately decreased yield. In these circumstances,

			seed priming treatments may help in proper crop establishment and to avoid the loss in the yield (*Limbani A. K.*, 2007). A number of seed quality enhancements treatments have shown better seedling performance and crop establishment and ultimately increased yield in several crops, including groundnut. By using priming method, can minimize the seedling emergence time in the field and total crop duration will be shortened (*Narayanaswamy S. et al*., 2012). In view of this, the present study will be undertaken to find out the effect of seed priming and suitable method of priming for better crop establishment and shortening the crop growth period in groundnut.
06.	Materials and methods	:	Varieties: 2 Priming treatment: 3
07.	Crop/ varieties	:	BARI Chinabadam-8 and BARI Chinabadam-10
08.	Design	:	RCB
	Treatment	:	T_1- Control (No priming) T_2- Seeds soaked in tap water for 6 hr followed by shade drying, T_3- Seeds soaked in tap water for 12 hr followed by shade drying
	Replication	:	3
09.	Plot Size	:	4mx3m
10.	Planting system/ spacing	:	Line sowing
11.	Fertilizer dose & application method	:	Recommended dose: 45-36-75-30-2-1-.6 kg/ha NPKSZnBMo. Half N and full quantity of other fertilizers will be applied as basal. Remaining N will be top dressed at flowering stage and covered with soil followed by irrigation.
12.	Irrigation/rainfed	:	Irrigated
13.	Data To be recorded	:	Germination percentage, germination speed, seedling dry weight (mg), vigour index and electrical conductivity (dSm-1) and field emergence % data will be recorded.
14.	Investigators	:	P.Roy, F. Begum and M.M.Karim
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2022
17.	Date of completion		August, 2023
18.	Expected Output/Benefit	:	Selection of suitable priming method for better crop establishment and shortening of growing period of groundnut at field condition.
19.	Location	:	Joydebpur
20.	Status	:	2nd year
21.	Estimated Cost	:	Tk.50,000/-
22.	Sources of Fund	:	BARI
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 19**	:	**Effect of spacing on growth and yield of perilla**
04.	Objective(s)	:	To find out the suitable spacing of perilla. To find out the growth, yield, and yield component of perilla.
05.	Rationale	:	Perilla oil (*Deulgireum*) is a edible vegetable oil derived from perilla seeds. Having a distinct nutty aroma and taste. Each 100gm oil contains energy 884 kcal, fat 100mg, 64g omega-3 & 14g omega-6, Moreover it contains 38-45% lipids. Beside, edible oil, it could also be used various industrial purpose like paints, varnishes, printing ink, waterproof coating on cloth, fuel etc. Perilla cake can be used as natural fertilizer or animal feed. Oil seed research centre of BARI have been included perilla as oilseed crop. But it cultivation procedure like spacing still now unknown. Considering this the experiment will be undertaken to find out the optimum spacing for cultivation of perilla.

06.	Materials and methods	:	Treatment: Spacing :5 T_1= 40cm×40cm T_2=45cm×40cm T_3= 50cm×40cm (recommended) T_4= 55cm×55cm T_5=Broadcasting
07.	Crop/Variety	:	SAU Perilla-1
08.	Design	:	RCB
	i) Replications	:	3
09.	Plot Size	:	4mX3m
10.	Planting system/spacing	:	As per treatment
11.	Fertilizer dose & methods of application	:	Fertilizer at the rate of (N_{138} P_{35} K_{50} S_{32} $Zn_{2.5}$ B_7) kg/ha in the form of Urea, TSP, Mop, Zypsum, Zinc sulphate & Boric acid, will be applied. Full amount of TSP, Mop, Zypsum, Zic sulphate, boric acid and half of urea will be broadcasted in the plot at the time of final land preparation. The rest half of urea will be applied 40 days after seedling emergence at vegetative stage.
12.	Irrigated/Rainfed	:	Irrigated.
13.	Data to be recorded	:	1. Initial plant population/m^2, final plant population/ m^2, 2. Growth parameter (data will be collected at 15 days interval after seed germination): plant height (cm), no of leaves per plant, days to flowering & days to maturity, LAI, CGR, TDM, SPAD, 3.Yield and yield attributing data: silique length (cm), seeds/siliqua, siliqua/plant, 1000 seeds wt.(g), seed yield (t/ha), stover yield (t/ha).
14.	Investigator(s)	:	M.M.Karim, F. Begum and P. Roy
15.	Season	:	Rabi
16.	Date of initiation	:	November, 2022
17.	Date of completion	:	February, 2023
18.	Expected output/ Benefit	:	Farmers will be benefited with desire yield by adopting optimum spacing of perilla
19.	Location	:	Joydebpur
20.	Status	:	2nd year
21.	Estimated cost	:	Tk. 15,000/-
22.	Source of fund	:	BARI
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 20**	:	**Effect of planting time on yield and seed quality of perilla**
04.	Objective (s)	:	To determine optimum planting time for maximizing yield of perilla.
05.	Rationale	:	About 48.21 lakh metric tonnes of edible oil is imported every year to meet the demand of 51.28 lakh metric tonnes of edible oil in Bangladesh. Scientists believe that the cultivation of new edible oil crops will bring about unimaginable changes in the country's economy. Perilla is established as a new oil crop in Bangladesh which is beneficial for the body, this oil does not contain any harmful uric acid. Moreover, oil can be extracted in the domestic method. Besides this, edible oil crops are usually cultivated during the Rabi season. But due to less competition in the cultivation of Perila in Kharif-2, it will be relatively advantageous to meet the demand for edible oil products. However, recently Oilseed Research Centre, BARI demonstrated an observation trial on perilla where sowing time was rabi season. Crop establishment and yield were considerable on that season too. So there is a prospect for expansion of perilla cultivation in Bangladesh in both the season rabi and kharif. To keep this in mind, this experiment will be conducted to find out the optimum

			planting time of perilla for getting maximum yield.
06.	Materials and methods	:	Date of sowing: 12
07.	Crop/ varieties	:	SAU Perilla-1
08.	Design	:	RCB
	Treatment	:	Date of sowing: 12 August 2022, September 2022, October 2022, November 2022, December 2022, January 2023, February 2023, March 2023, April 2023, May 2023, June 2023 & July 2023
	Replications		3
09.	Plot Size	:	5m x 4m
10.	Planting system/spacing	:	Line sowing, spacing 50cm (line to line)x40cm(plant to plant)
11.	Fertilizer dose & application method	:	Fertilizer at the rate of (N_{138} P_{35} K_{50} S_{32} $Zn_{2.5}$ B_7) kg/ha in the form of Urea, TSP, Mop, Zypsum, Zinc sulphate & Boric acid, will be applied. Full amount of TSP, Mop, Zypsum, Zic sulphate, boric acid and half of urea will be broadcasted in the plot at the time of final land preparation. The rest half of urea will be applied 40 days after seedling emergence.
12.	Irrigation/rainfed	:	Irrigated
13.	Data To be recorded	:	1. Initial plant population/m^2, final plant population/ m^2, 2. Growth parameter (data will be collected at 15 days interval after seed germination): plant height (cm), no of leaves, days to flowering & days to maturity, LAI, CGR, TDM, SPAD, 3.Yield and yield attributing data: head diameter (cm), seeds/head, mature seeds/head, 100 seed wt.(kg), seed yield (t/ha), stover yield (t/ha).
14.	Investigators	:	F. Begum and P.Roy
15.	Season	:	Rabi
16.	Date of initiation	:	August, 2022
17.	Date of completion		July, 2023
18.	Expected Output/ Benefit	:	Optimum sowing time for maximum yield of perilla may be ascertained.
19.	Location	:	Gazipur
20.	Status	:	2nd year
21.	Estimated Cost	:	Tk. 50,000/-
22.	Sources of Fund	:	EPOC Project
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 21**	:	**Effect of spacing on growth and yield of BARI soybean-7**
04.	Objective(s)	:	To determine optimum spacing for maximizing the yield of soybean genotype as well as economic return.
05.	Rationale	:	Soybean is a leguminous crop. It becomes a high potential crop in our country due to its multipurpose use like soya milk, soya naget, fish, cattle and poultry feed etc. It contain high protein (80-85%) and 19-22% oil. BARI has recently released a soybean variety named BARI soyabean-7 which is YMV (Yellow Mosaic Virus) tolerant and have a yield potential. As a new variety we have to know the some informations reading spacing, because spacing is a important factor to boost up the yield of soybean. Considering above factors this experiment was undertaken to know the optimum spacing of BARI soyabean-7.
06.	Materials and methods	:	Five spacing
07.	Crop/variety	:	BARI Soybean-7
08.	Design :	:	RCB

	i) Treatment	:	T_1= 40cm × 10cm. T_2 = 35cm ×1 0cm. T_3 = 30cm × 10cm. T_4 = 40cm × 5cm. T_5 = 45cm × 10cm.
	ii) Replications	:	3 (Three)
09.	Plot size	:	4m × 5m
10.	Planting system /spacing	:	Line sowing
11.	Fertilizer dose and methods of application	:	N-P-K-S-B : 28-35-60-23-2 kg/ha respectively. All amount of the fertilizer will be applied during final land preparation.
12.	Irrigated/rainfed	:	Irrigated
13.	Data to be recorded	:	Growth, yield and yield contributing characters.
14.	Investigator(s)	:	M M Karim, F Begum & P Roy
15.	Season	:	Rabi
16.	Date of initiation	:	December 2022
17.	Date of completion	:	February 2023
18.	Expected output/ benefit	:	Identify optimum spacing for boosting crop yield as well as economic return.
19.	Location	:	Joydebpur
20.	Status	:	2nd year
21.	Estimated cost	:	50,000/-
22.	Source of fund	:	EPOC Project
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and soil management
03.	**Experiment 22**	:	**Effect of transplanting time on yield and seed quality of sunflower variety**
04.	Objective (s)	:	To determine optimum transplanting time for maximizing yield of sunflower variety
05.	Rationale	:	Sunflower is emerged as a promising potential oilseed crop because of its special characteristics viz., wider adaptability to varied climatic conditions, photo insensitivity, low seed rate, high yield potential, short duration, response to applied nutrients, high quality oil content, high seed multiplication ratio and its easy cultivation. The lower productivity of crop is mainly ascribed to cultivation of sunflower in less fertile marginal lands under low and uncertain rainfall situations with low and imbalanced use of fertilizers (Ramulu *et al*., 2011).In Bangladesh it is an important minor oilseed crop. Sunflower is a thermo neutral crop, therefore can be grown both in Rabi and Kharif seasons. Moreover, the relative tolerant to drought and saline condition would encourage its cultivation in the problem area. So there is a prospect for expansion of sunflower cultivation in Bangladesh. Oilseed Research Centre of BARI recently developed some dwarf lines of sunflower. In the southern region of Bangladesh, sowing of sunflower is delayed due to late maturity of aman rice as well as late drainage of soil moisture. Although short duration aman varieties are developed by BRRI but still farmers are using their local practices, as a result sunflower sowing is delaying. In this situation transplanting of sunflower seeding might be an option. To keep this in mind, this experiment was designed to maintain the optimum sowing time of sunflower by scheduling different transplanting dates for getting maximum yield.
06.	Materials and methods	:	Date of transplanting: 6
07.	Crop/ varieties	:	BARI Sunflower-3
08.	Design	:	RCB

	Treatment	:	Date of transplanting: 5 5 November 15 November 25 November 5 December and 15 December, 2021 (Seedling age will be -15 days)
	Replications		3
09.	Plot Size	:	4m x 3m
10.	Planting system/spacing	:	Line sowing, spacing 50x30cm
11.	Fertilizer dose & application method	:	Fertilizers will be applied at the rate of $N_{88}P_{34}K_{80}S_{28}Zn_3B_2$ kgha^{-1} in the form of urea, TSP, MOP, gypsum, zinc oxide and boric acid, respectively. Full amount of triple super phosphate, muriate of potash, gypsum, zinc oxide, boric acid and half of urea will be broadcasted in the experimental plot at the time of final land preparation. The rest half of urea will be applied in equal amounts at 30 & 55 days after sowing (DAS).
12.	Irrigation/rainfed	:	Irrigated
13.	Data To be recorded	:	1. Initial plant population/m^2, final plant population/ m^2, 2. Growth parameter (data will be collected at 15 days interval after seed germination): plant height (cm), no of leaves, days to flowering & days to maturity, LAI, CGR, TDM, SPAD, 3.Yield and yield attributing data: head diameter (cm), seeds/head, mature seeds/head, 100 seed wt.(kg), seed yield (t/ha), stover yield (t/ha).
14.	Investigators	:	P.Roy, F. Begum and M.M.Karim
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2020
17.	Date of completion		March, 2023
18.	Expected Output/ Benefit	:	Suitable transplanting time for maximum yield of sunflower may be ascertained for the coastal area of Bangladesh.
19.	Location	:	Gazipur
20.	Status	:	3rd year
21.	Estimated Cost	:	Tk. 50,000/-
22.	Sources of Fund	:	BARI
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and soil management
03.	**Experiment 23**	:	**Growth and maturity pattern of different mustard genotypes**
04.	Objective (s)	:	To determine growth rate and maturity pattern of three different genotypes of mustard
05.	Rationale	:	Rapeseed-mustard is a major oilseed crop in Bangladesh. The Oilseed Research Centre, BARI has already developed 18 rapeseed and mustard varieties which comprises four brassica species. Maturity pattern of these varieties varied from 80 to 120 days. To fit well in the existing rice based cropping pattern it is important to notify the actual maturity period of these species of mustard. Thus, this experiment will be undertaken to identify suitable genotypes with high yield potential and wider adaptability to fit in existing cropping pattern.
06.	Materials and methods	:	Species:3 Genotype:9
07.	Crop/ varieties	:	Mustard
08.	Design	:	RCB
	Treatment	:	Species 3 (*Brassica napus* and *juncea*) Genotypes:9 (3 from each species)
	Replications	:	3
09.	Plot Size	:	4m x 3m

10.	Planting system/spacing	:	Line sowing
11.	Fertilizer dose & application method	:	Fertilizers at the rate of $N_{115}P_{33}K_{42}S_{26}Zn_{1.8}B_{1.7}$ kg/ha in the form of urea, TSP, MOP, gypsum, zinc sulphate and boric acid, respectively will be applied. Half of urea and full amount of other fertilizers wii be broadcasted in the experimental plot at the time of final land preparation. The rest half of urea will be applied 25-30 days after sowing (pre-flowering stage).
12.	Irrigation/rainfed	:	Irrigated
13.	Data To be recorded	:	1. Initial plant population/m^2, final plant population/ m^2, 2. Growth parameter (data will be collected at 15 days interval after seed germination): plant height (cm), no of leaves, days to flowering & days to maturity, LAI, CGR, TDM, SPAD, 3.Yield and yield attributing data: siliqua length (cm), silique/plant, seeds/siliqua, 1000 seed wt.(kg), seed yield (t/ha), stover yield (t/ha)., 4. Photosynthesis at different growth stages
14.	Investigators	:	P.Roy, F. Begum and M.M.Karim
15.	Season	:	Rabi
16.	Date of initiation	:	November, 2020
17.	Date of completion		March, 2023
18.	Expected Output/Benefit	:	Actual maturity time of mustard with photo-synthetically efficient varieties will be identified for farmers with wider adaptability in existing cropping pattern.
19.	Location	:	Gazipur
20.	Status	:	3rd year
21.	Estimated Cost	:	Tk. 50,000/-
22.	Sources of Fund	:	BARI
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and soil management
03.	**Experiment 24**	:	**Study on branching behavior of sunflower variety**
04.	Objective (s)	:	to observe the branching behavior of sunflower under different conditions for getting maximum yield.
05.	Rationale	:	Sunflower is emerged as a promising potential oilseed crop because of its special characteristics viz., wider adaptability to varied climatic conditions, photo insensitivity, low seed rate, high yield potential, short duration, response to applied nutrients, high quality oil content, high seed multiplication ratio and its easy cultivation. The lower productivity of crop is mainly ascribed to cultivation of sunflower in less fertile marginal lands under low and uncertain rainfall situations with low and imbalanced use of fertilizers (Ramulu *et al*., 2011).In Bangladesh it is an important minor oilseed crop. Sunflower is a thermo neutral crop, therefore can be grown both in Rabi and Kharif seasons. Moreover, the relative tolerant to drought and saline condition would encourage its cultivation in the problem area. So there is a prospect for expansion of sunflower cultivation in Bangladesh. Oilseed Research Centre of BARI recently developed some dwarf lines of sunflower. In the southern region of Bangladesh, sowing of sunflower is delayed due to late maturity of aman rice as well as late drainage of soil moisture. Although short duration aman varieties are developed by BRRI but still farmers are using their local practices, as a result sunflower sowing is delaying. From last 3 years trial on different experiments of ORC field it was observed that BARI Sunflower-3 showed branching behaviour. In this situation study on this branching tendency of sunflower might be an option to unveil the main reason behind this. To keep this in mind, this experiment was designed to

			observe the branching behavior of sunflower under different conditions for getting maximum yield.
06.	Materials and methods	:	
07.	Crop/ varieties	:	BARI Sunflower-3
08.	Design	:	RCB
	Treatment	:	7 1. Control 2. 15 days seedlings will be transplanted 3. Seeds from branching plants will sown 4. No irrigation 5. Irrigation at vegetative stage 6. Irrigation at flowering stage 7. Irrigation at seed development stage
	Replications		3
09.	Plot Size	:	4m x 3m
10.	Planting system/spacing	:	Line sowing, spacing 50x30cm
11.	Fertilizer dose & application method	:	Fertilizers will be applied at the rate of $N_{88}P_{34}K_{80}S_{28}Zn_3B_2$ kgha^{-1} in the form of urea, TSP, MOP, gypsum, zinc oxide and boric acid, respectively. Full amount of triple super phosphate, muriate of potash, gypsum, zinc oxide, boric acid and half of urea will be broadcasted in the experimental plot at the time of final land preparation. The rest half of urea will be applied in equal amounts at 30 & 55 days after sowing (DAS).
12.	Irrigation/rainfed	:	Irrigated
13.	Data To be recorded	:	1. Initial plant population/m^2, final plant population/ m^2, 2. Growth parameter (data will be collected at 15 days interval after seed germination): plant height (cm), no of leaves, days to flowering & days to maturity, LAI, CGR, TDM, SPAD, 3.Yield and yield attributing data: head diameter (cm), seeds/head, mature seeds/head, 100 seed wt.(kg), seed yield (t/ha), stover yield (t/ha).
14.	Investigators	:	P.Roy, F. Begum and M.M.Karim
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2022
17.	Date of completion		March, 2023
18.	Expected Output/ Benefit	:	Information on branching behaviour of newly released sunflower variety will be gathered and might be used for attaining the maximum yield of sunflower for the coastal area of Bangladesh.
19.	Location	:	Gazipur
20.	Status	:	New
21.	Estimated Cost	:	Tk. 50,000/-
22.	Sources of Fund	:	BARI
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 25**	:	**Effect of two different plant growth regulators on production traits of sunflower**
04.	Objective(s)	:	The objectives of this study were to evaluate the effect of foliar application of two different plant growth regulators on seed yield and oil content of sunflower.
05.	Rationale	:	Sunflower (*Helianthus annuus* L.) currently is the world's fourth most important oil crop with a harvested area of about 25 million hectares in which 36 million tons of seeds are produced on average. The climatic condition of Bangladesh is suitable for sunflower cultivation. The seed of sunflower is the source of high quality vegetable oil which contains high level of unsaturated fatty acids and free from toxic constituents

			such as linolenic acid and trans fatty acid. In Bangladesh it is important minor oilseed crop. Plant growth regulators are the chemical substances, when applied in small amounts modify the growth of plants by stimulating or inhibiting part of the natural growth regulatory system. About 60 plant growth regulators are now commercially available and several of them have reached considerable importance in crop production. Though plant growth regulator have great potentialities, its application and actual assessments ete. Have to be judiciously planned in terms of optimal concentrations, stage of application etc. for obtaining higher seed yield and quality (koreet al, 2003). Quality seed determines the stability of yields in crops. Keeping in this view, the present experiment has been undertaken with the objective to know the effect of plant growth regulators on seed yield and oil content of sunflower.
06.	Materials and methods	:	-
07.	Crop/Variety	:	BARI Surjamukhi-3
08.	Design	:	RCB
	Treatment	:	Treatments: 7 i) IAA 100 ppm, ii) IAA 150ppm, iii) IAA 200ppm, iv) GA_3 100ppm, v) GA_3 150ppm, vi) GA_3 200ppm and vii) Control
	Replications	:	3
09.	Plot Size	:	3 m X 2.4m
10.	Planting system/spacing	:	Line sowing: 30cm x 5cm
11.	Fertilizer dose & methods of application	:	NPKS: 50-28-23-1.8-1.8 kg/ha respectively will be applied. Half nitrogen and full amount other fertilizers will be applied at basal. Rest amount of nitrogen will be applied at flowering stage.
12.	Irrigated/Rainfed	:	Irrigated
13.	Data to be recorded	:	Yield and yield attributes and oil contents of sunflower
14.	Investigator(s)	:	M A H Khan, M O Kaisar, P. Roy and F. Begum
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2022
17.	Date of completion	:	March, 2023
18.	Expected output/ Benefit	:	Impact of growth regulators on the yield and oil content of sunflower will be find out.
19.	Location	:	RARS, Cumilla
20.	Status	:	2nd year
21.	Estimated cost	:	Tk. 40,000/-
22.	Source of fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 26**	:	**Field Performance Evaluation of BARI Seeder for Oil Seed Crops**
04.	Objective(s)	:	i) To study the field performances of BARI Seeder for oil seed crops in farmers' field ii) To make economic analysis of machine at farmers' socio-economic conditions
05.	Rationale	:	Mechanical seeding is an emerging technology to the farmers of Bangladesh. It can till soil and sow seed in line by a single pass which can minimize the turnaround time. It is becoming important to minimize the cost of land preparation, environmental pollution, maintain soil health and timeliness of operation. Upland crops like maize, wheat, jute, vegetables, pulses and oil seeds can be cultivated with this seeder. But the farmers of Bangladesh are still practicing broadcasting method of seed sowing by conventional tillage. Small

			seeds like oilseeds are easy for continuous sowing but laborious to sow in line. But for large seeds groundnut are difficult to sow in hill at a certain distance. Seed metering devices of BARI Seeder are suitable for continuous sowing of small seeds and also suitable for large surface seeds. Demand of sowing oil seed crop by machine is increasing day by day. A power tiller operated seeder has been developed by FMP Engineering Division of BARI. By using the seeder, number of tillage operations as well as time and money could be saved significantly which should be evaluated in different locations and for different oil crops. Considering the above facts, a programme on Field Performance Evaluation of BARI Seeder for oil seed crops in farmers' field.
06.	Materials and methods	:	BARI seeder will be evaluated for seeding mustard, groundnut, Sunflower and Soybean in different locations of the country.
07.	Crop/Variety	:	Mustard, Groundnut, Sunflower and Soybean
08.	Design	:	RCB
	Treatments	:	T_1 = Mechanical line seeding with BARI seeder, T_2= Manual seeding in line, T_3= Conventional broadcasting.
	Replications	:	4
09.	Plot Size	:	-
10.	Planting system/spacing	:	-
11.	Fertilizer dose & methods of application	:	-
12.	Irrigated/Rainfed	:	-
13.	Data to be recorded	:	Agronomic and economic data will be collected according to a standard test code and analysis will be done.
14.	Investigator(s)	:	M A Hoque, P. Roy, M Karim and F. Begum
15.	Season	:	Rabi
16.	Date of initiation	:	November, 2022
17.	Date of completion	:	April, 2023
18.	Expected output/ Benefit	:	Reduce planting cost and turnaround time
19.	Location	:	Joydebpur, Barishal, Jamalpur, Ishuirdi, Burirhat, Alamnagar, Pabna and Jashore
20.	Status	:	1st year
21.	Estimated cost	:	Tk. 1,00,000/-
22.	Source of fund	:	BARI
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 27**	:	**Design and development of sunflower oil-expeller machine**
04.	Objective(s)	:	i) To design and fabricate a power operated sunflower oil-expeller ii) To evaluate the performance of the expeller over existing available expeller
05.	Rationale	:	The oil extracted from sunflower seeds is a good source of vegetable oil for cooking, manufacturing of margarine, paints, soaps, and cosmetics. In addition to the oil, edible proteins can be obtained from the cake for human being consumption. At the local level, the cake can be boiled or fried for the table, or used in the preparation of edible cake called Kosei in Hausa, Akara in Yoruba, Moin-moin, Robo, soup ingredient etc. The cake is also a good source of protein in the manufacture of furfural in yeast, alcohol production and as fuel. The most common method of extracting edible oil from oilseeds is mechanical pressing of oilseeds (Mrema and McNulty, 1985). This method ensures extraction of a non-contaminated, protein-rich low fat cake at a relatively low-cost. However, mechanical presses do not have

			high extraction efficiencies, about 8 + 14% of the available oil in the cake are left un-extracted (Srikantha, 1980). Efforts are been made to design and development of sunflower oil expeller through modification and optimization of existing oil-expeller
06.	Materials and methods	:	The main components of the oil expeller will be frame, cake outlet, expeller housing, heating compartment, auger, hopper, auger pulley and Various components of the oil expeller were designed using standard formula. The frame was constructed from 50 x 90 x 50 mm channel and 40 x 40 mm angle bar to give rigidity and stability that will withstand load and vibration. The machine will powered by an electric motor or IC engine via pulley arrangement connected to the main shaft that| turns the screw conveyor. The steam generator, which will constructed of thick pipe, imbedded in is electric heating element and coupled to the heating compartment by an inlet pipe and steam return pipe with water jacket to condense the steam.
07.	Crop/Variety	:	BARI Surjamukhi-3
08.	Design	:	
	i) Replications	:	
09.	Plot Size	:	
10.	Planting system/spacing	:	
11.	Fertilizer dose & methods of application	:	
12.	Irrigated/Rainfed	:	
13.	Data to be recorded	:	Speed (rpm), Through put seed weight (g), Oil Yield (g), Cake yield (g), Expected Oil Yield (g), Expelling Efficiency (%)
14.	Investigator(s)	:	M A Rahman, M Alimur Rahman, P. Roy and F. Begum
15.	Season	:	Rabi
16.	Date of initiation	:	August, 2022
17.	Date of completion	:	January, 2023
18.	Expected output/ Benefit	:	Reduce production cost, operational time and drudgery
19.	Location	:	RARS, Rahmatpur, Barishal
20.	Status	:	New
21.	Estimated cost	:	Tk. 1, 50,000/-
22.	Source of fund	:	EPOC
23.	Priority	:	1st

01.	Programme	:	Oilseed Crops Improvement
02.	Project	:	Crop and Soil Management
03.	**Experiment 28**	:	**Effect of irrigation on growth and yield of Canola type mustard variety**
04.	Objective(s)	:	i) To study the effect of different irrigation regimes on the growth and yield of canola type mustard variety. ii) To identify critical growth stages for irrigation of canola type mustard variety.
05.	Rationale	:	In regions where water scarcity is the principal limiting factor for cultivation, farmers are interested in growing crops that are able to adapt to drought conditions (Bannayan *et al.*, 2008). Mustard is a crop that fits well in the existing cropping system. Crop growth rate (CGR) and crop growth duration along with other vegetative and reproductive parameters have significance for development of high yielding variety. Information regarding dry matter accumulation, leaf area index (LAI), crop growth rate and duration are some of the key parameters for evaluation of cultivars (Soriano *et al.*, 2004; Nadjafi, 2006). There was positive correlation between maximum CGR, total LAD, number of fertile seed head^{-1} and concentration of oil in the achene and yield of

			achenes. Substantially high yields could be obtained from irrigated mustard, provided suitable varieties and irrigation techniques are used. Hybrid cultivars having high seed cost can give the highest yield only when irrigated (Flagella *et al*., 2002). In view, a field experiment will be conducted to study the effect of different irrigation regimes at different growth stages on the growth and yield of canola type mustard variety.
06.	Materials and methods	:	Treatment: Irrigation level: 5 1. Irrigation as and when necessary 2. Irrigation at vegetative and flowering stage 3. Irrigation at vegetative and seed development stage 4. Irrigation at flowering and seed development stage 5. Irrigation at vegetative, flowering and seed development stage
07.	Crop/Variety	:	BARI Sharisha-18
08.	Design	:	RCB
	i) Replications	:	3
09.	Plot Size	:	4mX3m
10.	Planting system/spacing	:	Line sowing, row to row 30 cm
11.	Fertilizer dose & methods of application	:	Fertilizers at the rate of $N_{115}P_{33}K_{42}S_{26}Zn_{1.8}B_{1.7}$ kg/ha in the form of urea, TSP, MOP, gypsum, zinc sulphate and boric acid, respectively will be applied. Half of urea and full amount of other fertilizers will be broadcasted in the experimental plot at the time of final land preparation. The rest half of urea will be applied 25-30 days after sowing (pre-flowering stage).
12.	Irrigated/Rainfed	:	Irrigated
13.	Data to be recorded	:	1. Initial plant population/m^2, final plant population/ m^2, 2. Growth parameter (data will be collected at 15 days interval after seed germination): plant height (cm), no of leaves, days to flowering & days to maturity, LAI, CGR, TDM, SPAD, 3.Yield and yield attributing data: silique length (cm), seeds/siliqua, siliqua/plant, 1000 seeds wt.(g), seed yield (t/ha), stover yield (t/ha).
14.	Investigator(s)	:	P. Roy, F. Begum and concern scientist of seed technology
15.	Season	:	Rabi
16.	Date of initiation	:	October, 2022
17.	Date of completion	:	March, 2023
18.	Expected output/ Benefit	:	Farmers will be benefited with desire yield by applying proper irrigation at different growth stages of canola type mustard
19.	Location	:	Joydebpur
20.	Status	:	3rd year
21.	Estimated cost	:	Tk. 50,000/-
22.	Source of fund	:	BARI
23.	Priority	:	1st

PROJECT III: DISEASE MANAGEMENT

Sub-Project I: Survey of oilseed crop diseases

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Disease Management
03	**Experiment 01**	**:**	**Survey of oilseed crop diseases and their existing disease management practices**
04	Objectives	:	i) To assess disease status of the crop ii) To identify the different diseases of the crop iii) To know the present status of disease management practice of the farmers
05	Rationale	:	The ever increasing population of Bangladesh demands the maximization of oilseed production to meet their need of edible oil. To achieve this there is no alternative to increase production of oilseed per unit area of land. Occurrence of widespread diseases in major oilseed crops is among the major problems. Various diseases attack oilseed crop including fungi, bacteria, virus and nematodes. They may causes considerable yield loss under favorable conditions. Some of the diseases are known and well documented but still many are new or appear sporadically. Some are important in a particular areas. Farmers of our country still lack in managing the disease problem of their crops. Sometimes they left unmanaged or managed incorrectly. Beside the knowledge of important diseases the knowledge of farmers in controlling the disease is essential to know. The information generated from this study will help in disease management activities as well as national extension systems, by identifying what types of actions might be required to promote more effective and sustainable management of oilseed crops diseases. Considering above facts, the study will be undertaken to find out the status of diseases and existing management practices against major diseases of oilseed crops at farmer's field.
06	Materials and methods	:	Survey will be conducted in different areas of the country. Pathogen will be identified in the laboratory.
07	Crop/ variety	:	Mustard, Groundnut, Sesame, Sunflower, Soybean, Linseed, Niger and Safflower
08	Design Treatment Replications	: : :	During survey a prescribe sheet will be filled up
09	Plots size	:	N/A
10	Planting system/spacing	:	N/A
11	Fertilizer dose / methods of application	:	N/A
12	Irrigated/rainfed	:	N/A
13	Data to be recorded	:	Crop, variety, area, disease incidence, disease severity and farmers disease management practices
14	Investigators	:	Concern scientist of ORC
15	Season	:	2022-23 crop season
16	Date of initiation	:	December, 2022
17	Date of completion	:	July, 2023
18	Expected output/benefit	:	The generated information will help to prepare disease management approach and finally will increase the yield of oilseed crops.
19	Location	:	All over the country
20	Status	:	New
21	Estimated cost	:	2,00,000/-
22	Source of fund	:	BARI
23	Priority	:	1st

Sub-Project II: Disease Management of rapeseed-mustard

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Disease Management
03	**Experiment. 02**	:	**Screening of rapeseed-mustard varieties/lines against *Alternaria* leaf blight disease**
04	Objectives	:	i) To find out the resistant source(s) against *Alternaria* leaf blight disease of mustard ii) The selected resistant lines will be advanced as variety or utilize in the breeding programme
05	Rationale	:	Mustard (*Brassica* sp.) is the important oilseed crops in Bangladesh. The oilseed production in Bangladesh largely dependent on mustard and rapeseed. Many factors contribute to the low yield of mustard. Diseases play an important role in reducing the quality and quantity of mustard and rapeseed. Mustard and rapeseed suffer from 14 diseases in Bangladesh. *Alternaria* leaf blight is a serious problem for mustard cultivation. This disease causes blight of leaf, pod and stem. Severe blight cause force maturity of the crop. This disease causes severe yield loss 30-60% in Bangladesh (Meah *at. al*., 1988, Fakir,1980).This disease may be control effectively by using fungicides but it may cause environmental hazard**.** True resistant is not yet identified in any available materials of the country. However, continuous screening practice is necessary to identify any resistant material which will be valuable source for resistant breeding.
06	Materials and methods	:	Rapeseed-mustard lines (Advanced lines and lines selected for PYT, RYT and adaptive trials) will be grown in the screening field of ORC, BARI, Joydebpur. After every two test lines seeds of highly susceptible variety Tori-7 will be sown.
07	Crop/ variety	:	Advanced lines of mustard
08	Design Treatment Replications	: : :	RCB No. of line: 40-50 3
09	Plot size	:	2 rows of 3m long
10	Planting system/spacing	:	Line sowing with 30 cm x 5 cm spacing
11	Fertilizer dose / methods of application	:	As per Recommendation
12	Irrigated/ rainfed	:	Irrigated
13	Data to be recorded	:	Disease data will be recorded following 0-5 scoring scale. Twenty plants in each line will be randomly selected for data collection. Number of pod / plant and yield/ plant (g) will be recorded.
14	Investigator(s)	:	Concern scientist of ORC
15	Season	:	Rabi
16	Data of initiation	:	November 2022
17	Date of completion	:	March 2023
18	Expected output / benefit	:	The resistant genotype may be released as variety or may be used in hybridization.
19	Location	:	ORC, BARI, Joydebpur
20	Status	:	2nd year
21	Estimated cost	:	TK. 50,000/-
22	Source of fund	:	BARI
23	Priority	:	1st

01	Programme	**:**	Oilseed Crops Improvement
02	Project	**:**	Disease Management
03	**Experiment 03**	**:**	**Evaluation of different group of commercial fungicides against Alterneria blight disease of mustard**
04	Objectives	:	i) To find out the most effective fungicides in controlling Alterneria blight disease of mustard ii) To increase seed yield of mustard
05	Rationale	:	*Alternaria* blight, reported in the early 20th centruy (Fawceltt, 1909), is one of the most widespread fungal disease of Brassicaceae crops and exists in almost every country worldwide. Blight of mustard caused by *Alternaria brassicae* (Brek) zacc. is one of the major diseases of mustard in Bangladesh. It occur quite regularly every year during the cropping season (October-March). The disease caused blight of leaf, pod and stem (meah et al, 1986; Bari, 1988), and seed abnormalities (Howlider et al;' 1991). This disease is seed borne, soil borne and also air borne. This disease causes an average yield loss of 40-70% in India (Vishwanath and kolt, 1997) and 30-60%in Bangladesh (Meah e*t. al*., 1988, Fakir, 1980). In addition to direct losses of yield the disease adversely affects the seed quality reducing seed size, seed discoloration and reduction in oil contents (Howlider *et al*., 1991; Kaushik *et al.*, 1984). Rovral (Iprodion) is using as an effective fungicide in controlling the disease for a long time. But it is necessary to find out another effective fungicides to control the disease. Therefore, this experiment has been designed to find out another effective group(s) of fungicides.
06	Materials and methods	:	Available fungicides of different group(s) will be evaluated.
07	Crop/ variety	:	Tori-7
08	Design Treatment Replications	: : :	RCB 10-12 3
09	Plots size	:	3m X 1.5m
10	Planting system/spacing	:	Line sowing with 30 cm x 5 cm spacing
11	Fertilizer dose / methods of application	:	As per Recommendation
12	Irrigated/rainfed	:	Irrigated
13	Data to be recorded	:	Disease data will be recorded following 0-5 scoring scale, yield and yield contributing characters will be recorded.
14	Investigators	:	Concern scientist of ORC
15	Season	:	Rabi
16	Date of initiation	:	November 2022
17	Date of completion	:	March 2023
18	Expected output/benefit	:	Best fungicide will be identified and thus the farmer will be benefited
19	Location	:	ORC, BARI, Joydebpur
20	Status	:	2nd
21	Estimated cost	:	50,000/-
22	Source of fund	:	BARI
23	Priority	:	1st

Sub-Project III: Disease Management of groundnut

01	Programme	:	Oilseed Crops Improvement
02	Project	:	Disease Management
03	**Experiment. 04**	:	**Screening of groundnut varieties/lines against Tikka, rust and other soil born diseases**
04	Objectives	:	i) To find out the resistant source(s) against Tikk**a** (leaf spot), rust and other soil born diseases of groundnut ii) The selected resistant lines will be utilize as variety or use in the breeding programme
05	Rationale	:	Groundnut (*Arachis hypogaea*) is an important oil legume crop cultivated in Bangladesh. More than 40 fungal diseases have been reported on groundnut (Jackson and Bell 1969); but in Bangladesh, the crop is subjected to attack by more than a dozen of diseases (Talukder 1974, Anon. 1984). Among them, Tikka (leaf spot) caused by *Cercospora arachidicola* Hori. and *Cercosporidium personatum* Berk. and Curt. and rust caused by *Puccinia arachidis* Speg. are serious foliar fungal diseases (Fakir 1980, Khaleque 1985). Losses in nut yield due to the diseases were recorded to be above 70% (Subrahmanyam *et al.* 1980). This disease may be control effectively by using fungicides but it may cause environmental hazard. Now a days incidence of soil born diseases caused by *Sclerotium rolfsii***,** *Sclerotinia sclerotiorum, Rhizoctonia solani* and *Fusarium spp.* Are increasing. These soil born diseases are very difficult to control. True resistant against these diseases is not yet identified in any available materials of the country. However, continuous screening practice is necessary to identify any resistant material which will be valuable source for resistant breeding.
06	Materials and methods	:	Groundnut lines (Advanced lines and lines selected for PYT, RYT and adaptive trials) will be grown in the screening field of ORC, BARI, Joydebpur. After every two test lines seeds of highly susceptible variety Dhaka-1 will be sown.
07	Crop/ variety	:	Advanced lines of groundnut
08	Design Treatment Replications	: : :	RCB No. of line: 40 3
09	Plot size	:	2 rows of 3m long
10	Planting system/spacing	:	Line sowing with 30 cm x 5 cm spacing
11	Fertilizer dose / methods of application	:	As per Recommendation
12	Irrigated/ rainfed	:	Irrigated
13	Data to be recorded	:	Disease data will be recorded following 0-5 scoring scale. Twenty plants in each line will be randomly selected for data collection. Number of pod / plant and yield/ plant (g) will be recorded.
14	Investigator(s)	:	Concern scientist of ORC
15	Season	:	Rabi
16	Data of initiation	:	December 2022
17	Date of completion	:	May 2023
18	Expected output / benefit	:	The resistant genotype may be released as variety or may be used in hybridization.
19	Location	:	ORC, BARI, Joydebpur
20	Status	:	2nd
21	Estimated cost	:	TK. 50,000/-
22	Source of fund	:	BARI
23	Priority	:	1st

01	Programme	**:**	Oilseed Crops Improvement
02	Project	**:**	Disease Management
03	**Experiment 05**	**:**	**Evaluation of different group of commercial fungicides against Tikka (leaf spot) and rust disease of groundnut (*Arachis hypogaea*)**
04	Objectives	:	i) To find out effective fungicides in controlling Tikka (leaf spot) and rust disease of groundnut ii) To increase seed yield of groundnut
05	Rationale	:	Groundnut (*Arachis hypogaea*) is an important oil legume crop cultivated in Bangladesh. More than 40 fungal diseases have been reported on groundnut (Jackson and Bell 1969); but in Bangladesh, the crop is subjected to attack by more than a dozen of diseases (Talukder 1974, Anon. 1984). Among them, Tikka (leaf spot) caused by *Cercospora arachidicola* Hori. and *Cercosporidium personatum* Berk. and Curt. and rust caused by *Puccinia arachidis* Speg. are serious foliar fungal diseases (Fakir 1980, Khaleque 1985). Losses in nut yield due to the diseases were recorded to be above 70% (Subrahmanyam *et al.* 1980). Some fungicides of different groups are using in controlling the disease for a long time. Now a days many fungicides of different groups are available in the market for controlling leaf spot and rust diseases of different crops. So, it is necessary to find out the most effective fungicides to control the diseases of groundnut. Therefore, this experiment has been designed to find out the most effective group(s) of fungicides.
06	Materials and methods	:	Available fungicides of different group(s) will be evaluated.
07	Crop/ variety	:	Dhaka-1
08	Design Treatment Replications	: : :	RCB 10-12 3
09	Plots size	:	3m X 1.5m
10	Planting system/spacing	:	Line sowing with 30 cm x 5 cm spacing
11	Fertilizer dose / methods of application	:	As per Recommendation
12	Irrigated/rainfed	:	Irrigated
13	Data to be recorded	:	Disease data will be recorded following 0-5 scoring scale, yield and yield contributing characters will be recorded.
14	Investigators	:	Concern scientist of ORC
15	Season	:	Rabi
16	Date of initiation	:	December 2022
17	Date of completion	:	May 2023
18	Expected output/benefit	:	Best fungicide will be identified and thus the farmer will be benefited
19	Location	:	ORC, BARI, Joydebpur
20	Status	:	2nd
21	Estimated cost	:	50,000/-
22	Source of fund	:	BARI
23	Priority	:	1st

PROJECT IV: INSECT PEST MANAGEMENT

1.	Programme	:	Oilseed Crops Improvement
2.	Project	:	Insect Pest Management
3.	**Experiment 01**	**:**	**Effect of insecticides on foraging behaviour of honeybee (*Apis mellifera* L.) on mustard (*Brassica rapa*)**
4.	Objective(s)	:	i) To know to the adverse effect of insecticides on honeybee ii) To determine the safe time for beekeeper to set their hive.
5.	Rationale	:	The western honeybee, *Apis mellifera* L., plays a significant economic role in pollinating a variety of self-pollinated plants, increasing the productivity and quality of commercially developed insect-pollinated crops as well. Recently declines of various pollinators including *A. mellifera* have been reported worldwide. Pesticides are a significant contributor among all environmental and anthropogenic factors thought to contribute to annual honey bee colony losses, even if many of these aspects are still being investigated. Thus, the present studies were, therefore, undertaken with a view to the adverse effect of some insecticides on foraging activity of bees.
6.	Materials and methods	:	Mustard seed, Mosquito net etc.
7.	Crop/ Variety	:	BARI Sarishar-14
8.	Design	:	
	i) Treatment	:	1) Imidacloprid 200SL@ 0.5ml/L of water 2) Thiamethoxam (Aktara 25 WG) @ 0.2 gm/L of water 3) Spinosad (Success 2.5 SC) @ 1.2 ml/L of water 5) Nimbecidine @ 4 gm/L of water 6) Untreated control
	ii) Replications	:	Four
9.	Plot size	:	4m X 3m
10.	Spacing	:	Row to Row distance 50 cm and plant to plant distance 30 cm
11.	Fertilizer dose and method of application	:	Appendix- 1, Recommended method
12.	Irrigation/ rainfed	:	As and when necessary.
13.	Data to be recorded	:	Number of honeybee, before and after insecticide spray,
14.	Investigator(s)	:	R. Islam, SSO and M A. Islam, SO, ORC, BARI Gazipur, Dr N A Pramanik, OFRD, Barind, Rajshahi.
15.	Season	:	Rabi, 2022-23
16.	Date of initiation	:	December, 2022
17.	Date of completion	:	April, 2023
18.	Expected output/ Benefit	:	Which insecticide/s are less toxic to bees, and optimum time for beekeepers to set their hive after spraying insecticides.
19.	Location	:	Joydebpur, Rajshahi
20.	Status	:	1st year
21.	Estimated cost	:	50,000/-
22.	Source of fund	:	BARI/ EPOC Project
23.	Priority	:	1st

1.	Programme	:	Oilseed Crops Improvement
2.	Project	:	Insect Pest Management
3.	**Experiment 02**	:	**Insect Pollinators and their role to yield of sunflower (*Helianthus annuus* L.)**
4.	Objective(s)	:	To identify the proper pollinating option for improving yield of sunflower
5.	Rationale	:	One of the most significant oilseed crops in the world, sunflower (*Helianthus annuus* L.) ranks third in terms of area after soybean and peanuts. The family Asteraceae (Compositae), which is native to Mexico and the Southern United States, includes cultivated sunflowers. Due to the high concentration of polyunsaturated fatty acids, it is a rich source of edible oil (40–52% of total oil content).It is a cross pollinated crop and produce high amount of pollen and necter. As a result, it attracts a wide range of insect but documentation of insect pollinators of sunflower scanty in our country. Pollination, however, is a major issue when growing sunflowers. Due to improper pollination services, sunflowers do not produce 100% of their seeds. As a result, the yield is decreased by up to 40%. In order to increase sunflower seed setting the current study undertaken to determine the optimal pollination techniques in sunflower.
6.	Materials and methods	:	Sunflower seeds, Mosquito net etc.
7.	Crop/ Variety	:	BARI Surjomukhi-3
8.	Design	:	
	i) Treatment	:	1) Open pollination 2) Bagging (mosquito net beg) 3) Bagging + Hand pollination
	ii) Replications	:	Three
9.	Plot size	:	4m X 3m
10.	Spacing	:	Row to Row distance 50 cm and plant to plant distance 30 cm
11.	Fertilizer dose and method of application	:	Appendix- 1, Recommended method
12.	Irrigation/ rainfed	:	As and when necessary.
13.	Data to be recorded	:	Number of healthy seed per head, number of unfilled seed , weight of total seed etc.
14.	Investigator(s)	:	R. Islam, SSO and M A. Islam SO, ORC, Dr. H. Habib, SSO, ORC BARI Gazipur
15.	Season	:	Rabi, 2022-23
16.	Date of initiation	:	December, 2022
17.	Date of completion	:	June, 2022
18.	Expected output/Benefit	:	Proper pollination option may be identified.
19.	Location	:	Joydebpur
20.	Status	:	1st year
21.	Estimated cost	:	50,000/-
22.	Source of fund	:	BARI/ EPOC Project
23.	Priority	:	1st

1.	Programme	:	Oilseed Crops Improvement
2.	Project	:	Insect Pest Management
3.	**Experiment 03**	:	**Development of IPM package against the major insect pests of sesame**
4.	Objectives	:	i)To find out the most effective management package(s) against insect pests of sesame ii)To record the incidence and damage severity of these pests
5.	Rationale	:	Sesame (*Sesamum indicum* L.) is the second important oilseed crop in Bangladesh. About 30 species of insect pest attack sesame crop in this country. Among them, Hairy caterpillar, Leaf roller and hawk moth are the most destructive and serious pests of sesame in Bangladesh. The caterpillar of these insects damages the crop by eating leaves, stems, flowers and also pod causing significantly yield losses (30-50%). So, developing an integrated management technique against those pests is essential for boosting up sesame production in the country.
6.	Materials and Methods	:	Sesame seed will be sown in the field during 1st week of March, 2023. Bio- pesticides and insecticides will be sprayed 2 times at intervals of 10 days commencing from first incidence of pest attack.
7.	Variety	:	BARI Till-4
8.	Design	:	RCB
	Treatment	:	T_1 (IPM Package-1) = Hand Picking of larvae + spraying Spinosad (Success 2.5 SC) @ 1.2 ml/L of water T_2(IPM Package-2) = Hand Picking of larvae + spraying Delegate (Spinetoram 11.7% SC) @ 1ml/L of water T_3(IPM Package-3) = Hand picking of larvae + spraying Bio-chamak (*Celastras angulatas* 1% EW) @ 2.5 ml/litre of water T_4 = Farmers practice (Spraying of Nitro 505 EC@ 1.0 ml/L of water) T_5 = Untreated control
	Replication	:	3
9.	Plot size	:	4m x 2m
10.	Spacing	:	Row to row 30 cm and continuous sowing
11.	Fertilizer dose/method	:	Appendix-1, Recommended method
12.	Irrigation/rainfed	:	As and when necessary
13.	Data to be recorded	:	Incidence of the pest, number of insect pest per plant, yield (kg/ha) will be recorded. Percent plant and leaf infestation before and after spraying will be recorded. Yield will also be recorded.
14.	Investigators	:	M A Islam, SO and R. Islam, SSO, ORC, Gazipur
15.	Season	:	Kharif, 2023
16.	Date of initiation	:	March, 2023
17.	Date of completion	:	August ,2023
18.	Expected output/benefit	:	Effective management package for the major insect pest of sesame will be developed
19.	Location	:	Joydebpur
20.	Status	:	2nd year
21.	Estimated cost	:	Tk. 50,000/-
22.	Source of fund	:	BARI/ EPOC Project
23.	Priority	:	1st

1.	Programme	:	Oilseed Crops Improvement
2.	Project	:	Insect Pest Management
3.	**Experiment 04**	:	**Relative susceptibility of groundnut cultivars against sucking insect pests, hairy caterpillar and leaf roller**
4.	Objective(s)	:	i) To identify the resistant groundnut variety(ies) to sucking pest, hairy caterpillar and leaf roller ii) To fit the resistant variety in the IPM package for managing those pests
5.	Rationale	:	BARI has developed a considerable number of groundnut varieties. These varieties are resistant to various insect pests and diseases to a certain level. But nowadays, the varieties are showing susceptibility to different sucking pest, Leaf roller (*Lamprosema indicata* Fab.) and Hairy caterpillar (*Spilarctia obliqua* Walk.) etc. in the field level. Due to the attack of those insect pests, the varieties can't produce desirable yield and farmers are losing economically. Therefore, in the present study has been designed to check the relative resistance of those BARI released groundnut varieties.
6.	Materials and methods	:	Groundnut seeds, sweeping net etc.
7.	Crop/ Variety	:	BARI released Groundnut varieties will be evaluated for susceptibility to above mentioned insect pests.
8.	Design	:	RCB
	Treatment	:	Number of entries to be available
	Replications	:	Three
9.	Plot size	:	4m X 3m
10.	Spacing	:	Row to Row distance 30 cm and plant to plant distance 5 cm
11.	Fertilizer dose and method of application	:	Appendix- 1, Recommended method
12.	Irrigation/ rainfed	:	As and when necessary.
13.	Data to be recorded	:	i) Number of healthy and sucking pest infested plants ii) Number of healthy and hairy caterpillar, leaf roller infested plant. iii) Weather data
14.	Investigator(s)	:	M A Islam, SO and R. Islam, SSO, ORC, Gazipur
15.	Season	:	Rabi, 2022-23
16.	Date of initiation	:	December, 2022
17.	Date of completion	:	June, 2023
18.	Expected output/ Benefit	:	Susceptible and resistant varieties of groundnut to target insect pests may be identified.
19.	Location	:	Joydebpur
20.	Status	:	2nd year
21.	Estimated cost	:	Tk. 50,000/-
22.	Source of fund	:	BARI/ EPOC Project
23.	Priority	:	1st

1.	Programme	:	Oilseed Crops Improvement
2.	Project	:	Insect Pest Management
3.	**Experiment 05**	:	**Survey on the insect pests of sunflower and documentation of their natural enemies**
4.	Objective(s)	:	i) To record the insect pests of sunflower with their natural enemies ii) To estimate the extent of damage by the major insect pests of sunflower.
5.	Rationale	:	A variety of insect pests infest sunflower and cause a significant decrease in yield. Vulnerability of the sunflower insect pests and diseases is one of the main hurdles towards its production. The information on insects attacking sunflower and their natural enemies is scanty in our country. For designing appropriate management package, documenting pest status and population fluctuation of insect pests of the sunflower are of great importance. Therefore, the present study has been designed to record the number of insect pests of sunflower along with their pest status and extent of damage, and associated natural enemies.
6.	Materials and methods	:	The survey will be carried out in three locations viz. Gazipur; Patuakhali and Jashore. Data on different insect pests of sunflower with their infestation rates will be taken at 15 days intervals.
7.	Crop/Variety	:	Sunflower Variety: BARI Surjamukhi-2/ BARI Surjamukhi-3
8.	Design	:	-
	i) Treatment	:	-
	ii) Replication	:	-
9.	Plot size	:	-
10.	Spacing	:	-
11.	Fertilizer dose and method of application	:	-
12.	Irrigation/ rainfed	:	
13.	Data to be recorded	:	Number of insects and natural enemies of sunflower will be counted at 15 days interval, % infestation by number, Weather data will be recorded during the whole study period.
14.	Investigators	:	M A Islam, SO and R. Islam, SSO, ORC, Gazipur
15.	Season	:	2022-23
16.	Date of initiation	:	October, 2022
17.	Date of completion	:	June, 2023
18.	Expected output/ Benefit	:	Major insect pests of sunflower and their natural enemies will be recorded and documented which will be supportive to develop appropriate management options.
19.	Locations	:	Gazipur, Patuakhali and Jashore.
20.	Status	:	2ndyear
21.	Estimated cost	:	Tk. 150,000/-
22.	Source of fund	:	BARI/ EPOC Project
23.	Priority	:	First

1.	Programme	:	Oilseed Crops Improvement
2.	Project	:	Insect Pest Management
3.	**Experiment 06**	:	**Development of a management approach against flea beetle attacking mustard**
4.	Objective(s)	:	i) To record the incidence of flea beetle in mustard ii) To estimate damage severity of the pests in mustard varieties.
5.	Rationale	:	Mustard is one of the most important oilseed crop in Bangladesh. But during cultivation flea beetle (*Phyllotreta s*sp. Coleoptera: Chrysomelidae) severely attack and causes huge loses of mustard production. Now-a-day's flea beetle is found to damage mustard crop on leaves and pods, respectively flea beetles are small oval-shaped beetles (2-3mm). The common name reflects their habit of jumping or hopping when disturbed flea beetles damage mostly 6 at seeding and early vegetative stages. It is a challenge to manage which is very difficult to forecast and can cause significant crop losses very quickly. Adult flea beetles make small circular pits in leaf tissue as they feed. Feeding at the early seedling stage can cause seedling mortality, reduced plant growth, delayed and uneven maturity and lower seed yield or grade. But no detailed information is available on its damage or crop loss especially in mustard crop in this country. Therefore the study has been designed.
6.	Materials and methods	:	The research work will be done in experimental field of ORC
7.	Crop/ Variety	:	BARI Sorisha-14
8.	Design	:	RCB
	Treatment	:	T_1= White sticky trap + Antario (Bt+abamectin) @ 1.0 ml/L of water, T_2= White sticky trap + Bio-chamak (Celastras angulatas 1% EW) @ 2.5 ml/litre of water, T_3= White sticky trap+ Spraying of Biotrin (0.5% Matrine) @ 1.5ml/L of water, T_4= White sticky trap+ Spraying of Spinosad (Success2.5 SC) @ 1.2 ml/ L of water, T_5= Spraying of Proclaim 5 SG (Emamectin benzoate) @ 0.5 g/L of water, T_6= Untreated control.
	Replications	:	Three
9.	Plot size	:	6m X 5m
10.	Spacing	:	Row to Row distance 30 cm and continuous sowing
11.	Fertilizer dose and method of application	:	Appendix- 1, Recommended method
12.	Irrigation/ rainfed	:	As and when necessary.
13.	Data to be recorded	:	Incidence of the pests, number of insects per plant, yield (Kg/ha) will be recorded. Percent infestation will be recorded. % infestation of plant and weather data will also be recorded during the study period.
14.	Investigator(s)	:	M A Islam, SO and R. Islam, SSO, ORC, Gazipur
15.	Season	:	Rabi, 2022-23
16.	Date of initiation	:	November, 2023
17.	Date of completion	:	June, 2023
18.	Expected output/ Benefit	:	Incidence damage severity of the flea beetle on mustard crop will be recorded.
19.	Location	:	Joydebpur

20.	Status	:	2nd year
21.	Estimated cost	:	Tk. 50,000/-
22.	Source of fund	:	BARI/ EPOC Project
23.	Priority	:	First

1.	Programme	:	Oilseed Crops Improvement
2.	Project	:	Insect Pest Management
3.	**Experiment 07**	:	**Relative susceptibility of soyabean varieties to sucking pest, hairy caterpillar and leaf roller**
4.	Objective	:	To identify the resistant soyabean variety(ies) to sucking pest, hairy caterpillar and leaf roller.
5.	Rationale	:	BARI has developed seven soyabean varieties for both winter seasons. These varieties are resistant to various insect pests and diseases to a certain level. But nowadays, the varieties are showing susceptibility to different sucking pest, Leaf roller (*Lamprosema indicata* Fab.) and Hairy caterpillar (*Spilarctia obliqua* Walk.) etc. in the field level. Due to the attack of those insect pests, the varieties can't produce desirable yield and farmers are losing economiclly. Therefore, in the present study has been designed to check the relative susceptibility of those BARI released soyabean varieties.
6.	Materials and methods	:	Soyabean seeds, sweeping net etc.
7.	Crop/ Variety	:	BARI released soyabean varieties will be evaluated for susceptibility to above mentioned insect pests.
8.	Design	:	RCB
	i) Treatment	:	Number of entries to be available
	ii) Replications	:	Three
9.	Plot size	:	5m X 4m
10.	Spacing	:	Row to Row distance 30 cm and plant to plant distance 5 cm
11.	Fertilizer dose and method of application	:	Appendix- 1, Recommended method
12.	Irrigation/ rainfed	:	As and when necessary.
13.	Data to be recorded	:	i) Number of healthy and sucking pest infested plants ii) Number of healthy and hairy caterpillar, leaf roller infested plant. iii) Weather data
14.	Investigator(s)	:	M A Islam, SO and R. Islam, SSO, ORC, Gazipur
15.	Season	:	Rabi, 2022-23
16.	Date of initiation	:	November, 2022
17.	Date of completion	:	June, 2023
18.	Expected output/ Benefit	:	Susceptible and resistant varieties of soyabean to target insect pests may be identified.
19.	Location	:	Joydebpur
20.	Status	:	3rd year
21.	Estimated cost	:	50,000/-
22.	Source of fund	:	BARI/ EPOC Project
23.	Priority	:	1st

1	Programme	:	Oilseed Crops Improvement
2	Project	:	Insect Pest Management
3	**Experiment 08.**	:	**Screening of rapeseed and mustard genotypes against aphid under natural field condition**
4	Objectives	:	i) To find out the tolerance genotypes against aphid ii) To observe the infestation time.
5	Rationale	:	Mustard aphid is the most destructive pest of rapeseed and mustard and a major limiting factor for successful cultivation of the crop in this country. They suck sap from leaves, inflorescence and pods; as a resulting stunted growth, flowers wither and pod formation is hindered. The losses of mustard due to aphids varied from 35-90 percent Farmers spray insecticides in their field indiscriminately. Management of these pests through cultivating tolerant /resistant genotype could be one of the best ways. So this experiment is designed to screen some genotype against mustard aphid.
6	Materials and methods	:	The experiment will be set in breeding plots under natural field condition. Susceptible variety will be sown in between three or four rows of every entries
7	Crop/Variety	:	Rapeseed and mustard genotypes
8	Design i)Treatment ii) Replications	: : :	RCB Thirty (25-30) entries of rapeseed and mustard genotypes 3
9	Plot size	:	3 m x 80cm
10	Spacing	:	Row to row distance 30 cm and continuous sowing
11	Fertilizer dose and method of application	:	Appendix-1, Recommended method
12	Irrigation/ rainfed	:	As and when necessary
13	Data to be recorded	:	Incidence of the pests, number of aphids per plant, yield (Kg/ha) will be recorded. Percent infestation will be recorded. Weather data will also be recorded during the study period.
14	Investigator(s)	:	R. Islam, SSO, and A. Islam SO, ORC, Joydebpur, Gazipur
15	Season	:	Rabi 2022-23
16	Date of initiation	:	December, 2022
17	Date of completion		February, 2023
18	Expected output / benefit	:	Aphid tolerance rapeseed and mustard genotypes with higher yield will be selected which could be used in future breeding program
19	Location	:	Joydebpur, Gazipur
20	Status	:	Routine work/new
21	Estimated cost	:	TK. 55,000/-x 1 = 55,000/-
22	Source of fund	:	BARI/EPOC
23	Priority	:	1 st

Project V: TECHNOLOGY TRANSFER PROGRAMME

To boost the production of oilseed crops, the Oilseed Research Center of BARI is always working to develop better oilseed production technology. Development of high-yielding, short-duration oilseed crop varieties and production technologies are among the enhanced technologies. Most of the varieties have not yet reached to the farmers. They do not apply irrigation and fertilizers for oilseeds cultivation. So, there exist huge yield gap between farmers field and research plot. There is a wide scope of increasing the total production of oilseed in the country by adopting new varieties and technologies by the farmers. Therefore, it is urgently needed to transfer modern technologies of oilseed crops to the farmers and all concern agencies. For quick dissemination of improved technologies, a number of technology transfer program have been proposed for 2022-23 cropping season.

SL No.	Title	Date	Location	Budget (lac Tk.) with source
1	**A. Training**			
	I. SAAO/SSA/SA/FA Training on Layout prepartion data collection seed production techniques of oilseed crops **Batch-02 (25 person/batch)**	December 2022 and May 2023	Gazipur and Barishal	TK. 1.5 'Enhancing Production of Oilseed Crops (EPOC)' Project (BARI Part)
	II. Farmer's training on improved varieties and production techniques of oilseed crops **Batch-18 (30 farmers/batch)**	10/09/22, 20/09/22, 28/10/22, November,22 - January 23	Jamalpur, Kishorgonj, Hathazari, Dinazpur, Jessore, Netrokona, Shatkhira, Gazipur, Tangail, Cumilla, Rajshahi, Faridpur, Sylhet, Patuakhali, Mymensing, Kustia, Sirajgonj etc.	TK. 9.00 EPOC Project (BARI Part)
2	**B. Field day** Productivity and Production Technology of newly developed variety Of oilseed crops No. of field days- 30 (80 persons/field day)	January – March 2023	Jamalpur, Kishorgonj, Hathazari, Dinazpur, Jessore, Netrokona, Shatkhira, Gazipur, Tangail, Cumilla, Rajshahi, Faridpur, Sylhet, Patuakhali, Mymensingh, Kustia, Sirajgonj etc.	TK. 15.00 EPOC Project (BARI Part)

C. PILOT PRODUCTION PROGRAM

Cropping pattern based Pilot Production Program will be conducted in the farmers' field. In cropping pattern, at least one oilseed crop must be included. Popular and recently developed varieties released by ORC of BARI will be included in pilot production program in order to popularize these varieties. OFRD of BARI will execute the pilot production program at the following locations (30 locations) and area of each location will be at least one hectare.

No. of locations	Name of locations
30	Gazipur, Manikgonj, Kishorgonj, Faridpur, Tangail, Sylhet, Hobigonj, Panchagar, Thakurgaon, Kurigram, Sherpur, Netrakona, Jamalpur, Pabna, Sirajgonj, Rangpur, Gaibandha, Bhola, Patuakhali, Khulna, Kumilla, Noakhali, Chandpur, Bandarban, Satkhira, Borguna, Mymensingh, Bogura, Kushtia, Rajshahi (Barind), Hathazari, Coxbazar, Chokoria, Khagrachari, Laxmipur, Satkhira, Jashore & Barishal.

No. of Pilot Production Program	:	30
Area of Pilot Production Program	:	01 ha
Estimated Cost	:	1,00,000/-x30 = 30,00,000/-
Source of Fund	:	'Enhancing Production of Oilseed Crops (EPOC)' Project (BARI Part)
Investigator	:	Concern scientists of OFRD, F. Begum, M.A.L Akanda

D. ADAPTIVE TRIAL/VALIDATION TRIAL

Cropping pattern based Adaptive Trials and Validation Trials will be conducted in the farmers' field. Advanced lines and technologies of different oilseed crops developed by ORC of BARI will be included in Adaptive and Validation Trials in order to release variety and technology. In addition, released varieties and technologies of ORC of BARI and other research organizations and institutions will be included in Validation Trials to see the performance of varieties and technologies. ORC and OFRD of BARI will execute the Adaptive and Validation Trials at the following locations (50 locations) and area of each location may be 0.5 hectare depending on trial size.

No. of locations	Name of locations
50	Jamalpur, Pabna, Sylhet, Rangpur, Jashore, Kumilla, Hathazari, Rajshahi (Barind), Faridpur, Netrakona, Patuakhali, Khulna, Noakhali, Satkhira & Kushtia

No. of Adaptive and Validation Trials	:	50
Area of Adaptive and Validation Trials	:	0.5 ha
Estimated Cost	:	50,000/-x 50= 25,00,000/-
Source of Fund	:	'Enhancing Production of Oilseed Crops (EPOC)' Project (BARI Part)
Investigator	:	Concern scientists of ORC & OFRD, F. Begum, M.A.L Akanda

Project VI: A. SEED PRODUCTION PROGRAM

Seed is the most essential commodity of crop production. For a successful crop production good quality seed, true to the variety is needed. Sometimes the genetic purity of a variety may be lost due to various reasons. Experienced breeders can maintain the genetic purity of the varieties through nucleus seed production. Bangladesh Agricultural Development Corporation (BADC) needs breeder's seed of the varieties to produce foundation seed and certified seed from the foundation seed. DAE and NGO require seed from BARI for demonstration purpose. Moreover, there is also demand of seeds for BARI Technology villages. Truthful Level Seed (TLS) can be supplied for these purposes. Keeping these in mind, the following nucleus seed, breeder's seed and TLS seed production programmes have been planned for 2022-23.

Breeder seed and TLS production

01 Plan/expt. no. 01	**:**	**Breeder seed & TLS production of rapeseed- mustard**
02 Objectives	:	i) To produce breeder seeds of modern varieties/advanced lines of rapeseed-mustard. ii) To supply seed to BADC, research divisions and other research organizations, NGOs, farmers etc.
03 Rationale	:	Seed is the basic tool of agricultural development. It is carrier of new technology and the principal means of secure crop production. Good quality seeds of any crops can play a key role for increasing per hectare yield and total production. Rapid seed multiplication helps to increase in agricultural production through quickest possible spread of new varieties developed by the plant breeders. Without quality seed the investment on fertilizer, water, pesticides and other inputs will not pay the required returns. So, seed production is urgently needed especially for oilseed crops. Breeders' seeds are supplied to the seed producing agency like BADC and TLS are supplied to the DAE, NGOs and farmers.
04 Materials and methods	:	Varieties/lines: 8
05 Spacing	:	40cm × 5 cm
06 Seed rate	:	8 kg/ha
07 Fertilizer dose	:	Appendix 1
08 Irrigation and cultural practices	:	As and when necessary and standard cultural practice would be followed.
09 Rouging	:	Rouging will be done at seedling, pre-flowering and pre-maturity stage
10 Data to be recorded	:	Days to flower, days to maturity and seed yield (kg/ha)
11 Locations and area		Joydebpur, Ishurdi, Jamalpur, Jashore, Hathazari, Rahamatpur, Bogura, Burirhut, Debigonj, Kumilla Dinajpur, & Thakurgaon

Breeder seed production of rapeseed-mustard

location	Variety and area (ha)								Total Area (ha)	Total cost (Tk)
	BARI Sar.-11 (ha)	BARI Sar.-14 (ha)	BARI Sar.-15 (ha)	BARI Sar.-16 (ha)	BARI Sar.-17 (ha)	BARI Sar.-18 (ha)	BARI Sar.-19 (ha)	BARI Sar.-20 (ha)		
Joydebpur	0.1	1.0	0.1	0.05	0.5	0.2	0.1	0.1	**2.15**	2,05,000
Ishurdi	0.1	0.2	0.1	-	0.1	-	-		**0.5**	50,000
Jamalpur	-	0.5	-	-	-	-	-		**0.6**	60,000
Jashore	0.1	0.1	-	-	0.1	-	-		**0.3**	30,000
Burirhat		0.1	-	-	-	-			**0.1**	10,000
Hathazari	-	0.1	-	-	-	-	-		**0.1**	10,000
Rahmatpur		0.1	-	-	-	-	-		**0.1**	10,000
Bogura	-	-	-	-	0.1	0.1	-		**0.2**	20,000
Debigonj	-	0.2	-	-	-	0.2	-		**0.4**	40,000
Kumilla	-	-	-	-	0.1	-	-		**0.1**	10,000
Dinajpur	-	-	-	-	0.1	-	-		**0.1**	10,000
Thakurgaon	-	-	-	-	0.1	-	-		**0.1**	10,000
Total area (ha)	**0.3**	**2.3**	**0.2**	**0.05**	**1.1**	**0.5**	**0.1**	**0.1**	**4.75**	**4,75,000**
Target (kg)	**360**	**2520**	**240**	**90**	**1320**	**900**	**120**	**120**	**5670**	

Truthful Level Seed production of rapeseed-mustard

location	BARI Sar.-14 (ha)	BARI Sar.-15 (ha)	BARI Sar.-17 (ha)	BARI Sar.-18 (ha)	BARI Sar.-19 (ha)	BARI Sar.-20 (ha)	Total Area (ha)	Total cost (Tk)
Joydebpur	-	-	-	-	**0.1**	**0.1**	**0.2**	
Jamalpur	1.0	-	-	-			**1.0**	1,00,000
Ishurdi	-	0.1	0.1	-			**0.2**	20,000
Hathazari	0.1	-	-	-			**0.1**	10,000
Rangpur	0.1	-	-	-			**0.1**	10,000
Dinajpur	-	-	0.1	-			**0.1**	10,000
Thakurgaon	-	-	0.1	-			**0.1**	10,000
Bogura	-	-	0.1	0.1			**0.2**	20,000
Debigonj	-	-	-	0.1			**0.1**	10,000
Total area (ha)	**1.2**	**0.1**	**0.4**	**0.2**	**0.1**	**0.1**	**2.1**	**2,10,0000**
Target (kg)	**1560**	**120**	**480**	**360**	**120**	**120**	**2760**	

12 Investigators	:	F. Begum, M.S. Uddin, M. Kadir, M.A.L Akanda, concerned scientists of ORC, RARS, ARS and OFRD
13 Season	:	Rabi 2022-23
14 Date of initiation	:	Last week of October-1st week of November, 2022
15 Output / benefit	:	About 5.67 ton breeders seed & 2.52 ton TLS would be produced
16 Status	:	On-going
17 Estimated cost	:	Tk (4,750,00/-+2,10,000) = 6,85,000/-
18 Source of fund	:	'Enhancing Production of Oilseed Crops (EPOC)' Project (BARI Part)
19 Priority	:	1st

01 Plan/expt.No. 02	**:**	**Breeder and Truthful level seed (TLS) production of groundnut**
02 Objectives	:	i) To increase seeds of modern varieties of groundnut. ii) To supply seed to BADC, research divisions and other research organizations, NGOs, farmers, etc.
03 Rationale	:	Seed is the basic tool of agricultural development. It is carrier of new technology and the principal means of secure crop production. Good quality seeds of any crops can play a key role for increasing per hectare yield and total production. Rapid seed multiplication helps to increase in agricultural production through quickest possible spread of new varieties developed by the plant breeders. Without quality seed the investment on fertilizer, water, pesticides and other inputs will not pay the required returns. So seed production is urgently needed especially for oilseed crops. Breeders' seeds are supplied to the seed producing agency like BADC and TLS are supplied to the DAE, NGOs and farmers.
04 Materials and methods	:	Eleven (11) varieties will be grown. Each variety will be grown with 40 cm spacing. At growing stage rouging will be done strictly.
05 Seed rate	:	100 kg/ha (unshelled)
06 Spacing	:	40cm x 15cm.
07 Fertilizer dose	:	Appendix-1
08 Irrigation and other cultural management	:	As and when necessary
09 Locations	:	Joydebpur, Jamalpur, Burirhat, Debigonj.

Breeder seed production of groundnut (Area in ha)

Location	Dhaka -1	Bashonti badam	Tridana (DM-1)	Jhinga - badam	BARI C. badam-5	BARI C. badam-6	BARI C. badam-7	BARI C. badam-8	BARI C. badam-9	BARI C. badam-10	BARI C. badam-11	Area (ha)	Cost Taka
Joydebpur	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.8	80,000/-
Jamalpur	0.05	0.05	0.05	0.2	0.05	0.05	0.05	1.0	0.5	0.5	0.1	2.6	2,60,000/-
Burirhat	-	-	-	-	-	-	-	0.1	0.1	0.1		0.3	30,000/-
Debigonj	-	-	-	-	-	-	-	0.2	0.2	0.2		0.6	60,000/-
Area (ha)	**0.1**	**0.1**	**0.1**	**0.3**	**0.1**	**0.1**	**0.1**	**1.4**	**0.9**	**0.9**	**0.2**	**4.30**	**4,30,000/-**
Target(kg)	**100**	**150**	**150**	**450**	**150**	**150**	**150**	**2100**	**1350**	**1350**	**200**	**6250**	

Truthful Level Seed production of groundnut (Area in ha)

Location	BARI C.badam-8	BARI C.badam-9	BARI C.badam-10	BARI C.badam-11	Area (ha)	Cost Taka
Jamalpur	0.5	0.5	0.5	**0.1**	**1.5**	1,50,000/-
Debigonj	0.5	0.2	0.2		**0.9**	90,000/
Area (ha)	**1.0**	**0.7**	**0.7**	**0.1**	**2.5**	**2,50,000/-**
Target (kg)	**1500**	**1050**	**1050**	**150**	**3750**	

12 Investigators	:	F. Begum, M.S. Uddin, M. Kadir, M.A.L Akanda and concerned scientists of ORC, RARS, ARS, OFRD
11 Expected out put/ benefit	:	To get large amount of seeds for distribution to BADC, NGO's, Private seed growing agency and elite farmers.
13 Season	:	Rabi, 2022-23
14 Date of initiation	:	December 2022
15 Output/benefit	:	6.1 ton breeder seed and 3.6 ton TLS will be produced
16 Status	::	On-going
17 Land area		2.1 ha
18 Estimated cost	:	TK. (**4,30,000/-+2,50,000/-) = 6,80,000/-**
19 Source of fund	:	'Enhancing Production of Oilseed Crops (EPOC)' Project (BARI Part)
20 Priority	:	1st

01 Plan/expt.No. 03	**:**	**Breeder seed and Truthful level seed (TLS) production of sesame, sunflower and soybean**
02 Objectives	:	i) To increase seeds of modern varieties of sesame, sunflower and soybe ii) To supply seed to BADC, research divisions and other research organizations, NGOs, farmers, etc.
03 Rationale	:	Seed is the basic tool of agricultural development. It is carrier of new technology and the principal means of secure crop production. Good quality seeds of any crops can play a key role for increasing per hectare yield and total production. Rapid seed multiplication helps to increase in agricultural production through quickest possible spread of new varieties developed by the plant breeders. Without quality seed the investment on fertilizer, water, pesticides and other inputs will not pay the required returns. Breeders' seeds are supplied to the seed producing agency like BADC and TLS are supplied to the DAE, NGOs and farmers.
04 Materials and methods	:	Each variety will be grown in rows with recommended row spacing. At growing stage roguing will be done strictly.
05 Variety	:	10 (BARI Til 2, 3, 4,5 and 6, BARI Surjamukhi 2, 3, BARI Soybean 5, 6, 7)
06 Out put/Benefit	:	To get large amount of seeds for distribution to BADC, NGO's, Private seed growing agency and elite farmers.
07 Seed rate	:	Sesame : 8 kg/ha, Sunflower : 12-15 kg/ha, Soybean: 50-70 kg/ha
08 Fertilizer dose	:	Appendix-I
09 Irrigation/ cultural management	:	As and when necessary.
10 Locations	:	Joydebpur, Ishurdi, Jamalpur, Jashore, Hathazari, Burirhat, Rahmatpur, Debigonj, Laxmipur,Rajbari, Dinajpur, OFRD Rangpur

Breeder seed production of sesame, sunflower and soybean

Variety and area (ha)/ location	Sesame					Sunflower		Soybean			**Total Area (ha)**	**Total Cost (Tk)**
	BARI Til-2	**BARI Til-3**	**BARI Til-4**	**BARI Til-5**	**BARI Til-6**	**BARI Surja.-2**	**BARI Surja.-3**	**BARI Soy.-5**	**BARI Soy.-6**	**BARI Soy.-7**		
Joydebpur	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.10	1,20,000/-
Ishurdi	-	-	0.2			-	0.1	-	-	-	0.3	30,000/-
Jamalpur	-	-	0.2			-	-	-	-	-	0.2	20,000/-
Jashore	-	0.1	0.2			-	-	-	-	-	0.3	30,000/-
Rahmatpur			-			0.1	-	-	-	-	0.1	10,000/-
Hathazari	-	0.1	-			-	-	-	-	-	0.1	10,000/-
Burirhat	-	0.1	0.2			-	0.1	0.2	0.2	0.2	1.0	1,00,000/-
Rangpur	-	-	-			-	0.1	-	-	-	0.1	10,000/-
Debigonj	-	-	0.50			-	0.2	0.5	0.5	0.2	1.9	1,90,000/-
Rajbari	-	-	-			-	0.2	0.1	0.1	-	0.4	40,000/-
Dinajpur							-	0.2	0.2	-	0.4	40,000/-
Raikhali							0.1			-	0.1	10,000/-
Area (ha)	**0.1**	**0.4**	**1.5**	**0.1**	**0.1**	**0.2**	**0.9**	**1.1**	**1.1**	**0.3**	**6.00**	**620,000/-**
Target (kg)	**100**	**400**	**1500**	**100**	**100**	**200**	**1000**	**2000**	**2000**	**300**	**7700**	

Truthful Level Seed production of sesame, sunflower and soybean

Location/ Variety	**Sesame**				**Soybean**		**Sunflower**	**Total Area (ha)**	**Cost (Taka)**
	BARI Til-3	**BARI Til-4**	**BARI Til-5**	**BARI Til-6**	**BARI Soy.-5**	**BARI Soy.-6**	**BARI Surja.-3**		
Dinajpur	-	-			0.1	0.1	0.1	0.3	30,000/
Debigonj	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.7	70,000/-
Laxmipur	-	-			-	0.2	-	0.2	20,000/-
Rangpur	-	0.1			0.1	0.1	0.1	0.4	40,000
Area (ha)	**0.1**	**0.2**	**0.1**	**0.1**	**0.3**	**0.5**	**0.3**	**1.4**	**1,60,000/-**
Target (kg)	**100**	**200**	**100**	**100**	**300**	**500**	**300**	**1700**	

11 Investigators	:	F. Begum, , M.S. Uddin, M. Kadir M.A.L Akanda,,concerned scientists of ORC, RARS, ARS and OFRD
12 Season	:	Rabi 2021-22
13 Date of initiation	:	1st week of Nov.2022 and February, 2023
14 Output / benefit	:	7860 kg breeders seed and 1500 kg TLS would be produced
15 Status	:	Continuous
16 Estimated cost	:	Tk. (62**0,000/-+1,60,000/-) = 7,80,000/-**
17 Source of fund	:	'Enhancing Production of Oilseed Crops (EPOC)' Project (BARI Part)
18 Priority	:	1st

01 Plan/expt.No. 04	**:**	**Breeder seed and Truthful Level Seed (TLS) production of minor oilseeds**
02 Objectives	:	i) To increase seeds of modern varieties of linseed, niger and safflower. ii) To supply seed to BADC, research divisions and other rese organizations, NGOs, farmers etc.
03 Rationale	:	Seed is the basic tool of agricultural development. It is carrier of new technology and the principal means of secure crop production. Good quality seeds of any crops can play a key role for increasing per hectare yield and total production. Rapid seed multiplication helps to increase in agricultural production through quickest possible spread of new varieties developed by the plant breeders. Without quality seed the investment on fertilizer, water, pesticides and other inputs will not pay the required returns. Breeders' seeds are supplied to the seed producing agency like BADC and TLS are supplied to the DAE, NGOs and farmers. To meet up seed requirements of BADC, DAE, NGO and elite farmers, it is urgently needed to increase seeds of some modern varieties.
04 Materials and methods	:	Each variety will be grown in rows with recommended row spacing. At growing stage roguing will be done strictly.
05 Variety	:	Linseed : 1 Niger : 1 Safflower : 1
06 Out put/Benefit	:	To get large amount of seeds for distribution to BADC, NGO's, Private seed growing agency and elite farmers.
07 Seed rate	:	1.Linseed : 12 kg/ha 2. Niger : 8 kg/ha 3. Safflower : 20 kg/ha
08 Fertilizer dose	:	Appendix-1
09 Irrigation and other cultural management	:	AS and when necessary
10 Location	:	Joydebpur, Burirhat and Rangpur

Breeder seed and TLS production of linseed, niger and safflower

Variety and area (ha)/location	**Linseed**		**Niger**	**Safflower**	**Total Area (ha)**	**Cost (Taka)**
	Neela	**BARI Tisi-2**	**Shova**	**Saff 1**		
Joydebpur	0.1	0.1	0.1	0.1	0.4	40,000
Burirhat	-	0.1			0.1	10,000
Rangpur	0.1	0.1			0.2	20,000
Area (ha)	**0.2**	**0.3**	**0.1**	**0.1**	0.7	**70,000/**
Target (kg)	**150**	**200**	**70**	**80**	**500**	

11 Investigators	:	F. Begum, M.S. Uddin, M. Kadir M.A.L Akanda, concerned scientists of ORC, RARS, ARS and OFRD
12 Season	:	Rabi 2022-23
13 Date of initiation	:	1st week of Nov.2022 and February, 2023
14 Output / benefit	:	580 kg breeders seed would be produced
15 Status	:	Continuous
16 Estimated cost	:	Tk. 70,000/-
17 Source of fund	:	'Enhancing Production of Oilseed Crops (EPOC)' Project (BARI Part)
18 Priority	:	1st

Appendix I: Fertilizer dose

A. Recommended fertilizer doses for different oilseed crops

Fertilizers	Rapeseed -mustard (Kg/ha)	Sesame (Kg/ha)	G. nut (Kg/ha)	Soy bean (Kg/ha)	Sun-flower (Kg/ha)	Niger (Kg/ha)	Linseed (Kg/ha)	Safflower (Kg/ha)
Urea	260	115	25	55	190	75	75	100
TSP	170	140	160	165	170	120	120	100
MP	90	45	85	110	160	50	46	50
Gypsum	160	105	300	100	160	100	100	100
Zn Oxide	5	-	-	-	-	-	-	-
Zn Sulpht	-	5	-	-	10	-	-	-
B.acid	10	10	10	-	10	5	5	5

B. Recommended fertilizer doses (major and minor elements) for different oilseed crops

Ferti-lizers	Rapeseed-mustard Kg/ha	Sesame Kg/ha	G.nut Kg/ha	Soy-bean Kg/ha	Sun-flower Kg/ha	Niger Kg/ha	Lin-seed Kg/ha	Saf-flower Kg/ha
N	120	50	12	25	90	35	35	45
P	34	28	32	35	35	25	25	20
K	45	23	43	55	80	25	23	25
S	30	20	54	18	30	-	-	-
Zn	-	1.8	-	-	3.6	-	-	-
B	1.8	1.8	1.8	-	-	-	-	-

Appendix II: Materials for breeding experiments

Rapeseed-mustard

Experiment-05: Observation Trial of *B. rapa* (Set-I)

Sl. no.	Lines	Seed colour
1	BC-2014-Y01	Yellow
2	BC-2014-Y02	Yellow
3	BC-2014-Y08	Yellow
4	BC-2014-Y014	Yellow
5	BS-14xBS-15-1	Yellow
6	BS-14xBS-15-4	Yellow
7	BS-14xBS-15-3-1	Yellow
8	BC-2014-Y02-1	Yellow
9	BC-2014-Y02-1-2	Yellow
10	BC-100614(4)-14	Yellow
11	BC-100614(4)-9	Yellow
12	BC-2014-Y011	Yellow
13	BARI Sarisha-14 (ch)	Yellow

Experiment-05: Observation Trial of *B. rapa* (Set-II)

Sl. no.	Line/Variety	Seed colour
1	BS-14 x -BS-15-10	brown
2	BS-14 x -SAU-1-1	brown
3	BS-14 x -SAU-1-3	brown
4	BS-14 x -SAU-1-4	brown
5	BS-15 x- SAU-1-1	brown
6	BS-14 x -SAU-1-2	brown
7	BS-6 x -SAU-1-1	brown
8	BS-6 x -SAU-1-3	brown
9	BS-6 x-BS-1-6	brown
10	BC-100614(Y)-4	brown
11	BC-100614(Y)-10	brown
12	BARI Sarisha-9 (Ch)	brown

Experiment-6: PYT Trial of *B. rapa* (Set-I)

Sl. no.	Line/Variety	Seed colour
1	BC-100614(8)-1	Yellow
2	BC-100614(4)-2	Yellow
3	BC-100614(4)-4	Yellow
4	BC-100614(4)-5	Yellow
5	BC-100614(4)-11	Yellow
6	BC-100614(4)-19	Yellow
7	BC-110714(7)-8	Yellow
8	BC-100614(8)-2	Yellow
9	BC-100614(4)-10	Yellow
10	BC-100614(8)-7	Yellow
11	BC-100-614(7)-3	Yellow
12	BARI-Sarisha14(ch)	Yellow

Experiment-29: PYT of *B. napus* (Set-I)

Sl. no.	Lines/Variety
1	13CA12014
2	13CA32014
3	13CA42014
4	13CA52014
5	13CA72014
6	13CA92014
7	BARI Sar.-13(Ch.)

Experiment-29: Maintenance short duration inbred lines of *B rapa* (Set-II)

Sl. no.	**Inbred lines**
1	T7-09BS_1-BS_2- BS_3- BS_4- BS_5- BS_6
2	BS9-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6
3	BS12-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6
4	Kln-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6
5	Din2-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6
6	BC2193-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6
7	SBC3593-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6
8	SBC4093-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6
9	SBC6823-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6
10	SBC8693(B)-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6
11	SBC8693(Y)-09BS_1- BS_2- BS_3- BS_4- BS_5- BS_6

Experiment-29: Maintenance convergent cross lines of *Brassica rapa* (Set-III)

Sl. no.	**Lines**		
1	BARI Sarisha-14 X Tori-7 (S_6)	X	BARI Sarisha-6
2	BARI Sarisha-14 X BARI Sarisha-9 (S_6)	X	BARI Sarisha-6
3	BARI Sarisha-15 X Tori-7 (S_6)	X	BARI Sarisha-6
4	BARI Sarisha-15 X BARI Sarisha-9 (S_6)	X	BARI Sarisha-6
5	BARI Sarisha-17 X Tori-7 (S_6)	X	BARI Sarisha-6
6	BARI Sarisha-17 X BARI Sarisha-9 (S_6)	X	BARI Sarisha-6
7	BARI Sarisha-6 X Tori-7 (S_6)	X	BARI Sarisha-17
8	BARI Sarisha-6 X BARI Sarisha-9 (S_6)	X	BARI Sarisha-17

Experiment-29: Maintenance double low lines of *Brassica napus* (Set-IV)

Sl. no.	Lines		
1	BARI Sarisha-17	X	Nap-14-001
2	BARI Sarisha-17	X	Nap-14-004
3	BARI Sarisha-17	X	Nap-14-007
4	BARI Sarisha-17	X	Nap-14-010
5	BARI Sarisha-17	X	Nap-14-011
6	Nap-0876	X	Nap-14-001
7	Nap-0876	X	Nap-14-004
8	Nap-0876	X	Nap-14-007
9	Nap-0876	X	Nap-14-010
10	Nap-0876	X	Nap-14-011
11	Nap-0869	X	Nap-14-001
12	Nap-0869	X	Nap-14-004
13	Nap-0869	X	Nap-14-007
14	Nap-0869	X	Nap-14-010
15	Nap-0869	X	Nap-14-011

Experiment-29: Maintenance inbred lines of *B. juncea* (Set-V)

Sl. no.	Lines/variety	Seed colour
1	BJ-2014-Y04	Yellow
2	BJ-2014-B06(Y)	Yellow
3	BJ-2014-B07	Brown
4	BJ-2014-B08	Brown
5	BJ-2014-B09	Brown
6	BJ-2014-B10	Brown
7	BJ-2014-B11	Brown
8	BJ-2014-B12	Brown
9	BJ-2014-B13	Brown
10	BJ-2014-B14	Brown
11	BJ-2014-B15	Brown
12	BJ-2014-B16	Brown
13	BJ-2014-B04	Brown
14	BARI Sarisha-11(Ch)	Brown

Experiment-17: Maintenance inbred lines of *Brassica juncea* (Set-VI)

Sl. no.	Line/variety	Seed colour
1	BJ-10-10104(Y)	Yellow
2	BJ-10-10411(Y)	Yellow
3	BJ-2014-Y01	Yellow
4	BJ-2014-Y04	Yellow
5	BJ-2014-Y03	Yellow
6	BJ-2014-Y05	Yellow
7	BJ-11536-(7)-2	Yellow
8	BJ-11536(9)-2	Yellow
9	BJ-11536(9)-6	Yellow
10	BJ-11536(11)-1	Yellow
11	BJ-11536(12)-3	Yellow
12	BARI Sarisha-11 (Ch)	Yellow

Experiment-17: Maintenance Backcross inbred lines (BILs) of *Brassica napus* (Set-VII)

Sl. no.	Inbred names	Pedigrees		
1	BIL-1	(BARI Sar.-14xLT-7XLT-7	X	LT-7
2	BIL-2	(BARI Sar.-14xLT-7(S_1)XLT-7	X	LT-7
3	BIL-3	(BARI Sar.-15xLT-7XLT-7	X	LT-7
4	BIL-4	(BARI Sar.-14xLT-7(S_1)XLT-7	X	LT-7
5	BIL-5	(BARI Sar.-9(S_3-S_4XLT-7XLT-7	X	LT-7
6	BIL-6	T-7 (S_3-S_4)XLT-7XLT-7	X	LT-7

Experiment-05: Observation Trial of sesame

Sl. no.	Entry
1.	BT_2 X Ses-207 (White)
2.	Ses-207 X Ses-05178
3.	BT-2 X BT-3-8 (Black)
4.	T_6 X Ses-130-1 (Black)
5.	T_6 X BT-2-3 (Brown)
6.	BT-2 X BT-3-2 (Black)
7.	Ses-0265
8.	Ses-76
9.	Ses-JP-21
10.	Ses-81
11.	BT-4

Experiment-06: Preliminary yield of sesame

Sl. no.	Entry
1.	Ses-115
2.	Ses-22
3.	Ses-0570
4.	Ses-65
5.	Ses-79
6.	Ses-JP-25
7.	Ses-5
8.	Ses-JP-24
9.	Ses-78
10.	Ses-52
11.	Ses-70
12.	BT-4

Experiment-07: Regional yield sesame (Set-I)

Sl. no.	Entry
1.	Ses-31
2.	Ses-14
3.	Ses-79
4.	Ses-65
5.	Ses-05115
6.	Ses-05178

7.	Ses-0570
8.	BT-3
9.	BT-4

Experiment-08: Regional yield trials of sesame (Set-II)

Sl. no.	Entry
1.	Ses-JP-25(Y)
2.	Ses-05163
3.	Ses-0265
4.	Ses-JP- 69 (Y)
5.	Ses-JP- 47 (Y)
6.	Ses- 2010-01 R
7.	Ses-JP-47 (Y)
8.	BINA Til-1
9	BARITil-4

Appendix III: Soybean germplasm

Sl No.	Name of Germplasm	Sl No.	Name of Germplasm	Sl No.	Name of Germplasm
1.	ASG-191	37.	NS-1	76.	86017-66-6
2.	ASSET-93-19-13	38.	i. PL-4174-75 ii. PL-4174-75	77.	20965477
3.	ASoMEM	39.	ST-1	78.	B2
4.	AGS-95	40.	SHOLV	79.	401
5.	AGS-205	41.	BARI Soybean-7	80.	Australia 2016
6.	ASSET-95	42.	SHOHAG	81.	USDA-44
7.	BS-13	43.	TAS-4	82.	Unknown
8.	i.BS-29 ii.BS-29	44.	USDA-3	83.	Thailand-1
		45.	USDA-4	84.	Thailand-2
9.	BS-32	46.	USDA-44	85.	BD 2332
10.	BS-33	47.	USDA-11	86.	BD 2333
11.	BG-60	48.	USDA-15	87.	BD 2337
12.	BR-14	49.	Boss	88.	BD 2340
13.	BR-33	50.	USDA-22	89.	BD 2341
14.	BARI Soybean-5	51.	USDA 29	90.	BD 2342
15.	BARI Soybean-6	52.	USDA 30	91.	BD 2348
16.	CS-2	53.	USDA 37	92.	BD 2351
17.	COLOMBUS	54.	USDA 40	93.	BD 2354
18.	DJS-9207	55.	USDA 41	94.	A6785
19.	FV-4PLNICE 7	56.	USDA 42	95.	Santarose (L)
20.	Galarsing	57.	USDA 46	96.	i.Shohag ii.Shohag iii.Shohag iv.Shohag
21.	GC 83001-16	58.	USDA 47	97.	Brag
22.	GMOT-13	59.	USDA 50	98.	Davis
23.	i. GMOT-95 ii. GMOT-95	60.	USDA 51	99.	Goo-382
		61.	USDA 53	100.	G00-390
24.	GMOT-43	62.	USDA 66	101.	BINA soybean -1
25	GOVRAL	63.	USDA 69	102.	Burrunjuk
26.	GC-335	64.	USDA 70	103.	Hayman
27.	Joya Waya	65.	USDA 79	104.	Ricmond
28.	JS-9207	66.	USDA 80	105.	ASG-79
29.	KADSING	67.	USDA 90	106.	KUSH-2004
30.	KANH	68.	USDA 92	107.	Hayman
31.	K-16	69.	USDA 93	108.	Richmond
32.	i. LG-92P-1176 ii.LG-92P-1176	70.	USDA 95	109.	USDA-72
		71.	USDA 96	110.	USDA-85
33.	LG-92P-1825	72.	Australia(i)		
34.	MTD-453	73.	USDA 107		
35.	MTD-16	74.	USDA 110		
36.	NAMVAUC	75	i.VIETKHAI ii.VIETKHAI		

Appendix IV: APA Targets for 2022-2023

ক্রমিক নং	সূচক	সূচকের মান	একক	লক্ষ্যমাত্রা
১.	১.১.১ নিবন্ধিত জাত (উচ্চ ফলনশীল, পুষ্টি সমৃদ্ধ, প্রতিকূল পরিবেশ সহনশীল ইত্যাদি)	২	সংখ্যা	২
২.	১.১.২ জাত সম্পর্কিত প্রযুক্তি উদ্ভাবিত (উচ্চ ফলনশীল, পুষ্টি সমৃদ্ধ, প্রতিকূল পরিবেশ সহনশীল ইত্যাদি)	২	সংখ্যা	২
৩.	১.১.৪ জাতের লাইন উন্নয়নকৃত	১	সংখ্যা	৫
৪.	১.২.১ প্রশিক্ষিত কৃষক	২	সংখ্যা	৩০০
৫.	১.২.৩ স্থাপিত প্রদর্শনী	৪	সংখ্যা	৪৫
৬.	১.২.৪ আয়োজিত সেমিনার/ওয়ার্কশপ	২	সংখ্যা	১
৭.	১.২.৫ আয়োজিত মাঠ দিবস/ র‍্যালী	২	সংখ্যা	১৯
৮.	১.২.৬ হস্তান্তরিত জাত	২	সংখ্যা	১
৯.	১.২.৭ হস্তান্তরিত প্রযুক্তি	২	সংখ্যা	১
১০.	১.২.৮ বার্ষিক গবেষণা রিপোর্ট প্রকাশিত	২	সংখ্যা	১
১১.	১.২.৯ লিফলেট, নিউজলেটার, বুকলেট, জার্নাল ইত্যাদি প্রকাশিত	২	সংখ্যা	৩
১২.	২.১.১ উৎপাদিত ব্রিডারবীজ	৮	মে টন	৩.৫
১৩.	২.১.২ উৎপাদিত মানঘোষিত বীজ	৮	মে টন	৩.৫
১৪.	২.১.৪ বিতরণকৃত ব্রিডার বীজ	৬	মে টন	৩.০
১৫.	২.১.৫ বিতরণকৃত মানঘোষিত বীজ	৫	মে টন	৩.০
১৬.	৫.১.১ কর্মকর্তাদের পরিদর্শনকৃত উন্নয়ন প্রকল্প, কর্মসূচির কার্যক্রম	৫	সংখ্যা	৪
১৭.	৫.১.৪ মহাপরিচালক/ পরিচালক কর্তৃক পরিদর্শনকৃত জাত / প্রযুক্তি/ বীজ উৎপাদন / অবকাঠামো ইত্যাদি কার্যক্রম	৫	সংখ্যা	৪
১৮.	৫.২.১ প্রশিক্ষিত জনবল (সরকারি বিধি, প্রশাসনিক ও আর্থিক ব্যবস্থাপনা, আইসিটি, গবেষণা ব্যবস্থাপনা ইত্যাদি বিষয়ে বিজ্ঞানী/ কর্মকর্তা/ এসএসএ/ এসএ/ এলএ/ কর্মচারীদের প্রশিক্ষণ/ সমসাময়িক বিষয় নিয়ে লার্নিং সেশন আয়োজিত)	১০	সংখ্যা	৫০

Appendix V: Comments and suggestions

A. Internal Research Review and Program Planning Workshop 2022

#	Suggestions/Recommendations	Action taken
1.	Development of magic population, speed breeding activities should be done simultaneously with conventional breeding process.	Will be followed
2.	Hybrid variety development program should be strengthened in oilseed crops.	Suggestion will be followed
3.	Spacing of BARI Surjomukhi-3 should be adjusted.	Will do accordingly
4.	More emphasis will be given to develop waterlogging variety of sesame and pilot program of sesame should be done in Padma's char. Sesame should be cultivated in raised bed.	Will do accordingly
5.	Disease and insects' infestation data should be included in varietal development experiments.	Suggestion will be followed
6.	Regional trials of soybean should be done at coastal area for salinity tolerance.	Will do accordingly
7.	For variety development, variation should be created through mutation, hybridization etc.	Will do accordingly
8.	For creating hybrid, good parent should be selected.	Will do accordingly
9.	Oilseed breeder and rice breeder should work collaboratively to reduce duration of rice variety where mustard variety can fit that time.	Will do accordingly
10.	It is needed to find out CMS line in case of Sunflower.	Suggestion will be considered
11.	Fallow land, coastal area should be utilized to increase oil crop production.	Program going on
12.	Quantity of water should be mentioned on irrigation experiment.	Will do accordingly
13.	Long duration mustard varieties can be cultivated in fruit orchard, char land, waste land.	Action going on
14.	Research program should be taken about unfilled grain of BARI Surjamukhi-3.	Action has been taken
15.	Weather parameter should be correlated in related experiment.	Will do accordingly
16.	Depth of sowing should be mentioned in case of sowing by machine.	Will do accordingly
17.	Single cropped area can be converted into double cropped area by early supplying adequate mustard seed in haor area of Kishoregonj.	Program going on
18.	Sowing date after January may be included in Sunflower experiment.	Will do accordingly
19.	Stress tolerant oilseed crop should be developed.	Program going on
20.	Experiment on weed control of groundnut cultivation during Kharif season may be taken.	Will be considered
21.	Lodging problem of BARI Sarisha-18 should be considered in fertilizer dose experiment.	Will do accordingly
22.	To expand mustard growing area in Ishurdi region mixed cropping of lentil with mustard may be strengthened.	Will be followed
23.	Multidisciplinary scientist should be worked jointly in Oilseed Research Centre.	Will do accordingly
24.	Tori-7 should be replaced with BARI Sarisha-14 in Chalon bill area.	Suggestion will be followed
25.	Review of literature should be mentioned in case of justification.	Will be followed
26.	Salinity level from sowing to harvest should be mentioned.	Will be followed
27.	Survey on impact of honeybee rearing in case of oil crop production improvement.	Will be taken
28.	Mechanization should be encouraged in oil crop cultivation specially in Bhola.	Suggestion will be followed
29.	Weather forecasting data of DAE website need to follow during crop cultivation.	Will be followed

#	Suggestions/Recommendations	Action taken
30.	Seed production of popular varieties should enhance of oilseed crops.	Action going on
31.	APA target of two varieties of which crop should include. APA targeted two technology also should be include in program 2022-23	Action has been taken
32.	BARI Soybean should disseminate with help of SOLIDARIDAD NGO in Noakhali and Laxmipur, District.	Suggestion will be followed
33.	A pathologist should recently appoint in ORC to conduct pathological research.	Action going on

B. Central research review and program planning workshop 2022

#	Suggestions/Recommendations	Action taken
1.	Short duration more oilseed crop varieties should be developed to fit in *T. Aman-Mustard-Boro* cropping pattern.	Action going on
2.	Adoption of BARI released popular varieties should be studied.	Action going on
3.	Speed breeding research should be emphasized.	Action going on
4.	Pathological and Climate smart research should be strengthened along with manpower.	Action will be initiated if manpower is available
5.	ORC lab to facilitate the scientist to research on oil quality of oilseed crops.	Action will be initiated if facilities is available
6.	Oilseed varieties should be disseminated in Southern part of Bangladesh.	Suggestion will be followed
7.	ORC research should focus on achieving about 40% self-sufficiency of edible oil within three years.	Action going on
8.	Research program should be as per APA target which will fulfill our SDG goals.	Suggestion will be followed
9.	Proper emphasis should be given to compile the information about seed production of oilseed crops through BADC, DAE and NGOs.	Suggestion will be followed

C. Review workshop 2022 of NARS Institute at BARC

#.	Comments and suggestions	Action taken
1.	Developing short duration (80-85 days) with high oil containing rapeseed-mustard varieties should be emphasized.	Program going on
2.	Groundnut varieties with cluster-bearing pod and appropriate shelling percentage should be developed.	Program going on
3.	In case of soybean trial, BU Soybean-1 (early salt tolerance) and BU Soybean-2 (high yielding and salt tolerance) should be used as check.	Action has been taken
4.	Shattering resistant variety of *Brasica napus* should be attempted through inter specific hybridization.	Action has been taken
5.	Climate resilient mustard varieties should be developed.	Program going on
6.	Care should be taken to prevent pollen contamination while maintaining CMS lines in rapeseed/mustard and sunflower.	Action going on
7.	Sunflower mutants should be maintained properly. Research should be strengthened for increasing of sunflower population.	Action going on
8.	Linkage of traits with allelic variation need to be identified.	Suggestion will be followed
9.	Focus on research activity of oilseed production on the basis of farmers choice.	Action going on
10.	In validation trials only two treatments viz., one sole crop and intercropped treatment are preferable.	Suggestion will be followed
11.	Reinforce seed production program and distribution at farm level.	Action going on

Oilseed Research Centre, BARI, Gazipur
Research Programm 2022-23

1. List of experiment for variety development

A. Central

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
	A. Rapeseed-mustard		
1.	Collection of rapeseed-mustard germplasm	Different agro-ecological zones of Bangladesh	25
2.	Evaluation of rapeseed-mustard germplasm	Gazipur	25
3.	Hybridization in *B rapa* L.	Jamalpur (Set-1), Gazipur (Set-II)	30
4.	Evaluation of segregating generation of *Brassica rapa*	Gazipur and Jamalpur	70
5.	Observation trial of *Brassica rapa* L.	Gazipur (Set-I, Set-II, Set-IV & Set-V) and Jamalpur (Set-III)	50
6.	Preliminary yield trial of *Brassica rapa* L.	Set-I: Gazipur, Ishurdi, Jashore, Rahmathpur, Rangpur and Hathazari Set-II: Gazipur, Jamalpur, Ishurdi Set-III: Gazipur, Jamalpur, Jashore	120
7.	Regional yield trial of *Brassica rapa* L.	Gazipur, Ishurdi, Jamalpur, Jessore, Rahmatpur, Rangpur and Hathazari	140
8.	Hybridization in *B. napus* L.	Gazipur and Jamalpur	50
9.	Evaluation of segregating generation of *Brassica napus*	Gazipur and Jamalpur	135
10.	Observation yield trial of *B napus* L.	Jamalpur	30
11.	Preliminary yield trial of *B. napus* L.	Jamalpur, Gazipur, Ishurdi and Jashore	60
12.	Regional yield trial of *B. napus* L.	Jamalpur, Gazipur, Ishurdi, Hathazari, Rahmatpur, Rangpur and Jashore	105
13.	Regional yield trial of *Brassica juncea* L.	Gazipur, Ishurdi, Jamalpur, Jashore, Rahmatpur, Rangpur and Hathazari	105
14.	Interspecific hybridization in *B. napus L.; B. rapa and B. carinata*	Gazipur and Jamalpur	50
15.	Evaluation of segregating generation of interspecific crosses	Gazipur and Jamalpur	60
16.	PYT of entries developed from back cross generation of interspecific crosses among *B. carinata, B. rapa* and *B. napus*	Gazipur, Ishurdi, Jessore, Rangpur, Hathazari and Rahmatpur	180
17.	Maintenance of CMS, restorer and maintainer lines of *Brassica napus* L.	Gazipur	15
18.	Development of hybrid variety in rapeseed I. Development of short duration parental lines II. Development of test cross hybrids III. Evaluation of test cross hybrids	Gazipur	90
19.	Heterosis study of hybrids developed through selected restorer	Gazipur and Jamalpur	50

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
20.	Hybridization in double low (canola) *B. napus* L.	Gazipur	25
21.	Evaluation of segregating generation of *Brassica napus*	Gazipur and Jamalpur	50
22.	Marker Assistance Selection (MAS) of double-low rapeseed	Molecular Breeding Lab, ORC, Gazipur	150
23.	Identification of restorer line through Marker Assisted Selection (MAS)	Molecular Breeding Lab, ORC, Gazipur	310
24.	Development of Multi-parent advanced generation inter-cross (MAGIC) populations	Greenhouse of Plant Breeding Division, Gazipur	120
25.	Development of hexaploidy *Brassica spp*	Greenhouse of Plant Breeding Division, Gazipur	100
26.	Development of nested association mapping (NAM) populations	Greenhouse of Plant Breeding Division, Gazipur	120
27.	Introgression of heat tolerance gene in rapeseed-mustard from wild relatives	Greenhouse of Plant Breeding Division, Gazipur	50
28.	Identification of climate smart rapeseed-Mustard	Greenhouse of Plant Breeding Division, Gazipur	80
29.	Maintenance of released variety and advanced lines of rapeseed-mustard	Gazipur	140
30.	Adaptive trial of advanced lines of *Brassica rapa* L.	Pabna, Cumilla, Netrakona and Tangail	60
31.	Adaptive trial of advanced lines of *B napus* L.	Jamalpur, Sherpur and Cumilla	45
32.	Evaluation of BARI and BAU developed rapeseed-mustard varieties at saline prone areas	Khulna (Dacope and Koyra), Satkhira, Cox's Bazar and Gazipur	90
	B. Sesame		
33.	Collection and evaluation of sesame germplasm	Collected from: Khulna, Satkhira, Kushtia, Faridpur, Jamalpur, Hathazari. Evaluated at Gazipur, Jessore and Ishurdi	50
34.	Maintenance of germplasm of sesame	Gazipur, Jessore and Ishurdi	30
35.	Creation of new genetic variability in sesame using gamma radiation Growing M_1 plant from M_o seed	Gazipur and Jessore	20
36.	Hybridization in sesame	Gazipur	20
37.	Evaluation of segregating generation of sesame	Gazipur	60
38.	Observation trial of sesame	Gazipur	10
39.	Preliminary yield trial of sesame	Gazipur, Ishurdi, Akbarpur, Faridpur, Kushtia, Dinajpur and Jessore	70
40.	Regional yield trial of sesame (Set-I, Set-II)	Gazipur, Ishurdi, Akbarpur, Faridpur, Kushtia, Rangpur, Dinajpur and Jessore	140
41.	Screening of sesame genotypes under water logged condition	Gazipur	25
42.	Maintenance of released varieties and advanced line of sesame	Gazipur, Jessore and Ishurdi	30
43.	Adaptive trial of advanced lines of sesame	Gazipur, Ishurdi, Akbarpur, Faridpur, Kushtia, Dinajpur, Jessore Khulna & Patuakhali	90
	C. Groundnut		
44.	Collection of groundnut germplasm	Gazipur, Gazipur	20

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
45.	Maintenance and evaluation of groundnut germplasm	Gazipur, Gazipur and RARS, Jamalpur	50
46.	Hybridization in groundnut	Set-I in Gazipur and Set-II in Jamalpur	50
47.	Evaluation of segregating generation of groundnut	Set-I in Gazipur and Set-II in Jamalpur	250
48.	Observation trial of groundnut (Set-I, Set-II, Set-III and Set-IV)	Sey-I, Set-II at Gazipur and Set-III, Set-IV at Jamalpur	100
49.	Preliminary yield trial of groundnut (Set-I and Set-II)	RARS, Jamalpur (Set-I) and RARS, Jamalpur and Burirhat (Set-II)	150
50.	Regional yield trial of Groundnut (Set-I, Set-II and Set-III)	Set-I and Set-II (Gazipur, Jamalpur and Burirhat) Set-III (Jamalpur, Hathazari and Burirhat)	225
51.	Maintenance of released varieties and advanced lines of groundnut	Gazipur	20
52.	Adaptive trial of groundnut (Set-I and Set-II)	Set-I: Manikgonj, Noakhali, Tangail and Rangpur Set-II: Nowbhangarchar, Jamalpur and Char Belgachha, Islampur	180
	D. Soybean		
53.	Maintenance and evaluation of soybean germplasm	Gazipur	60
54.	Hybridization in soybean	Rangpur	15
55.	Development of recombinant inbred lines (RIL) of soybean	Gazipur	30
56.	Observation trial of soybean	Gazipur	40
57.	Preliminary yield trial of soybean	Gazipur, Rangpur and Noakhali	90
58.	Regional yield trial of soybean	Gazipur, Burirhat, Bhola, and Cumilla (Chandpur)	120
59.	Maintenance of released varieties and advanced lines of soybean	Gazipur	10
	E. Sunflower		
60.	Maintenance of sunflower germplasms	Gazipur	30
61.	Regional yield trial of sunflower	Gazipur, Ishurdi, Jessore and Kumilla	60
62.	Development of synthetic sunflower variety	Gazipur	30
63.	Creation new genetic variability in sunflower using induced mutation. i) Evaluation of M6 mutant's family created by Gamma Radiation.	Gazipur	50
64.	Creation of sunflower mutant through EMS i) Evaluation of M4 mutant's family	Gazipur	50
65.	Molecular characterization of sunflower dwarf mutants (I) by the expression analysis of genes regulating Gibberalic Acid (GA) pathway	ORC field and ORC Molecular Biology Laboratory, Gazipur	100
66.	Molecular characterization of sunflower mutants (i) by the expression analysis of *FAD*, *SAD* and *Oleic* gene sequences	ORC field and ORC Molecular Biology Laboratory, Gazipur	100
67.	Screening of diverse genotypes of Oilseed crops	ORC field and ORC Molecular	200

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
	using SSR primers. (i) Assessment of genetic diversity in *Brassica rapa* genotypes using SSR markers	Biology Laboratory, Gazipur	
68.	Maintenance of released varieties and advanced lines of sunflower	Gazipur	20
69.	Adaptive trial of advanced lines of sunflower	Satkhira. Patuakhali, Sylhet and Khulna	60
	MINOR OILSEEDS		
	F. Linseed		
70.	Maintenance of linseed germplasms	Gazipur	15
71.	Regional yield trial of linseed	Gazipur, Hathazari, Rahmatpur and Jamalpur	32
	G. Niger		
72.	Maintenance of niger germplasm	Gazipur	15
73.	Observation trial of niger	Gazipur	30
	H. Safflower		
74.	Maintenance of safflower germplasm	Gazipur	15
	Revenue Budget =		**4805**
	Project/Development budget =		**687**
	Sub-Total (Variety development) Central =		**5492**

B) Local

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
	A. Rapeseed-mustard		
1.	Confirmation of F_1 generation in *Brassica napus*	RARS, Jamalpur	35
2.	Growing of F_1 generation in *Brassica napus*	RARS, Jamalpur	35
3.	Development of diverse rapeseed germplasm through hybridization	RARS, Jamalpur	30
4.	Searching of short-duration genotypes of *Brassica rapa* from F_2 populations	RARS, Jamalpur	30
5.	Adaptive trial of *Brassica campestris*	Jamalpur	35
	Canola programme		
6.	Hybridization in *B. rapa*	RARS, Jamalpur	20
7.	Hybridization in *B. napus*	RARS, Jamalpur	20
8.	Confirmation of F_1 Generation	RARS, Jamalpur	15
9.	Growing of F_2 generation of Canola	RARS, Jamalpur	15
10.	Growing of F_3 generation of Canola	RARS, Jamalpur	15
11.	Regional Yield trial of Canola (*B.rapa)*	RARS, Jamalpur, Gazipur and Burirhat	75
12.	Regional Yield trial of Canola(*B.napus)*	RARS, Jamalpur, Gazipur and Burirhat	75
	B. Sesame		
13.	Growing F_1 generation of Sesame	RARS, Jamalpur	35
	C. Groundnut		
14.	Growing F_1 generation in groundnut	RARS, Jamalpur	30
	Revenue Budget =		**465**
	Project/Development budget =		**-**
	Sub-total (Variety development) Local =		**465**
	Total Revenue Budget (Variety development =		**5270**
	Total Project/Development budget (Variety development) =		**687**
	Total (Variety development) =		**5957**

2. List of experiment for technology development

A) Crop and soil management

1. Central

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
1.	Intercropping bunching onion (pata peaz) with groundnut at different row arrangement	Gazipur	20
2.	Development of Mustard (var. BARI Sarisha-18) - T.Aus (var. BRRI dhan 87) - T. aman (var. BRRI dhan75) cropping pattern for increasing cropping intensity and productivity	Jamalpur and Tangail	200
3.	Development of cropping pattern for increasing cropping intensity and productivity	Gazipur	100
4.	Development of Mustard (var. BARI Sarisha-18) - Sesame (var. BARI Til-5) - T. aman (var. BRRI dhan75) cropping pattern for increasing cropping intensity and productivity	Gazipur	100
5.	Effect of relaying maize with mustard	Gazipur	25
6.	Performance of intercropping garlic, onion, fenugreek, fenugreek with groundnut in charland areas	Tangail and Jamalpur	60
7.	Performance of mustard, groundnut and sunflower varieties at haor areas in Bangladesh	Nikkli, Moulabhibazar and Sunamganj	60
8.	Performance of soybean varieties in southern region of Bangladesh	Chadpur and Noakhali	40
9.	Performance of sunflower varieties in southern region of Bangladesh	Barisal, Potuakhali and Shatkhira	90
10.	Performance of groundnut and sesame varieties at charland areas in Bangladesh	Faridpur and Kustia	40
11.	Validation of intercropping of fenugreek with groundnut in hilly areas	Bandarban	20
12.	Validation of intercropping fenugreek with groundnut in haor areas	Keshoregonj, Sunamganj and Moulovibazar	45
13.	Effect of different tillage conditions on growth and yield of soybean varieties in southern region of Bangladesh	Barishal	80
14.	Effect of sowing time and methods on the yield of Mustard in south-western saline areas	Satkhira	50
15.	Performance of mustard varieties in Barind tract areas	Joypurhat and Rajshahi	40
16.	Performance of selected linseed genotypes under salinity condition in pot culture	ORC, BARI, Gazipur	25
17.	Effect of seed priming on the yield and seed quality of groundnut (*Arachis hypogaea* L.)	Gazipur	50
18.	Effect of spacing on growth and yield of perilla	Gazipur	15
19.	Effect of planting time on yield and seed quality of perilla	Gazipur	50
20.	Effect of spacing on growth and yield of BARI soybean-7	Gazipur	50
21.	Effect of transplanting time on yield and seed quality of sunflower variety	Gazipur	50
22.	Growth and maturity pattern of different mustard genotypes	Gazipur	50

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
23.	Study on branching behavior of sunflower variety	Gazipur	50
24.	Field Performance Evaluation of BARI Seeder for Oil Seed Crops	Gazipur, Barishal, Jamalpur, Ishuirdi, Burirhat, Alamnagar, Pabna and Jashore	100
25.	Effect of irrigation on growth and yield of Canola type mustard variety	Gazipur	50
	Revenue Budget =		**365**
	Project/Development budget =		**1095**
	Sub-total (Crop and soil management) Central =		**1460**

2. Local

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
1.	Effect of harvesting time on seed yield and oil quality of BARI Sarisha-18 in char land in 9 AEZ	Jamalpur	35
2.	Performances of mustard based different cropping patterns in Barishal region	Rahmatpur, Barishal	100
3.	Effect of two different plant growth regulators on production traits of sunflower	RARS, Cumilla	40
4.	Design and development of sunflower oil-expeller machine	RARS, Rahmatpur, Barishal	150
	Revenue Budget =		**135**
	Project/Development budget =		**190**
	Sub-total (Crop and soil management) Local =		**325**

B) Plant Pathological Experiment

1. Central

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
1.	Survey of oilseed crop diseases and their existing disease management practices	All over the country	200
2.	Screening of rapeseed-mustard varieties/lines against *Alternaria* leaf blight disease	Gazipur	50
3.	Evaluation of different group of commercial fungicides against Alterneria blight disease of mustard	Gazipur	50
4.	Screening of groundnut varieties/lines against Tikka, rust and other soil born diseases	Gazipur	50
5.	Evaluation of different group of commercial fungicides against Tikka (leaf spot) and rust disease of groundnut (*Arachis hypogaea*)	Gazipur	50
	Revenue Budget =		**400**
	Project/Development budget =		**-**
	Sub-total (Plant Pathological) Central =		**400**

C) Entomological Experiment

1. Central

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
1.	Effect of insecticides on foraging behaviour of honeybee (*Apis mellifera* L.) on mustard (*Brassica rapa*)	Gazipur, Rajshahi	50
2.	Insect Pollinators and their role to yield of sunflower (*Helianthus annuus* L.)	Gazipur	50
3.	Development of IPM package against the major insect pests of sesame	Gazipur	50
4.	Relative susceptibility of groundnut cultivars against sucking insect pests, hairy caterpillar and leaf roller	Gazipur	50
5.	Survey on the insect pests of sunflower and documentation of their natural enemies	Gazipur, Patuakhali and Jashore	150
6.	Development of a management approach against flea beetle attacking mustard	Gazipur	50
7.	Relative susceptibility of soyabean varieties to sucking pest, hairy caterpillar and leaf roller	Gazipur	50
8.	Screening of rapeseed and mustard genotypes against aphid under natural field condition	Gazipur	50
	Revenue Budget =		**300**
	Project/Development budget =		**200**
	Sub-total (Entomological) Central =		**500**
	Total Revenue Budget (technology development) =		**1200**
	Total Project/Development budget (technology development) =		**1085**
	Total (technology development) =		**2285**

SL No.	Title	Location	Budget (000' Tk.)
1	**A. Training**		
	I. SAAO/SSA/SA/FA Training on Layout preparation data collection seed production techniques of oilseed crops **Batch-02 (25 person/batch)**	Gazipur and Barishal	150
	II. Farmer's training on improved varieties and production techniques of oilseed crops **Batch-18 (30 farmers/batch)**	Jamalpur, Kishorgonj, Hathazari, Dinazpur, Jessore, Netrokona, Shatkhira, Gazipur, Tangail, Cumilla, Rajshahi, Faridpur, Sylhet, Patuakhali, Mymensing, Kustia, Sirajgonj etc.	900
2	**B. Field day** Productivity and Production Technology of newly developed variety Of oilseed crops No. of field days- 30 (80 persons/field day)	Jamalpur, Kishorgonj, Hathazari, Dinazpur, Jessore, Netrokona, Shatkhira, Gazipur, Tangail, Cumilla, Rajshahi, Faridpur, Sylhet, Patuakhali, Mymensingh, Kustia, Sirajgonj etc.	1500
	Total Project/Development budget (Training and Field Day) =		**2550**

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
1.	**PILOT PRODUCTION PROGRAM**	Gazipur, Manikgonj, Kishorgonj, Faridpur, Tangail, Sylhet, Hobigonj, Panchagar, Thakurgaon, Kurigram, Sherpur, Netrakona, Jamalpur, Pabna, Sirajgonj, Rangpur, Gaibandha, Bhola, Patuakhali, Khulna, Kumilla, Noakhali, Chandpur, Bandarban, Satkhira, Borguna, Mymensingh, Bogura, Kushtia, Rajshahi (Barind), Hathazari, Coxbazar, Chokoria, Khagrachari, Laxmipur, Satkhira, Jashore & Barishal.	3000
2.	**ADAPTIVE TRIAL/VALIDATION TRIAL**	Jamalpur, Pabna, Sylhet, Rangpur, Jashore, Kumilla, Hathazari, Rajshahi (Barind), Faridpur, Netrakona, Patuakhali, Khulna, Noakhali, Satkhira & Kushtia	2500
	Total Project/Development budget (Pilot Production and Adaptive Trail/Validation Trail) =		5500

Sl no.	Title of the experiment	Location	Budget (000' Tk.)
1.	Breeder seed & TLS production of rapeseed- mustard	Joydebpur, Ishurdi, Jamalpur, Jashore, Hathazari, Rahamatpur, Bogura, Burirhut, Debigonj, Kumilla Dinajpur, & Thakurgaon	685
2.	Breeder and Truthful level seed (TLS) production of groundnut	Joydebpur, Jamalpur, Burirhat, Debigonj	**680**
3.	Breeder seed and Truthful level seed (TLS) production of sesame, sunflower and soybean	Joydebpur, Ishurdi, Jamalpur, Jashore, Hathazari, Burirhat, Rahmatpur, Debigonj, Laxmipur,Rajbari, Dinajpur, OFRD Rangpur	**780**
4.	Breeder seed and Truthful Level Seed (TLS) production of minor oilseeds	Joydebpur, Burirhat and Rangpur	70
	Total (Seed Production) =		**2215**

Summary of budget

Revenue budget (000' Tk.)	Project/Development budget (000' Tk.)	Total budget (000' Tk.)
5420	**12587**	**18007**