

Annual Report of RATES Project in 2024

Project Title	Improvement of Rural Agricultural Technology Extension System in Asia (RATES)	
Name of Principal Investigator	Dr. Suraya Parvin, Director (C. C.), Technology Transfer and Monitoring Unit (TTMU)	
Organization	Bangladesh Agricultural Research Council, Dhaka, Bangladesh	
Period & Budgets	Period	Budget (USD)
	Dec.2022.-Nov.2025	90,000 (30,000/year)

Summary:

This project led by the Bangladesh Agricultural Research Council (BARC) in collaboration with Bangladesh Agricultural Research Institute (BARI) and Department of Agricultural Extension (DAE) aims to disseminate high yielding varieties and associated package of practices developed by BARI in 5 crops namely Onion, Chili, Garlic, Turmeric and Mustard through field demonstrations, training of field extension staff and farmers and organizing field days. Through research trials, the project will also identify the yield gap between farmer fields and research field. All these are expected to enhance linkages between agricultural research and extension in the country. Training for Sub-Assistant Agricultural Officers (SAAOs) and farmers are organized at three crop stages, namely the initial demonstration stage, field management phase and harvest stage. The project will also develop technology manuals for the 5 crops (three already developed). For each crop, a group comprising 30 farmers has been formed. Trial plots in research field and demonstration plots for 5 crops in farmers’ field have already been initiated. These will be completed by end of 2024 to February 2025. A survey to evaluate the results will be conducted in Year 3 (2025, last year).

1. Introduction:

Population increasing rate 1.48% whereas arable land decreasing 1% in BD (BBS-2021). One of the objectives outlined in the sustainable development goals (SDGs) is to doubling the productivity. Research institutes, including BARI, undertake research

endeavors aimed at generating technologies for both oil seeds and spices crops, while DAE is responsible for disseminating these technologies to farmers to boost up the yield of crops. DAE possesses ample manpower and institutional capacity. However, it exhibits notable weaknesses, including lack of training of extension personnel's and farmers', information exchange platform, Only project based co-ordination meeting, delayed technology transfer process, lack of Res.-Extension-Farmer linkage, Joint Research Program planning, Joint Extension planning and Joint monitoring of Research and Extension program.

Spices have assumed a noteworthy role in promoting human health. To attain the highest possible yield from these crops, dissemination of high yielding varieties including smart management technologies are essential tools. To enhance the production of spices including onion, turmeric, chilli, garlic and oil seeds like mustard, the adoption of recently developed high-yielding varieties, smart management techniques, and capacity-building initiatives are crucial. The involvement of personnel from national agricultural research system (NARS) and the DAE in specialized regions of Bangladesh, with the support of the RATES project will play a pivotal role in this endeavor.

Under the coordination of TTMU, BARC, extension workers and researchers will enhance linkages by incorporating educational and marketing aspects. This study focuses on enhancing the extension system by incorporating advancements in spices and oil seeds technologies and minimizing the yield gap through improving Research-Extension-Farmers linkage.

Project Goal:

To improve agricultural extension and capacity building system for farmers' & agricultural extension professionals to increase the yield and production of spices and mustard in BD and establishment of global network and cooperation through RATES project.

The objectives of the projects are:

1. To increase the yield of onion, chili, garlic, turmeric and mustard using recently BARI generated high-yielding varieties and smart management practices in particular locations of Bangladesh.
2. To find the causes of yield gap between research and research field for sustainable development.
3. To increase extension professionals and farmers' knowledge and skills for spices and oil seed cultivation.
4. To reinforce the linkage between research-extension-farmers with the enhancement of existing extension system in Bangladesh.

2. Methodology

This project is being implementing by the PI from BARC and two Co-PIs from the Bangladesh Agricultural Research Institute (BARI) and Department of Agricultural Extension (DAE). Sixteen (16) research trial plots were set up by BARI to find out the yield gap between research and farmers field for 4 crops- mustard, onion, garlic and chili with their varieties BARI Sharisha-18, BARI Piaz-6, BARI Rosun-2, and BARI Chili-2, respectively. Twenty (20) project demonstration plots have been established by DAE in farmers field with extension services (land size: 0.13 hec/plot). In addition, twenty (20) project demonstration plots have been established by DAE in farmers field without extension services (land size: 0.13 hec/plot) to analyze the importance of extension services along with RATES project with the existing agriculture. DAE organized farmers training of Dhanbari and Ghatail Upazila with the assistance of Upazilla Agriculture Office to better address and disseminate the novel climate resilient technologies supported by RATES project. Farmers Group Meetings were organized by local Upazila Agriculture Office supported by Rates project.

Selection of co-operator farmers:

Co-operator farmers were selected for Researcher Managed Trial (RMT), Extension Managed Demonstration Trial (EMDT) and traditional Farmers Managed Trial (FMT) based on land and crop suitability, farmers willingness to grow the selected crops, local

demand, farmers choices, market access etc.

Sharing of the inputs for different trials

Quality seeds collected from BARI and other inputs (fertilizers, pesticides etc.) were distributed among the selected farmers for RMT and EMDT while only quality seeds were provided to the farmers for FMT.

Service providing for the production domain under Researcher and Extension managed Trial:

Production of spices and oil seed crops requires huge operational activities like sowing, fertilizer application, irrigation, weeding, pest and disease management, harvesting, post-harvest operations. For getting optimum yield different operations at the suitable crop growth stages is deemed imperative. In this regard participatory and collaborative approaches were carried out.

a. Research-Extension collaborative Training for capacity buildup of the farmers:

Participatory training was provided to the selected farmers under RMT and EMDT using audio-visual tools. Expert Researcher and Extension Personnel were facilitated for effective learning on the production technologies of spices and oil seed crops prior to onset of the trial. Field level research and extension staff were also sharpened their knowledge through participation with the farmers.

b. Research-Extension collaborative field monitoring:

During the implementation of the trial Researcher and Extension personnel jointly monitored the crops field and provided valuable suggestions to the cooperator farmers and necessary solutions for ensuring optimum crop growth and yield.

c. Quick information flow through Research-Extension channel

d. Distribution of printed technology book

e. Regular group meeting and information sharing

Farmers receive latest variety seeds from OFRD, BARI, Tangail. Receive Day long Farmers Training at the beginning Phase-1: Initial Demo Stage, at the middle period Phase-2: Field Management Stage, at final stage Phase-3: Harvest Stage. Close

Monitoring and step by step guideline by SAAO. Supervision by AEO, UAO, DD, HQ and project team. 3 stage field observation and varietal guideline by local research office (OFRD, BARI, Tangail).

Farmers practice with extension services:

- ❖ Followed production handbook
- ❖ On time field transplanting
- ❖ Practiced optimal and timely irrigation for the specific variety
- ❖ Followed recommended fertilizer doses for the specific variety
- ❖ Followed intercultural operation and other management practices
- ❖ All demo farmers seat together for group meeting twice in a month for their problems and detail discussions, supervised by SAAO

Conventional plots without extension service:

- ❖ Farmers receive latest variety seeds from OFRD, BARI, Tangail
- ❖ Late transplanting
- ❖ Irregular irrigation
- ❖ Inappropriate use of fertilizer
- ❖ Irregular weeding and soil management
- ❖ No collaboration among same type crop producing farmers
- ❖ Less idea about market price and value chain system

Agronomic Practices followed for crop cultivation:

BARI Sharisha-18

- Land preparation: 4-5 cross tillage and laddering.
- Sowing method: Broadcast
- Sowing time: Mid-October to November
- Seed rate: 7 kg ha⁻¹. Seeds were treated with Autostin @ 3g kg⁻¹ seed.
- Fertilizer Dose: 250-170-85-150-5-10 and 5000 kg ha⁻¹ Urea, TSP, MoP, Gypsum, Zinc sulfate, Boric acid and Cowdung. Intercultural operations: Two weeding was done at 10 to 12 and 20 to 25 (before flowering) days after sowing (DAS).
- Irrigation: Two irrigation was provided during the cropping period at 20 to 25 (before flowering) and 50 to 55 (pod initiation stage) days after sowing (DAS).
- Pest control: Sprayed two times with rovril 50wp@ 2g L⁻¹ water at 10 days interval after 50-60 days of sowing to control alternaria blight and white mould diseases.

BARI Piaz-6

- Land preparation: 4-5 cross shallow tillage and laddering.
- Sowing/planting method: Broadcast (For direct seeded); and line sowing, row to row distance 10 cm and plant to plant 5 cm (40-45 aged seedling)
- Sowing time: Last week of October to fast week of November
- Seed rate: For direct seeded 3 kg ha⁻¹. Seeds were treated with Autostin @ 3g kg⁻¹

seed.

- Fertilizer Dose: 240-260-150 and 5000 kg ha⁻¹ Urea, TSP, MoP and Cowdung.
- Intercultural operations: Two-three or more weeding was done to remove weed and the soil remain loose.
- Irrigation: 8-10 irrigation was provided during the cropping period to fulfill water requirement.
- Pest control: The crop was sprayed three times by Rovral@ 2g L⁻¹ water at 50-60 DAT to control purple blotch disease.

Table-1: Name of the selected Spices and Mustard Varieties that used for demonstration:

Name of the selected variety	Characteristics
<p>1. BARI Pijaj-6</p> 	<ul style="list-style-type: none"> ➤ Suitable for winter season ➤ Yield: 16-20 t ha⁻¹ ➤ Field duration: 120-130 days
<p>2. BARI Rosun-2</p> 	<ul style="list-style-type: none"> ➤ Yield: 10-11 t ha⁻¹ ➤ Field duration: 135-140 days ➤ Tip burn resistant
<p>3. BARI Morich-2</p> 	<ul style="list-style-type: none"> ➤ Suitable for summer season ➤ Yield: 20-22 t ha⁻¹ ➤ Field duration: 230-240 days
<p>4. BARI Holud-4</p> 	<ul style="list-style-type: none"> ➤ Suitable for summer season ➤ Yield: 28-30 t ha⁻¹ ➤ Field duration: 280-310 days
<p>5. BARI Sharisha-18</p> 	<ul style="list-style-type: none"> ➤ Yield: 2-2.5 ton/hectare ➤ Field Duration: 95-100 days ➤ Oil in seed: 40-42% ➤ Low in Uracic acid (91.06%) & Rich in essential Fatty acid

3.Results:

Table 2: Field trial result at Research Station:

Sl. No.	Crop	Variety	Area (bigha)	Sowing/ planting date	Harvesting Date	Yield (t ha ⁻¹)	Farmers' opinion
1.	Mustard	BARI Sarisha-18	6	10 to 15 Nov. 2023	6 March, 2024	Seed:2.4 Straw:3.54	Gave satisfactory yield. Boro rice can be grown easily, if mustard seed sown in optimum time.
2.	Onion	BARI Peaz-6	2.76	20 Dec. to 16 January 2024	28 March to 09 April, 2024	Bulb yield: 14.79	Profitable cash crop. Will be cultivate in the next year.
3.	Garlic	BARI Rashun-3	1.5	18 to 26 Nov, 2023	28 March to 17 April, 2024	Clove yield: 7.40	Profitable cash crop. All cloves will be stored for cultivation in more area in the next year.
4.	Turmeric	BARI Halud-4	7	16 to 21 April and 18 June 2024	-	-	-
5.	Chilli (Summer)	BARI Morich-2	3	13 March to last week of April, 2024	-	-	-

Result of DAE part:

Five (5) plots with extension service and five (5) conventional plots of four (4) crops including onion, chilli, turmeric, garlic and mustard result of total 40 plots were established. The garlic will be cultivated at the end of this year/production season.

- Mustard- BARI Sharisha-18: Demonstration (Harvested)
- Onion- BARI Peaz-6 Demonstration (Harvested)
- Chilli-BARI Chilli-2 Demonstration (in Field)
- Turmeric- BARI Holud-4 Demonstration (in Field)

Yield Performance of mustard or BARI Sharisha-18 demo. (harvested):

- ❖ Five (5) plot average yield: 1.82 ton/hect (with extension service (trial))
- ❖ Five (5) plot average yield: 1.58 ton/hect (without extension service)

Average Onion bulb yield:

- ❖ Five plots average bulb yield: 10 ton/hect (with extension services)
- ❖ Five plots average bulb yield: 07 ton/hect (without extension services)

Assessment of yield gap

The productivity of two different crops mustard and onion was evaluated under three management options viz. Research, Extension and Farmers aiming to find out the impact on case of Research Managed Trial (RMT), On-Farm Research Scientists Team followed their scientific approaches with modern management technologies for attaining the potential yield of the tested crops. However, in case of Extension Managed Demonstration Trial (EMDT) necessary extension approaches and mechanisms were followed. Farmers adopted their own management approaches using local community connectivity. The relevant data on the yield, economic return and necessary feedback regarding the gaps of different management system were collected and presented in graphs. The results revealed that RMT exhibited significantly higher seed yield of mustard (2.40 t ha⁻¹) and bulb yield of onion (14.40 t ha⁻¹) as compared to EMDT and FMT. The lowest yield of mustard and onion was recorded in FMT. However, EMDT demonstrated lower yield of both crops relative to RMT but higher over FMT.

The yield gap of mustard between RMT and EMDT was measured at 12.5% while 16.67% yield gap was noticed between EMDT and FMT (Fig.1). The yield gap of onion between RMT and EMDT was recorded 15.48% whereas it was noted 35.04% between EMDT and FMT.

Impact of Management approach on yield gap

The results indicate that a relatively lower yield gap was documented between RMT and EMDT that is 12.5% for mustard and 15.48% for onion as compared to yield gap between EMDT and FMT. The alignment of some joint innovative research-extension approaches with existing extension system such as direct quality seed supply at the farmers level from research organization, research-extension participatory planning, preparing comprehensive action plan, research-extension-farmers participatory training, joint field monitoring, quick information flow through digital platform in research-extension channel, participatory farmers group discussion, distribution of quality printed materials and other collaborative

services might be the reason for lowering the yield gap between RMT and EMDT.

Evaluation by stakeholder regarding yield gap

Yield gap is the resultant effect of many factors like biological, environmental, management issues, land criteria, social and others. However, we carried out an assessment event with the engagement of researchers, scientific staff (SA), extension personnel, field level extension worker (SAAO), farmers and other relevant persons to identify different factors for minimizing yield gap of mustard and onion. Stakeholder assessment suggests that some activities like fertilizer management, optimum time of sowing, availability of seeds and training were the most important factors for minimizing the yield gap between RMT and EMDT. Their opinion reflects some positive changes with improvement of production process due to research-extension collaborative functions eventually minimize the yield gap.

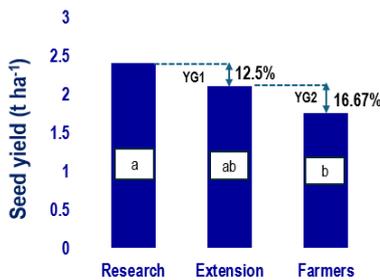


Fig. 1. Seed yield of mustard under different management

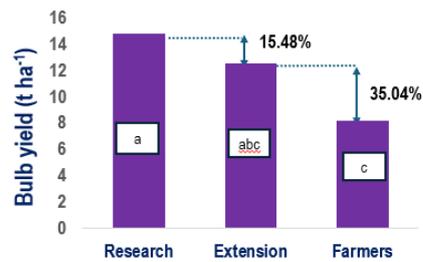


Fig. 2. Bulb yield of onion under different management

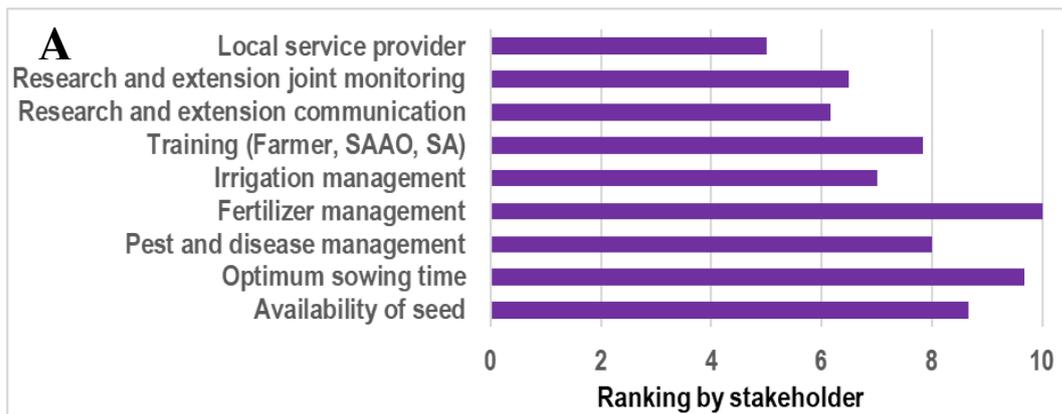


Fig 3: Stakeholder analysis result

Table-3: Progress of Year-2 Activities:

Qualitative goals:

Activities details in TCP	Activities (As per Work Plan)	Progress
1. Presentation of Action Plan	Action plan preparation and presentation	Presented at I st year project evaluation workshop on 09 November 2023 through Zoom meeting
2. Implementation of Action Plan	1. Establishment of trial plots in research field (22 no.)	16 trial plots established (6 plots remaining)
	2. Farmers group will be formed. Each group consist of 30 farmers including demonstration and non-demonstration farmers. Group meeting will be conducted and share their production related learnings on 15 days interval.	5 groups formed. Group meeting conducted by the supervision of SAAO
	3. 3 Spices & 1 oil seed (5 for each=20) Crop Demonstration Plots will setup in farmers field in two selected upazilas with extension services (1 crop remainimng)	20 demo plots established
	3. 3 Spices & 1 oil seed (5 for each=20) Crop Demonstration Plot will setup in farmers field in two selected upazilas without extension services (1 crop remaining)	20 demo plots established
	4. 3 steps training will be provided to farmer during plot selection & cultivation, after cultivation & before harvesting	4 Batches of training conducted
	5. Training and meeting will be conducted for Extension personnel	Training will be conducted
	1. End of the production season, field day will be organized and demonstration outcomes will be shared with the stakeholders in common village place. Total field day program number will be 5.	2 Field days organized

	2. Field Monitoring and field visits will be done by PI and Co-PIs.	3 Field Monitoring and field visit were completed
	3. Any project related Manual/information will be published	3 Manuals published
	4. Preparation of RATES project related video documentary	Will be completed on August 2024
	5. Annual Meeting/ workshop will be organized at BARC	Organized
	6. Annual Report will be prepared and submitted to AFACI	Submitted
3. Participate in interim evaluation workshop	Participation in AFACI RATES Project Evaluation workshop at Hanoi, Vietnam on 26 30 August 2024	Attended

Table-4 : Activities performed to address the specific Objectives (for the Year-2):

SL. No.	Specific Objectives	Activity	Progress
1	To facilitate the dissemination of BARI generated high-yielding varieties of Onion, Chili, Garlic, Turmeric & Mustard in Bangladesh	1. Establishment of 40 Demo plots in farmers field	4 crops Completed
		2. Capacity building of Extension personnel through training	1 Batch completed
		3. Capacity building of farmers through training	4 Batch Completed
		4. Spices and Oil seeds Manual publication	3 Manuals published
		5. Sharing the manuals to local farmers	80 farmers received the manual
02	To study the causes of yield gap between farmers field and research field	1. Establishment of demo plot in research fields for each variety	16 plots (4 crops) completed
		2. Establishment of demo plot in farmers field with extension services	16 plots (4 crops) completed
		3. Establishment of demo plot in farmers field with the traditional management practices	16 plots (4 crops) completed
		4. Intensive Field visit and monitoring with research and extension	3 Field visit and monitoring done by PI

		personnel together	and Co-PI
		5. Information collection: reason behind the yield gap	Ongoing

Capacity Building programme:

- Day long Farmers Training:
 - Phase-1: Initial Demo Stage x 2 Upazila Farmers (60),
 - Training Phase-2: Field Management Stage x 2 Upazila (60)
- Farmers Group Meeting headed by 2 SAAO: twice in a month (7 x 5 Groups)=35 meetings & 150 members
- Intensive Field Monitoring with research and extension personnel is ongoing

Extension personnels and Farmers were trained on

Production technology:

- Planting optimum time
- Optimum fertilizer management
- Optimum irrigation management
- Pest and disease management with IPM approach
- Optimum time of harvesting

Storage and post harvest quality

- Proper Grading
- Proper Curing technique
- Proper storage condition and management during storing
- Pest and disease management in storage

General Topics for training:

- Current status of Spices and oil seeds crops: Research, Technology, Production, Future strategies
- Modern Technologies of that crops generated from research Institutes (Variety and agronomic Management)
- Modern Cultivation Techniques of Spices and BARI Sharisha-18 varieties
- Major pests & Integrated Pest Management Techniques of spices & Oil seeds and Major diseases and pathological management of that crops
- Value chain and market linkage of spices and oilseed crops
- Farmers group formation and community approach for the extension of spices and oilseed crops

Activity Photos:



Fig-1: Researcher managed plot of Mustard at Ghatail, Tangail



Fig-2: Field Trial of BARI Sharisha-18 without extension services at Ghatail



Fig-3: Farmers demo plot of BARI Piaza-6 with extension services at Dhanbari





Fig-8: Farmers Group meeting (Twice in a month)

Field Day Photos:



Fig-9: Field Day at Dhanbari & Ghatail Upazila Upazila, Tangail on BARI Piaz-6 & Mustard

3-1: Results from GFRAS online meeting

Main topic of the meeting: Report of the Meetings held by GFRAS/APIRAS team with PI/Co-PI of RATES projects funded by AFACI on 18 April 2024

Progress:

The assessment of extension system in Bangladesh revealed the following weaknesses namely, inadequate training of extension staff, lack of platforms for information exchange and poor research-extension linkages. The mustard and onion varieties demonstrated through the project showed satisfactory yields and farmers have expressed interest in cultivating these cash crops in the future. The SAAOs trained by the project are supporting farmers cultivating these varieties in their demonstration farms through training and technical backstopping. Research trials by BARI and demonstration trials by DAE have been initiated. Training Manuals for 3 crops have al

ready been developed.

Discussion:

The presentation highlighted the challenges faced in seed supply, especially in garlic, and the efforts made to overcome this through local sourcing. Rasheed questioned the rationale behind conducting two types of treatments, one with and one without extension services. This was done to investigate the gap between research and extension services. However, Rasheed pointed out that despite the extension services, a significant yield gap still existed. It was confirmed this, acknowledging that it was a common issue in their country.

On use of digital tools, PI confirmed plans for preparing a video documentary during field day and dissemination of technology manuals via various media, including an e-delivery system. They discussed the importance of training extension staff to maximize the project's impact on farmers. Regarding the transfer of new crop varieties, PI clarified that while these crops have been grown by farmers, these new improved varieties have not been widely disseminated. Suraya mentioned that the project will be evaluated through a survey in the final year.

Challenges

- Inadequate availability of seeds of improved varieties
- Busy schedule of extension staff especially SAAOs that constrain them from devoting more time on technology dissemination.

Follow up actions:

1. PI will share the presentation and technology manuals with Rasheed and the team after the meeting.
2. PI will send the online version of the technology manuals to Rasheed and the team.
3. The project will conduct a survey on adoption rate of the new varieties in the next year.

4. Project achievements:

- A baseline study of the current extension system was conducted, and the existing situation and gaps were identified.
- BARI generated high yielding oil seed and spices crop technologies i.e. BARI Sharisha-18, BARI Piaz-6, BARI Rosun-2, BARI Morich-2, BARI Holud-4 (Variety and Management practice) were disseminated.
- Extension personnel/Farmers knowledge and skills are developed through training.

- The reason behind the yield gap between research field and farmers field were identified.
- Research-Extension-Farmers linkage was developed through involvement of researcher and extension worker in the project activities.
- 3 Manuals on spices and oil seed crops were published and shared with farmers.
- Two newsletter on AFACI-RATES project activities were published in the Daily Newspaper

※ **Quantitative goals** (*specimen*)

Quantitative Goals (Year-2):

Indicators	1st year (Dec. 2022-Nov. 2023)			2nd year (Dec. 2023-Nov. 2024)		
	Plan (A)	Output (B)	Rate (%)	Plan (A)	Output (B)	Rate (%)
Activities for the 1st & 2nd year (Fixed)						
1. Analyses of current state of infrastructure in rural extension system	1	1	100			
2. Establishment of action plan for rural extension	1	1	100			
3. Education and training for capacity building related to rural extension				6	4	66.6 6
4. Establishment of technology extension manual related to AFACI projects				5	2	40
5. Development of technology extension manual (General)				1	1	100
Activities for the 1st Year						
6. Survey and analysis of existing agricultural system for technology dissemination	1	1	100			
7. Orientation on Korean Agricultural Extension System through the Workshop in Korea	1	1	100			
8. Sharing of Project activities among the stakeholder and seeking valuable suggestions for the improvement of project action plan through Inception Workshop	1	1	100			
9. Setting up improvement strategies for existing extension system and action plan	1	1	100			
10. Selection of project site through field visit and sharing with relevant stakeholder	2	2	100			
11. Selection of Spices and Oil seeds crops for demo	5	5	100			
12. Attaining baseline information through survey with prescribed questionnaire, focus group discussion and secondary sources	1	1	100			
Activities for 2nd Year						
1. No. of farmers group formed (30)				5	5	100

2. No. of Demo fields organized in research field				22	16	72.73
Indicators	1st year (Dec. 2022-Nov. 2023)			2nd year (Dec. 2023-Nov. 2024)		
	Plan (A)	Output (B)	Rate (%)	Plan (A)	Output (B)	Rate (%)
3. No. of Demo fields organized in farmers field with extension services				25	20	
4. No. of Demo fields organized in farmers field without extension services				25	20	80
5. No. of Training Organized for farmers				6	4	80
6. No. of farmers gathered knowledge and skill on modern cultivation techniques of Spices & oil seed crop				180	120	66.66
7. No. of Training Organized for extension personnel (SAAO)				1	1	100
8. No. of Field Day organized				5	2	40
9. No. of farmers attended in Field Day				250	100	40
10. No. of meeting organized for Extension personnel				15	10	66.66
11. No. of Group meeting organized for farmers				120	70	58.33
12. No. of Technology Extension Manual Developed related to RATES Project				5	2	40
13. No. of Technology Extension Manual Developed (General)				1	1	100
14. No. of Stakeholders received the extension manual				200	80	40
15. Preparation of RATES project related video documentary				1	-	ongoing

4-1 Achievement evidence

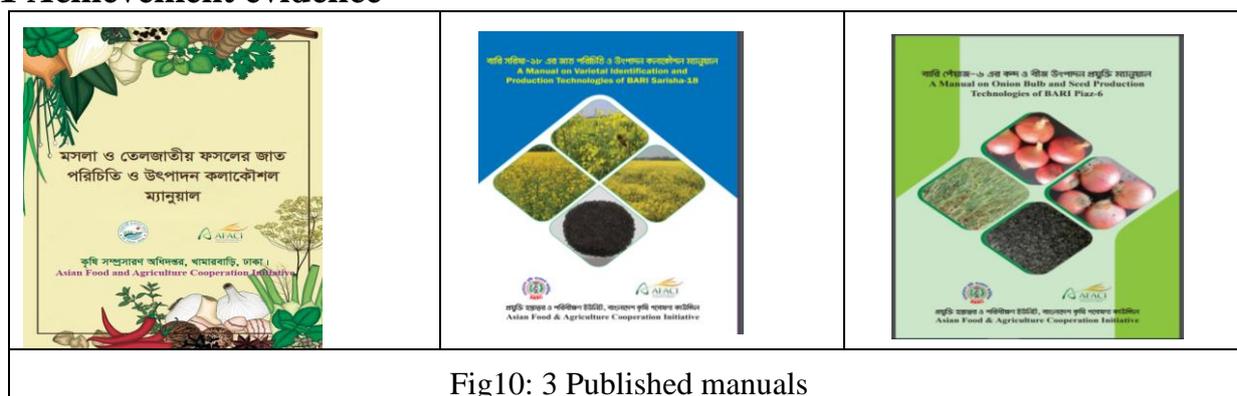


Fig10: 3 Published manuals



Fig 11: Published RATES project activity in the in Daily newspaper

5. Conclusion

- BARI has been validating the technologies including different genotypes of mustard, chili, turmeric, garlic and onion; Varieties and agronomic practices in their research fields.
- DAE demonstrates different demonstration plots of these crops along with their related technologies in the farmers’ field using extension services and without extension services/farmers’ practices.
- The knowledge and skills of farmers’ and extension personnels will be improved for cultivating these crops through training by this project.
- Different causes of yield gap of above mentioned crops between research and farmers’ field will be identified through RATES project and thereby sustainable agriculture will be enhanced.
- Research (BARI) and extension (DAE) linkage will be strengthened by the coordination of BARC using the support of RATES project.

6. Future plan and Recommendations

Table-5: Activity performance schedule during the project year 3:

Activities	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Activities Details in TCP: Initiate the improvement of agricultural extension system based on the results of the evaluation of 2nd year												
1.From the findings of the year-2, selective demonstrations plots will be established in the respective farmers field to identify the effective genotype/s for promoting the spices and oil seed cultivation in the proposed areas.												
2. Survey and analysis of adoption rate of disseminated new technologies of mentioned crops												
3.Analysis of data to determine yield gap in research field and farmers field												
4. Follow-up group meeting will be conducted												
5. In addition, on 3 rd year motivated farmers will cultivate latest spices varieties with their own budget.												
6.Two Market orientation and linkage establishment training cum workshop will be conducted at Upazila level.												
7. Upazila wise group farmers, new interested farmers, market stakeholders list and market linkage status will be shared.												
8. Progress review/annual meeting will be organized.												
2. Activities Details in TCP: Monitoring and consulting												
9. Attended in Final Evaluation Workshop												
3. Activities Details in TCP: Evaluation												
10.Farmer(s) success story as booklet of field demonstration will be documented.												
11.Final project report will be prepared and documented and submitted to AFACI.												

7. Major changes in AFACI project-related

In the second year, major changes to the project work plan were not required.

7-1: Challenges and Suggestions

- There is a shortage of high-quality oilseed and spices crop seeds, especially for

high-yielding and climate resilient varieties.

- Weather vulnerabilities, such as the excessive heat wave from April to May 2024, have adversely affected chili and turmeric cultivation.
- Seeds often do not reach farmers on time, leading to delays in planting and negatively impacting crop production cycles.
- More research extension farmer linkage with joint collaboration of research programme planning, monitoring, and farmers feedback analysis is necessary to improve the extension system.
- Remuneration for the Principal Investigator (PI) and Co-Principal Investigator (Co-PI) could be included.