Annual Report of RATES Project in 2023

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**	
Organization	**Bangladesh Agricultural Research Council, Dhaka, Bangladesh**	
Period & Budgets	**Period**	**Budget (USD)**
	Dec.2022.-Nov.2023.	30,000/year

Summary:

A three year project promotes system improvement and capacity building of extension personnel and farmers based on identified needs of AFACI 15 member countries including Bangladesh. During the past 11 months (December 2022 to October/2023) the project completed basic preparation including baseline study on agricultural extension and capacity building system in AFACI member countries. Country Report submitted to AFACI. Baseline study on Agricultural Extension and capacity building system in Bangladesh also submitted. Attended in the Workshop in Korea regarding Agricultural Technology Extension service; improvement strategy and action plan was established. Allotted budget disbursed to, BARI and DAE from BARC component as approved TCP.

The project also completed an inception workshop with the participation of research and extension personnel. An inception report has been prepared and this report forwarded to Co-PI's of DAE and BARI components. The Project sites Ghatail and Dhanbari Upazila of Tangail district in Bangladesh selected with the coordination of BARC, BARI and DAE project personnel. Questionnaire was prepared for Baseline Study and filled out questionnaire by farmers has been collated, collected and analyzed. Respective extension workers is being communicating and discussing to the selective farmers for demonstration plots. According to inception report, 4 spices crop (Onion, Garlic, Chili, turmeric) and 1 oil seed crop (BARI Sarisha-18) have been selected.

1. Introduction:

Population increasing rate 1.48% whereas arable land decreasing 1% in BD (BBS-2021). One of the objectives outlined in the SDGs is to doubling the productivity. Research institutes, including BARI, undertake research endeavors aimed at generating technologies for both crops and spices, while DAE is responsible for disseminating these technologies to farmers.

DAE possesses ample manpower and institutional capacity. However, it exhibits notable weaknesses, including inadequate Research-Extension-Farmers linkage, sluggish technology transfer processes, and insufficiencies in the training of extension personnel and farmers.

Spices have assumed a noteworthy role in promoting human health (antioxidant, heart health, metabolic and digestive advantages). Their significance extends beyond mere food flavoring. The declining trend in spice production can be attributed to the prioritization of other crops. Consequently, the instability in spice market prices is influenced by the considerable demand and the government's inclination to import various spices from overseas. Farmers across various regions in Bangladesh cultivate major spices such as chili, onion, garlic, turmeric, and ginger etc. driven by the variations in climatic and edaphic conditions to different agro ecological zones. To attain the highest possible yield from these spices, high yielding varieties including smart management technologies are essential tools. The Spices Research Centre, BARI has developed a range of high-yielding spices varieties and effective management technologies for spices cultivation. However, these innovations have not yet been widely disseminated and adopted by farmers. Under the coordination of TTMU, BARC, extension workers and researchers will enhance linkages by incorporating educational and marketing aspects. DAE is the sole govt. extension agency with the capacity to effectively disseminate spices technologies. This study focuses on enhancing the extension system by incorporating advancements in spice technologies.

The objectives of the projects are:

1. To improve agricultural extension and capacity building system for professional agricultural extension service
2. Establishment of global network and cooperation basis by spreading Korea's agricultural extension model

Specific Objectives:

3. To facilitate the dissemination of BARI generated high-yielding varieties and smart management practices of Onion, Chili, Ginger, Turmeric& Mustard in Bangladesh
4. To study the causes of yield gap between farmers field and research field
5. To enhance extension professionals and farmers' knowledge and skills in spices and oil seed production (Onion, Garlic, Chili, Turmeric and Mustard).
6. To reinforce the linkage between research and extension with the enhancement of existing extension system in Bangladesh

2. Methodology

The PI with the 2 Co-PIs of the project accomplish the objectives of the project visited the project location to establish the demonstration plot (15 in Ghatail Upazila and 10 in Dhanbari Upazila, 0.13 hec/plot). Questionnaire have been prepared to collect the relevant information including existing spices and oil seed technologies (Varieties and management technologies) that have been practicing by the farmers of that location. All relevant information was collected from the selected farmers through questionnaire. Secondary information was also collected from websites, reviewing published literatures etc. for preparing baseline study report. The collected information through questionnaire will be collated and analyzed for quality output.

On the basis of the recommendation of the inception workshop, some changes in the objective and activity section were included is included in the proposal. Objective is to study the causes of yield gap between farmers field and research field. To attain this objective, Establishment of demo plot in research fields for each variety in same location, Establishment of demo plot in farmers field with extension services, Establishment of demo plot in farmers field with the traditional management practices are necessary. In

addition, intensive field visit and monitoring with research and extension personnel together and Information regarding the reason behind the yield gap need to be collected. The demonstration for spices and oil seed production in the farmer's field was managed by the farmers with technical support form PI of this project along with the team of Bangladesh Agricultural Research Institute (BARI) and Department of Agricultural Extension (DAE). Farmers rally/field days were organized in demonstration sites with the participation of scientists, extension personnel and farmers.

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

Name of the selected variety	**Characteristics**
1. BARI Piaj-6 	➢ Suitable for winter season ➢ Yield: 16-20 t ha^{-1} ➢ Field duration: 120-130 days
2. BARI Rosun-2  	➢ Yield: 10-11 t ha^{-1} ➢ Field duration: 135-140 days ➢ Tip burn resistant
3. **BARI Morich-2**  	➢ Suitable for summer season ➢ Yield: 20-22 t ha^{-1} ➢ Field duration: 230-240 days
4. BARI Holud-4  	➢ Suitable for summer season ➢ Yield: 28-30 t ha^{-1} ➢ Field duration: 280-310 days
5. BARI Sharisha-18 	➢ 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: Progress of Year-1Activities:

Qualitative goals:

Activities details in TCP	Activities (As per Work Plan)	Progress
1. Baseline study on agricultural extension and capacity building system in AFACI member countries	1. Country Report will be submitted to AFACI	Submitted (as on 14/04/23)
	2. Baseline study on Agricultural Extension and capacity building system in Bangladesh	Completed (on January/23)
2. Training on agricultural extension system in Korea	3. To attend in the Workshop in Korea regarding Agricultural Technology Extension service;	Attended (24-28/04/23)
3. Establishment of action plan	4. Establishment of improvement strategy and action plan	Established (5/04/23)
	5. Inception workshop will be organized at BARC	Organized on 16.06
	6. Generation of Inception Report and sent to BARI & DAE	Sent as on 10/09/23
	7. Project sites will be selected with the coordination of BARC, BARI and DAE project personnel	Selected (on July/23)
	8. Questionnaire will be prepared for Baseline Study	Prepared
	9. Filled out Questionnaire will be collated & Analyzed	Ongoing
	11. Farmers Group Formation	Completed
	5. Allotted budget will be disbursed to BARC, BARI and DAE component	Disbursed
	7. Capital items (Laptop, 1 and Colour Printer, scanner etc.) will be procured as TCP	Procured
	12. Annual report will be prepared and submitted to AFACI.	Submitted

Table-3 : Activities performed to address the specific Objectives (for the Year-1):

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. Team formation with local extension workers and farmers leader	Completed
		2. Baseline study with the questionnaire developed by BARC, BARI and DAE	Completed
		3. Site selection and farmers selection	Completed
		4. Spices and oil seed crop variety selection	Completed
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	Ongoing
		2. Establishment of demo plot in farmers field with extension services	Ongoing
		3. Establishment of demo plot in farmers field with the traditional management practices	Ongoing
		4. Intensive Field visit and monitoring with research and extension personnel together	Will be held
		5. Information collection: reason behind the yield gap	Will be analyzed

Activity Photo:



Attended in the Workshop in Korea on 24-28 April/2023 on Agricultural Technology Extension Service

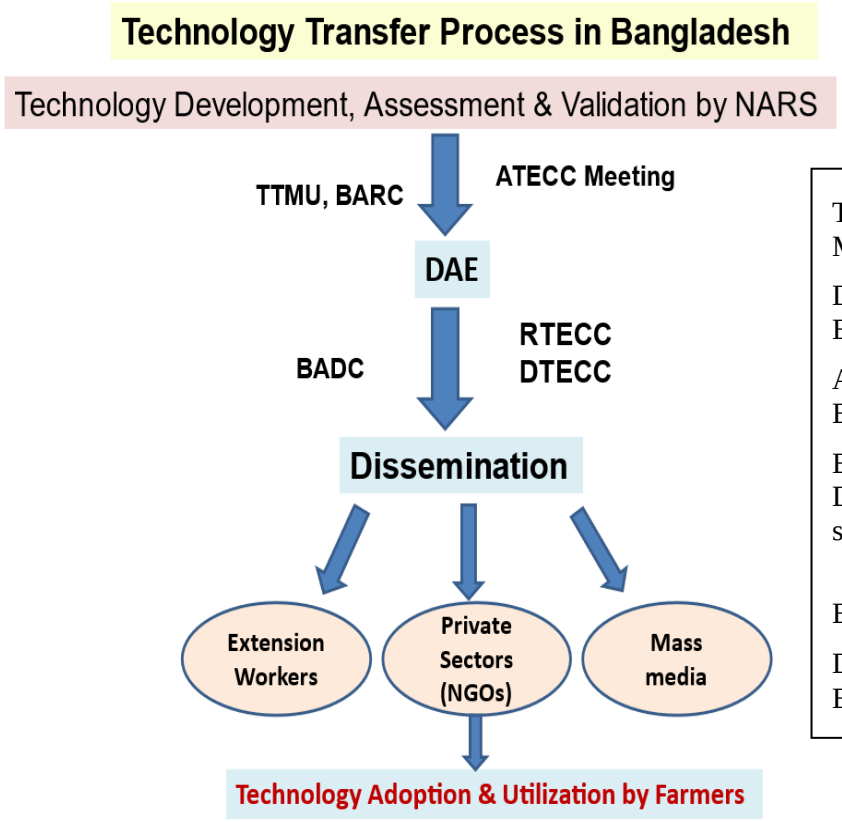
Visited Upazila Agriculture Office at Ghatail

Visited Upazila Agriculture Office at Dhanbari

Focus Group Discussion with farmers

Inception Workshop organized at BARC

5. Project achievements: Current State of Rural Extension System in Bangladesh:



TTMU: Technology Transfer & Monitoring Unit;

DAE: Department of Agricultural Extension;

ATECC: Agricultural Technology Extension Coordination Committee;

BADC: Bangladesh Agricultural Development Corporation (Input supply)

RTECC: Regional Technology Extension Coordination Committee;

DTECC: District Technology Extension Coordination Committee

Fig.: Agricultural Extension System in Bangladesh

Government of Bangladesh: Agricultural Extension Policy

- New Agricultural Extension Policy (NAEP), 2020
- National Agricultural Extension Manual, 2016

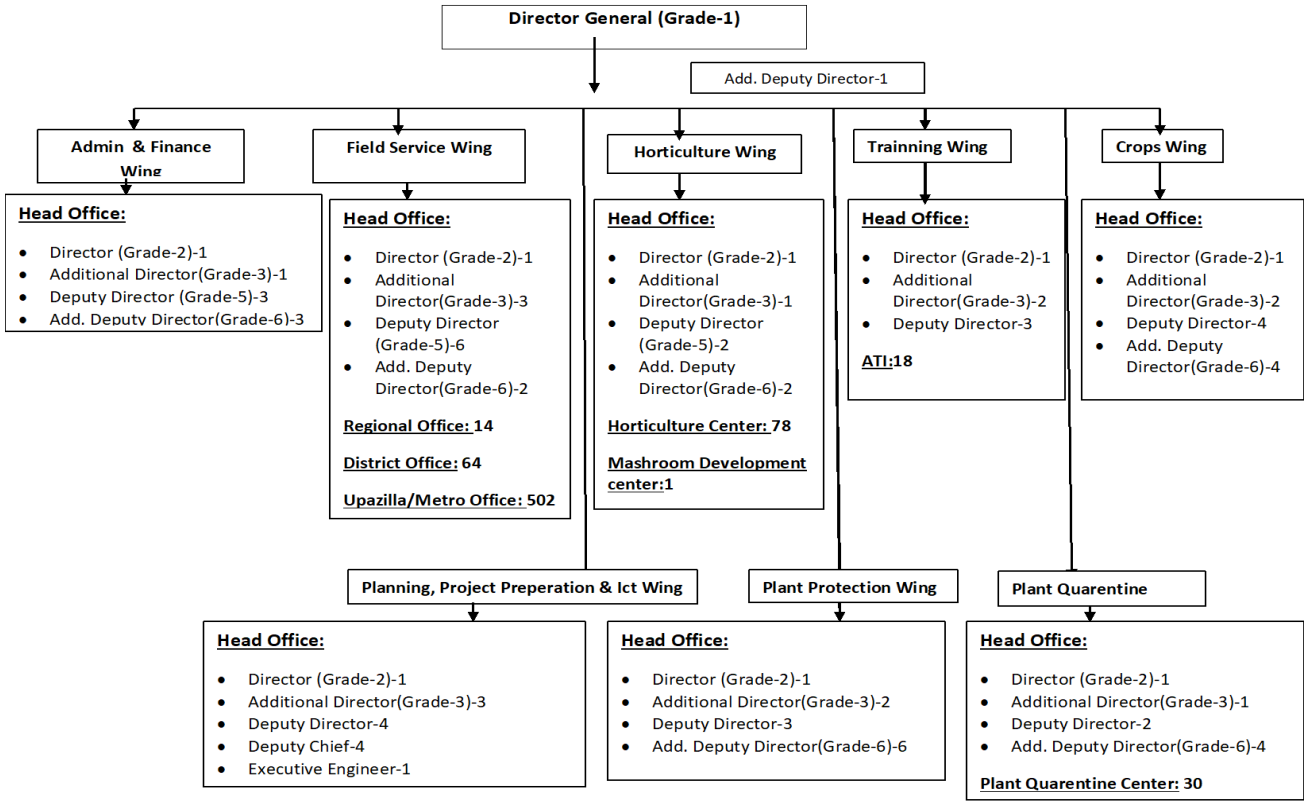
Principles:

1. Extension to all categories of farmers;
2. Efficient extension services;
3. Decentralization;
4. Demand led extension services;
5. Working with groups of all kinds of farmers;
6. Strengthened research-extension links;
7. Training of extension personnel;
8. Use of appropriate extension methodology/ies;

9. Integrated extension support services;
10. Co-ordinated extension activities;
11. Integrated environmental support.

Organization: Department of Agricultural Extension (DAE)

- DAE is the largest public sector extension service provider with considerable human & other resources along with country wide network in Bangladesh.
- The head office of the DAE has 8 wings
- Under the Field Service Wing, the activities are spread across the country in 14 regions, 64 districts, 492 upazilas, 15 metropolitan offices and 14032 blocks.
- Horticulture Wing: 76 Horticulture Centers and a Mushroom Development Institute.
- Training Wing: 18 Agricultural Training Institutes (ATIs) for diploma education
- Plant Quarantine Wing: 30 Quarantine Centers
- Others wings are Admin & Finance wing, Crops wing, Planning, Project Preparation & ICT Wing and Plant Protection Wing.



Research-Extension Farmers Linkage:

- Latest research trialed and recommended varieties are disseminated through DAE's different projects *via* Upazila Agricultural Offices up to farmer's field and trainings are provided.
- Research organization (BARI, BRRI, BJRI, BINA etc) are sharing the technical knowhow directly with the farmers through research-extension review workshops.
- Agricultural Technical Committees are formed and acting for the proper implementation of Government initiatives.

Field Extension Methods used by DAE:

Group Extension Approach:

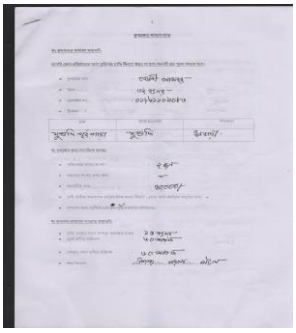
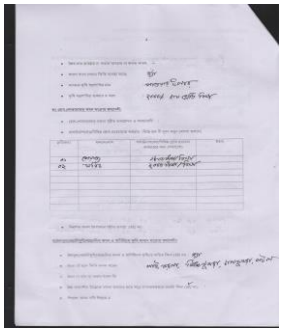
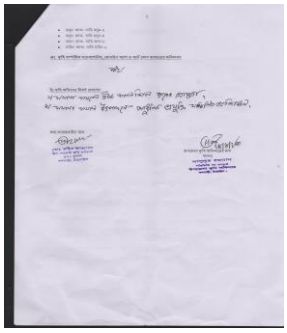
- Result Demonstrations with Farmer's Groups,
- Method Demonstrations,
- Field Days,
- District and Thana Fairs,
- Farm Walks,
- Farmers Rallies,
- Folk Media,
- Group Meetings,
- Motivational Tours/ Farmers to Farmers Exchange Visit
- Participatory Technology Development,
- Farmer Field Schools
- Training Days (TOT and farmers)

※ Quantitative goals *(specimen)*

Indicators	1st year (Dec. 2022-Nov. 2023)		
	Plan (A)	Output (B)	Rate (%)
1. Analysis of current state of infrastructure in rural extension system	1	1	100
2. Establishment of action plan for rural extension system	1	1	100
3. Survey and analysis of existing agricultural system for technology dissemination	1	1	100
4. Orientation on Korean Agricultural Extension System through the Workshop in Korea	1	1	100
5. Sharing of Project activities among the stakeholder (BARC, DAE, BARI, AIS and others) and seeking valuable suggestions for the improvement of project action plan through Inception Workshop	1	1	100
6. Setting up improvement strategies for existing extension system and action plan	1	1	100
7. Selection of project site through field visit and sharing with relevant stakeholder (BARC, BARI and DAE)	2	2	100
8. Selection of Spices and Oil seeds crops for demo	5	5	100
9. Attaining baseline information through survey with prescribed questionnaire, focus group discussion and secondary sources	1	1	100
10. Formation of site-specific farmers group for production, processing and marketing of spices crops under existing and improved extension system	5	5	100
11. Disbursement of budget among the project related partner organization (BARI and DAE)	3	1	33.33

4-1 Achievement evidence

Sample of a filled out Questionnaire collected from farmers:

6. Conclusion

- The requisite measures have been jointly undertaken by BARC, BARI and DAE to enhance the yield of onion, garlic, chili, turmeric, and mustard crops by improving research extension linkage.
- The RATES project aims to identify and address the yield gap of the mentioned crops between research and farmers' fields by implementing necessary solutions.

7. Future plan and recommendations

Activity Plan for the next year (Year-2):

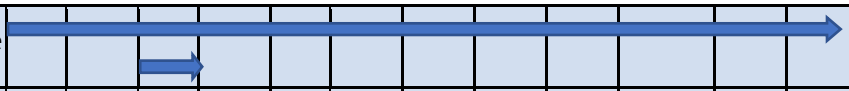
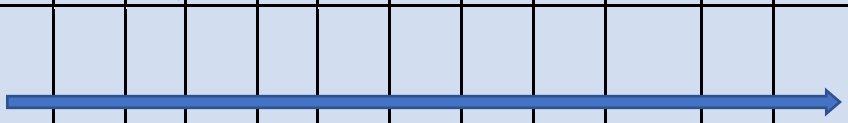
Activities details in TCP (Year 2)	Activities (As per Work Plan)
1. Implementation of Action Plan	1. Establishment of 25 demonstration plots in farmers field and 22 in research field
	2. 4 Spices and 1 oil seed (5 for each=25) Crop Demonstration Plot will setup in two selected upazilas (Dhonbari-10 & Ghatail-15) and 25 demo plot will be established in research field.
	3. 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
	4. 3 steps training will be provided to farmer during plot selection & cultivation, after cultivation & before harvesting. Latest varieties, production technologies, agronomic practices, machineries, irrigation and ICT enabled services will be shared by relevant experts.
	5. Training and meeting will be conducted for Extension personnel
	6. 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.
Monitoring and consulting	7. Field Monitoring and field visits will be done by PI and Co-PIs.
Evaluation	8. Any project related information will be published
	9. Annual Meeting/workshop will be organized
	10.Annual Report will be prepared and submitted to AFACI

Quantitative Goals (Year-2):

Indicators	2nd year (Dec. 2023-Nov. 2024)		
	Plan (A)	Output (B)	Rate (%)
No. of farmers group formed (30)	5		
No. of Demo fields organized in research field	22		
No. of Demo fields organized in farmers field with extension services	25		
No. of Demo fields organized in farmers field without extension services	25		
No. of Training Organized for farmers	6		
No. of farmers gathered knowledge and skill on modern cultivation techniques of Spices & oil seed crop	180		
No. of Training Organized for extension personnel (SAAO)	1		
No. of Field Day organized	5		
No. of farmers attended in Field Day	250		
No. of Group meeting organized for Extension personnel	15		
No. of Group meeting organized for farmers	24 times x 5 groups		
No. of Technology Extension Manual Developed related to RATES Project	5		
No. of Technology Extension Manual Developed (General)	1		
No. of Stakeholders received the extension manual	200		

Table-4: Activity performance schedule during the project year 2

List of planned activities to be performed in chronological order	(month per project year-2023 to 2024)											
	1	2	3	4	5	6	7	8	9	10	11	12
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1. Establishment of demonstration plots in research field (22 no.)	→	→									→	→
2. 4 Spices & 1 oil seed (5 for each=25) Crop Demonstration Plot will setup in farmers field in two selected upazilas (Dhonbari-10 & Ghatail-15).	→	→									→	→
3. 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.	→	→	→	→	→	→	→	→	→	→	→	→
4. 3 steps training will be provided to farmer during plot selection & cultivation, after cultivation & before harvesting	→	→	→	→	→	→	→	→	→	→	→	→

5. Training and meeting will be conducted for Extension personnel	
5. 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.	
6. Field Monitoring and field visits w ill be done by PI and Co-PIs.	
7. Any project related Manual/inform ation will be published	
8. Annual workshop will be organized at BARC	
9. Annual Report will be prepared an d submitted to AFACI	

Activities will performed to attain the specific objectives for year-2:

Objective 3: To enhance extension professionals and farmers' knowledge and skills in spices and oil seed production (Onion, Garlic, Chili, Turmeric and Mustard).

1. Trained up the SAAO and farmers about technological knowhow of variety before cultivation, during and after cultivation and post-harvest processing, Nutritional knowledge gain etc.
2. Field day will be organized and demonstration outcomes will be shared
3. Market orientation and linkage establishment training cum workshop will be conducted
4. Plan to strengthen the capacity of Extension worker to distribute cultivation technology for major spices crop:

Type of Extension Personnel	Type of Activity	Topic for Training/meeting Session	No. of Participants	Time Schedule
Upazila Agriculture Officer (UAO) Agriculture Extension Officer (AEO) Sub Assistant Agriculture Officer (SAAO)	Extension personnel Meeting (15 no.)	Seasonal planning	150	February/2024 June/2024
	Training on modern cultivation techniques of spices & oil seeds-1 Batch SAAO Training	• Current status of Spices and oil seeds crops: Research, Technology, Production, Future stretegies • Modern Technologies	30	March/2024

		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 • Major diseases and pathological management of that crops		

In addition, Plan to strengthen the capacity of farmers to distribute cultivation technology for major spices crop:

Type of Activity	No. of Participants	Topic for Training Session	Time Schedule
Day long Farmers Training Phase-1 Initial Demo Stage x 2 Upazila	30 x 2 batch=60	• Importance of spices and oilseed crops in respect of food, nutrition and farmers income • Introduction of different varieties of spices and oilseed crops • Production technologies of spices and oilseed crops • Post-harvest processing and storage of spices and oilseed 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	December/2023
Day long Farmers Training Phase-2 Filed Management Stage x 2 Upazila	30 x 2 batch=60		February/2024
Day long Farmers Training Phase-3 Harvest Stage x 2 Upazila	30 x 2 batch =60		April/2024
Field Day Year-2 * 5 nos	50*5=250		After each crop Harvesting time
Farmers Group Meeting headed by 2 SAAO: twice in a month (24 x 5 Groups)= 120)	30*5=150		January 2024-December 2024

Field Monitoring			
Field Monitoring Per Crop (*5) SAAO Visit: 10 AEO Visit 6 UAO visit 3 Director/AD/DD/DTO visit 1 Research visit 3 Project visit *1	6-7		Year Round

Objective-4: To reinforce the linkage between research and extension system in Bangladesh

1. Coordination by BARC through meeting, seminar, workshop, monitoring etc.

Recommendations:

- Expanding the project to additional locations will be an effective means of identifying weaknesses within the extension system. This expansion will enable us to determine the necessary solutions and foster the development of research-extension-farmer linkages.
- The project also aims to enhance the knowledge and skills of both farmers and extension personnel in the domain of smart technologies for spices and oilseed crops

6. Major changes in AFACI project-related

During the period (December 2022-November 2023) several important project activities such as Focus group discussion, Project site selection, co-operator farmer selection, Organization of Inception Workshop, Preparing of Action, Disbursement of Budget to the partner organization etc. have been successfully accomplished.

However, a very little change has been considered:

- The inclusion of Mustard instead of Zinger in the production, processing and marketing on the basis of national priority and demand. Oil seed crops play a significant role in the agricultural and economic landscape in Bangladesh (source of edible oil, economic contribution, livestock feed etc.).
- Yield gap between Research field and farmers field is a national concerning issue. So, for the estimation of Yield Gap a separate trial has been included the project activities aiming to identify the main reason (existing system, management, communication, farmers skillness etc.) behind the yield gap. For this reason, this objective is incorporated "To study the causes of yield gap between farmers field and research field".

To attain this objective some activities have been incorporated below:

a. Establishment of demo plot in research fields for each variety
b. Establishment of demo plot in farmers field with extension services
c. Establishment of demo plot in farmers field with the traditional management practices

Furthermore, as part of the work plan revision, the project budget has undergone a revision separate from the TCP.

Revised Budget in USD:

Code of Item	Code of Expenditure	Year 1	Year 2	Year 3	GT ($)
100	Personnel				
200	Materials & supplies	1401.5	8000.0	2000.0	11401.5
300	Training & Meeting	13070.5	13500.0	5000.0	34098.5
400	Other Operating Expenses	13928.0	11455.0	11456.0	36839.0
500	Publication/Dissemination		3528.0	1299.0	2299.0
600	Others (Miscellaneous)	1600.0	2000.0	1762.0	5362.0
	Total	**30000.0**	**38483.0**	**21517.0**	**90000.0**

7. Challenges and Suggestions

Spice crop cultivation in Bangladesh can face several common problems that affect the growth and yield of these valuable crops. Some of the major challenges include

Environment especially weather: Bangladesh experiences a tropical monsoon climate, which can be unpredictable and extreme. Variations in temperature, rainfall, and humidity can negatively impact spice crops, especially those that require specific climatic conditions

Pests and Diseases: Spice crops are susceptible to various pests and diseases. Common problems include fungal infections, bacterial diseases, and insect infestations. Managing these issues often requires the use of pesticides and other chemical treatments, which can be costly and have environmental implication. In addition, soil and water management, access to quality seeds/planting materials, lack of knowledge and training of extension personnel and farmers, are the major barriers for spices cultivation in Bangladesh.

To address these challenges, Govt, of Bangladesh and various agricultural organizations provide necessary support in terms of research, training, and technology dissemination t o help spices farmers improve their cultivation practices and increase their yield.

Sustainable and environmentally friendly climate smart agricultural technologies are bei ng promoted to reduce these challenges.