



Training Report on

“Life Skill Based Safe Agricultural Education and Skill
Development for Self-Employment of Marginalized Farmer
Project”

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Executive Summary:

Pesticide use is a common practice to control pests in the world. In Bangladesh for high yield and production extensive amount of chemical fertilizer has been used by the farmers, especially in the vegetable field. It is proven that although the effective and responsible use of a pesticide may bring significant contributions to the crop yield, the unbound, irrational, and unprotected uses of pesticides are threatening ecosystems such as soil fertility, river, pond, and underground water, fish, eco-friendly insects, beneficial microorganisms, human health, and environment.

In Bangladesh, the number of pesticides used in vegetable cultivation per unit area is much higher than in other parts of the world. The initiatives for pesticide-free vegetable production in Bangladesh are very limited.

Bangladesh Government has already taken some initiatives to control overdoses of pesticide use. In this connection, ASTER has taken a project titled “Life skill-based safe agricultural education and agricultural skill development for self-Employment of the marginalized farmer” to implement in Savar Upazilla of Dhaka district and Singair Upazilla of Manikgonj district.

CEMCA has allowed us to train the marginalized farmer on

- I. **Sustainable Agriculture** and
- II. **IPM Technologies for year-round vegetable production**

ASTER has made an agreement with a national NGO named Society for Development Initiatives (SDI) to get help in terms of trainee selection and trainer & facilitators support to implement the project properly. Because SDI has been doing their different programs like development, Microcredit and Institution development, etc. in the project area for long time. ASTER communicated with farmers in different villages with the help of SDI. SDI has different kinds of programs to promote income-generating activities to increase income, self-employment, self-empowerment, and eradicate the poverty of the society. SDI enforces the initiatives to develop socio-economic status where all the people will have the similar right, brighten prospects and accelerate the development of the human & skills, Capacities, and life desires.

ASTER Selected 10 vegetable producer groups from Savar Sub-district and Singair Sub-district. In the second stage, ASTER collected NID Card from interested farmers who wanted to get such kinds of training mentioned in the project proposal.

After that, the Male Farmer and Female farmer were trained on both technologies for their benefit.

Both areas must be vegetables cultivated areas. All kinds of vegetables like *Kharif* vegetables such as white gourd, ridge gourd, bottle gourd, snake gourd, bitter melon, brinjal, sweet melon, etc *Rabi* season vegetables such as carrot, brinjal, bottle gourd, potato, cauliflower, cabbage, carrot, etc are produced. Few farmers produce *boro* rice, sugarcane, mustard, wheat, maize, pulse crops (Lentil, pea, grass pea), etc. besides vegetables.

Previously they use different agrochemicals like insecticides, herbicides, and fungicides for cultivation. After getting the training all farmers are aware of the harmful effects of unplanned and more use of pesticides such as skin diseases, irritation of the eyes, nose, and mouth, headache, vomiting, blood pressure problems, cancer, irritation of the hands and legs, insomnia, difficulties in breathing and different diseases for the farmer involved in pesticide spray which is the consequences of spraying of pesticides without appropriate precautionary measures.

Introduction:

Chemical Pesticides, together with high-yielding crop varieties and fertilizers, are used in Bangladesh to increase crop production, especially vegetable production.

It is well known to farmers that the effective and responsible uses of pesticides may bring significant positive contributions to the crop yield, but more, irrational, and unprotected uses of pesticides are threatening our ecosystem, human health, and the environment. As a result, the risk of pesticide poisoning is very high in the case of all vegetables. From this project, the farmer has known the technologies of integrated pest management (IPM) and safe farming for su



Fig 1.: Clean Cultivation

Improving the Agricultural program:

Marginalized farmers are now very interested to know modern technologies of Agriculture. Not only that they are highly motivated to adopt any kind of modern technology relevant to agriculture. They are very busy with agricultural work. The government agriculture department, DAE, Agricultural Research Institute, Corporate farm, and NGOs are performing their activities for the development of the Agricultural Sector. When the cultivated land was unlimited and the population limited, then people without land died due to limited production. But now Agricultural cultivated land is limited but the population is high so, no people die because of hunger. Farmers implement crop diversification and crop rotation methods for more production and more income. They use high yielding variety, can prepare organic fertilizer, Pheromone traps, alive eco-friend insects, etc.

Field Background before the training:

ASTER collaborated with 10 farmer groups for the implementation of the project at the field level. 300 marginalized farmers in different areas in two different sub-districts participated in the project. ASTER identified more vegetables cultivated area. The farmers are selected who are highly interested to get the training such as i. Sustainable Agriculture and ii. IPM technologies for year-round vegetable production to create self-employment opportunities and increase their income. ASTER collected NID card and sent it to the CEMCA authority. After getting the project ASTER conducted training

Approach:

The focus was to learn from the International Experience, Research abstract, journal, Job experience, field experience, and ground-level implementation and provide suggestions for better implementation of training design, use of new technologies and media to ensure responsibility and accountability for the project **“Life skill Based Safe Agricultural**

Education and Agricultural skill development for Self -Employment of Marginalized Farmer”

Methodology:

This section provides the scope and methodology for implementing the project. However, the methodology used and scope are defined in this project proposal. CEMCA advised how to implement the project. ASTER discussed with CEMCA the methodology of the project. CEMCA personnel from India and a team of consultants from Bangladesh discussed on the project how to implement the project.

Key Concept of the Project:

Project indicators:-

- At the end of the project, 100% of Marginalized farmers completed skill training on Sustainable Agriculture and IPM technologies.
- After completion of the project, the majority of participants enhanced their agricultural knowledge of Sustainable Agriculture and IPM technologies as per feedback.

Expected Outputs/ Outcomes:-

- All Beneficiaries of the project completed the **Agricultural Skill training** (Sustainable Agriculture and IPM technologies) within the project timeframe.
- Improved Knowledge, Skill, Attitude, and confidence of Trainees in **Different Agricultural Skill training**.
- Increased incomes of project beneficiaries after completion of **Agricultural Skill training**.
- Improved livelihoods of project participants.
- Project beneficiaries created their Job employment and Self Employment opportunities after **Agricultural Skill training**.
- The Project beneficiaries reach to eradicate the poverty line through **Agricultural Skill training**.



Fig 2: Pheromone trap in Bottle gourd

The objective of the Project:

- i. Goal of the project:

The overall goal of the project is to Establish Self Employment and Job placement for marginalized Farmers of Bangladesh through Sustainable Agriculture and ii. IPM technologies for year-round vegetable production.

ii. Objectives of the project:-

- To improve knowledge, Efficiency, skills, and approach of a marginalized farmer on sustainable Agriculture and IPM technologies for year-round vegetable production.
- To increase incomes of marginal Farmer through maximum production by Sustainable Agriculture and IPM technologies.
- To create Self Employment.
- opportunity for a marginalized farmer through sustainable Agriculture and IPM technologies for year-round vegetable production
- To create Job employment opportunities for marginal farmers abroad through Sustainable Agriculture and IPM technologies.

Steps of Implementation of the Project:

Steps-I	Step-2	Step-3
1. Motivated participants are aware of IPM and Sustainable Agriculture 2. Each General information about IPM and Sustainable Agriculture have delivered to marginalized farmers. 3. Every step of IPM and Sustainable Agriculture were delivered to marginalized farmer. 4. Relevant assistance of the project are available 5. Essential steps of the project are transparent to all stakeholders.	1. If necessary Potential and interested participants will get more information on IPM and Sustainable Agriculture for better implementation. 2. Potential applicants will obtain guidance from Govt. Agricultural dept following the training and other Institute. 3. Farmers will collect all pure and quality input from reliable Diller	1. Well-trained farmers will implement all technologies of IPM and Sustainable Agriculture in their Agri. field. 2. Non-toxic vegetables and other products will be sold in the whole sell market. 3. After harvesting sorting, Grading, cleaning, and transporting will happen. 4. Each Group arranges their vegetables in a specific place called the collection center for Marketing.

- i. The participants of the project have been selected from different villages under 2 sub-district.
- ii. The project was identified and screened real 300 beneficiaries according to specific criteria.
- iii. ASTER has reviewed all the existing training schedules, modules, and curricula of the training courses.
- iv. The project has been implemented by the direct involvement of the project staff of ASTER, Government counterparts, and other stakeholders.
- v. 300 farmers were trained in Sustainable Agriculture and IPM technologies for Year-round vegetable production.
- vi. The Project challenges/ barriers were addressed, and the Focal point of the project closely worked with it.

- vii. A great significant relationship and Close coordination have been made among Savar and Singair sub-district agriculture offices.
- viii. Exposure visit arranged to SAU for Exchange experience among those.
- ix. The project aims to Job employment and Self Employment for marginalized farmers through Agricultural Skill Training.
- x. The Project activities have been monitored by CEMCA and ASTER.

Who needs the Project and why?

Sl. No.	Who	Why
	Many stakeholders are involved in the project such as-	
1	Marginalized Farmer	If a farmer knows how to produce nontoxic vegetables. Nontoxic vegetable production will be possible, and production will be high. The farmer will sell vegetables at a high price. As a result, farmers will be benefited. They have got enough life skill-based agriculture education for the benefit of others.
2	Wholesaler	If Non-toxic vegetables will be available in the market. The wholesaler will by nontoxic vegetables be sold in distance market. Through this, they will earn more money.
3	Stockiest	The farmer will supply mnontoxicoxic vegetables to the stockist from here the wholesaler will buy nontoxic vegetables and sell them to the retailer.
4	Retail seller	Retail sellers will collect nontoxic vegetables from the wholesaler market and sell them to consumers.
5	Consumer	Consumer General will buy nontoxic vegetables from the retail market.
	Input Supplier	Dealer has a great opportunity to sell all kinds of input for Nontoxic vegetable production.

The project helps Marginalized Farmer:

Before the project, the marginalized farmer had not had enough knowledge of Agricultural technologies like Soil fertility, soil productivity, essential nutrient (Micro and macronutrient) for the plant, prescribed fertilizer doses, can't identify of bad insects and eco-friend insects, proper intercultural operation, proper harvesting, sorting, grading, packaging, transporting, bargaining with wholesaler and consumer. They could not



Fig 3: Use pheromone Trap in Brinjal Land

create a production plan according to soil fertility and future market demand, they only select crops, vegetables, and pesticides, and the market was followed by other farmers. They never followed the principles of pesticide use and safety measure. They never use any register or not book for keeping time and amount of plowing, sowing, transplantation, irrigation, intercultural operation, fertilization, use of organic material, use of pesticide time and amount, and harvesting time. After the training, they can produce nontoxic safe vegetables. After getting the training the marginalized farmer is capable to overcome several kinds of agricultural problems and issues. Their theoretical and practical knowledge has been increased which will be a constructive change for agriculture development. They are now capable and efficient resources person for not only their family but also their society and country. As a result, the marginalized farmer is empowered, honored, and wealthy. For this reason, this project is perfect for them.

Benefits of the Project:

Sl.No.	Tropic	How
1.	Economic Level Benefit	
	i. All stakeholders will earn more money.	i. All kinds of Stakeholders such as Farmer, wholesalers, Stockiest, and Retail sellers will be benefited from IPM Practices and Sustainable Agriculture. Because of the technologies that will be applied in the agricultural field, Nontoxic vegetables will be produced which have a high value. ii. The consumer general will not be affected by eating the produced vegetables and some diseases will be eradicated by eating these vegetables.
2.	Personal Level Benefit	
	i. Though most of the farmers do not hold any educational qualifications, they are not capable to understand the agricultural book, literature, and pesticide label. So, the training was very important to develop their skill and mentality.	i. It was a motivational program to follow each strategy and technology of IPM and Sustainable Agriculture. ii. Moreover if they face any kinds of agricultural problem, they are motivated to go Govt. Agriculture officer. Besides this, they will show the pesticide leaflet to the son, daughter, or any educated person.

	<p>ii Marginalized farmers who acquired “Life skill Based safe Agricultural Education and Agricultural skill development for Self Employment” training, will produce nontoxic vegetables for more income and life skills agricultural education for ensuring the high price of their nontoxic vegetables.</p>	<p>When the farmer follows this technology and produces nontoxic vegetables more, they will earn more money. After that, they will be proud of their activities.</p> <p>Traditional crops and vegetables such as Bottle gourd, white gourd, sponge gourd, bitter gourd, cabbage, cauliflower, etc are produced by farmers coming season.</p>
	<p>iii. Increased Self-employment</p>	<p>Those who wanted to give up agricultural activities due to non-profit from agriculture will be able to resume agricultural activities.</p> <p>As a result, they will be able to make more profit by producing safe agriculture.</p>
3	<p>Socio-Economic Benefit</p>	
	<p>i. Balance food for Farmers and their family members</p>	<p>i. The trained farmer/ participants will produce more crops and vegetables. The production cost will be reduced, and profit will be increased. For this, they will earn more income. From this, they will earn more income and they can buy different kinds of food like balance food.</p> <p>Marginalized Farmer have been created as skilled farmers who will be able to perform a great role in the socio-economic development, which means Potentially reduced unemployment problem.</p> <p>The dedicated trained farmers will produce high-value vegetables such as red cabbage, capsicum, beet, squash, and Broccoli will be produced by participants in the winter season.</p> <p>As a result, consumers will get maximum nutrition. Society will get a healthy population.</p>
	<p>ii. Sustainable Agriculture will manage Soil, Crop, water, pests, and waste for humans, wild, Eco-friend insects, fish, etc.</p>	<p>i.Trained farmers will manage Soil fertility by organic fertilizer, Green manure, vermicompost, crop diversification, crop rotation, water management, and IPM alive eco-friend insect. The farmer doesn't feel any interest to use more pesticides, they will lead a healthy life, and the environment will safe.</p>

Stakeholders:

After the completion of the project, several stakeholders will be directly involved in the betterment of the trained farmer. The key stakeholders in the project along with the interaction between them has depicted here.

Stakeholder Role and responsibilities:

- Producer-Marginalized Farmer.
- Businessman Wholeseller/ Middleman/ Agent, Stockiest, Processing center, wholesaler, retail seller, the consumer.
- Input Supplier/ Dealer: (Seed-ACI, Lal-Tir, Metal, Suprim seed, BRAC, BADC, Organic technical Input (Sex trap, Trichocompost, Biopesticide.)
- Input producer (Ispahani biotech, Auto crop care)
- Trainer (Agriculture Expert, NGO, SAU)
- Information Research Institute (BARI, BRRI, DAE, BADC), Govt and Non-Govt. organization (BCSIR, BNSI, BSTI,), etc.



Fig 4: Pheromone Trap use in Tomato

Stakeholder Involvement:

- Producer-Marginalized Farmer has already trained in IPM and Sustainable agriculture. Now they will practice every component of IPM and Sustainable agriculture in their cultivated land to produce nontoxic vegetables and establish an unpolluted environment and healthy life.
- Businessman, Wholeseller/ Middleman/ Agent, Stockiest, Processing center, Wholesaler, Retail seller, Consumer. They will collect Nontoxic vegetables from markets, Farmer's Agriculture fields, and collection centers and sell them in different super shop markets, wholesale markets etc.
- Pheromone Input Supplier/ Dealer: They have a significant role to produce Nontoxic vegetable production. If they motivate the farmer to follow the roles and principles of pesticide use. Then farmers will be motivated to follow it such as Seed-ACI, Lal-Tir, Metal seed, Suprim seed, BRAC, BADC, Organic technical Input (Sex pheromone trap, Trichocompost, Biopesticide.)



Fig 5: Stockiest in a Wholesale Market

- Input producer (Ispahani biotech, Auto crop care) They Produce quality input for Nontoxic vegetables. They are now highly motivated to produce the best quality input for Nontoxic vegetable production.
- Trainer (Agriculture Expert, NGO, Sher-E-Bangla Agricultural University-SAU) Of all these organizations Skilled agriculturists, experts of different levels, and researchers are regularly imparting training at different levels. Regularly skilled students enter their workplace by studying agriculture through university teachers
- Information Research Institute (BARI, BRRI, DAE, BADC), Govt and Non-Govt. organization (BCSIR, BNSI, BSTI), etc. Regular research is being done in these institutes to produce safe non-toxic vegetables.

Training at a Glance:

Sl. No.	Village	No. of Participants		
		Male	Female	Total
1	Doshani	13	28	41
2	Dholla	15	15	30
3	Khasher chor 1	27	10	37
4	Khasher chor 2	42	18	60
5	Mirer chor	45	14	59
6	Shyampur	46	8	54
7	Durgapur	33	7	40
8	Komol Nagar	26	21	47
Total				368

Training:

Safe Farming activities - IPM technologies for year-round vegetable Production

Topic	Outcomes of the Project
What and Why IPM.	<ul style="list-style-type: none"> • participants will get a short conception of IPM • Participants can understand all components of IPM and use these.
Applied Classification of Bad Insect.	<ul style="list-style-type: none"> • Participants will know the Nature of Damage by insects • Participants will take some necessary action against the bad insect.
What and why is Insecticide and Classification of Insecticide with their use judicially	<ul style="list-style-type: none"> • Awareness buildup of Trainees the classification of Insecticide. • The participants will use insecticide following necessity.
Formulation of different components and their use	<ul style="list-style-type: none"> • The participants will know what kinds of Insecticide formulation gettable in a different market. • The participants can use insecticide following the Prescription. Judicial use of components

Methodology of Insecticide use	<ul style="list-style-type: none"> • The participants will be capable to use pesticides properly against Bad Insect. • Decrease the expenditure on pesticide use.
Terms and Principle of insecticide use	<ul style="list-style-type: none"> • After training the participants will be capable to take discussing,” Is insecticide is now essential or not.” • After realizing the terms and principles of insecticide they can identify which insecticide is important for land.
Safe use of Insecticide	<ul style="list-style-type: none"> • The health consciousness of the participants will be developed • Safety measures will be maintained by the participants. • No insecticide will be injected into the body unconsciously during the spraying situation • They never touch their nose, eyes, mouth, etc according to the rules.
Bad insect of Brinjal and their IPM	<ul style="list-style-type: none"> • The participants will be awarded about Bad insect of Brinjal • They will be capable to Maintain IPM properly.
Bad Insect of Cucurbits family vegetables and their IPM	<ul style="list-style-type: none"> • The participants will be awarded about Bad insect of Cucurbities family vegetables. • They will be capable to Maintain IPM properly.
Bad Insect of crucifer family and their IPM	<ul style="list-style-type: none"> • The participants will be awarded about Bad insect of Cruciferae Family vegetables. • They will be capable to Maintain IPM properly.

Description of the Training in Short:

At the beginning of the training, the moderator introduced the trainer, project key personnel, cluster chief, and Team leader of each farmer’s Group. He explains CEMCA, ASTER, SDI, Training title, and the training objectives. After that, every farmer mentioned their personal in the master role. The moderator wanted to know the expectation of the trainees.

What is IPM:

It is a series of different techniques such as biological control, clean cultivation in every step of the plant life cycle, habitat manipulation, use of different resistance varieties, Pest control net, and herbal pesticide are used for pest control. Chemical pesticides are only after monitoring indicated pesticide needed according to ETW level. Treatments are only made to remove only the target microorganism and insect. Pest control materials are selected with wisdom and consciousness and spray pesticides are careful. Always



Fig 6: Training Session

thinkable that more pesticide is very harmful to human being and the environment.

Importance of IPM in Bangladesh:

Advantages-

- It is possible to control insects effectively and sustainably and diseases effectively.
- Moderate use of pesticides reduces the health risks to farmers and consumers in general.
- Soil erosion and degradation of the crop are reduced.
- Reduce production cost
- Land fertility increases sustainably.
- IPM is highly effective for long-term crops.
- Crops are protected from the damage of pests in a sustainable way

Difficulties or limitations of IPM

- IPM takes more time than the conventional method
- The success of this system requires the concerted efforts of all the farmers in the area.
- This method may seem more troublesome to the farmer than the conventional method.

Components of IPM:

- Quarantine and Legal
- Serving
- Use of Genetically Resistant Varieties
- Physical
 - i. Apply hot and cold temperature
 - ii. Humidity
 - iii. Light Trap
- Mechanical.
 - i. Handpicking
 - ii. Keep insects away through curtains and other
 - iii. X-ray and suction device
- Biological
 - i. Natural control
 - ii. Parasitoids
 - iii. Parasitic Insects
 - iv. Disease using germs
 - v. Establishment of microorganisms
 - vi. Microbials preservation
 - vii. Microbials pesticides
- Herbal plant
- Chemical



Fig 7: Cauliflower Production

A practical classification of harmful insects:

1. Insects living on the Ground

Such as – cutworms, Ants, Wheat insects, termites, etc.

2. Eating Insect on the outside of trees or crops
Such as Beetle, Caterpillar, Bad smell Insects, Aphids, Jasad, Thrips, White Fly, Mailbag, Scale insects, etc.
3. Intercultural Insects –
Such as – Mazra insect, Fruit borer insect, Diamondback moth, Tobacco caterpillar, Leaf minor, etc.



Fig 8: Pheromone Trap Use in Cabbage Production

Pesticide:

- A. There are 4 types of pesticides based on the types of Action
 1. Contact and stomach poison
 2. Systemic poison
 3. Contact and penetration of poison
 4. Fumigants

- B. There are 2 types of pesticides based on the chemical properties
 1. Inorganic pesticide
 2. Chemical pesticide
 - I. Natural chemical insecticide
 - II. Synthetic chemical insecticide
- C. There are 4 types of synthetic chemical insecticides
 - i. Organochlorinated Compound pesticide
 - ii. Organophosphorus Compound pesticide
 - iii. Organo carbamate Compound pesticide
 - iv. Pyrethroid compound pesticide
- D. There are 3 types of Bio-pesticide based on their living system
 - I. Parasitoid
 - II. Parasitic
 - III. Microbial Pesticide
- E. Botanicals

Different types of pesticides marketed:

- i. Powder form
- ii. Liquid form
- iii. Granular form
- iv. Wetting form
- v. Aerosol form
- vi. Fumigants form
- vii. Ointment form
- viii. Fog form

Method of pesticide Spray:

- i. Spray machine
- ii. Duster
- iii. Mixed with Soil and Fertilizer

Thinking to Consider When Spraying

- i. Best Sprinkler
- ii. Properly exert pressure on the machine
- iii. Distance between spray machine nozzle and tree (30 cm)
- iv. Spray swath (1-1.5 m)
- v. Spray in favor of Air

Precaution of Pesticide use:

- i. Be confirmed which insect has infested.
- ii. Insecticide should be used in case of insect infestation only majorly.
- iii. Choosing the right insecticide
- iv. The correct method of pesticide
- v. Spray at the right time and Environment
- vi. Use the correct sprayer
- vii. Use the right dress, Mask, and hand gloves
- viii. Follow the approved dosage and total spray no.
- ix. Pesticide should not be used more than 3-5 times in a season for a crop
- x. Never spray pesticides unnecessarily.

Ingredients of Pest control System

- i. Conservation of beneficial insects and animals
- ii. Use of harmful insect tolerant species
- iii. Follow the modern farming methodology
- iv. Mechanical suppression
- v. Chemical suppression

Precaution before pesticide use

- i. Precaution before pesticide use
- ii. Precaution during pesticide use
- iii. Precaution after pesticide use

Symptoms and action of pesticide use poisoning

- i. Muscle tremors, weakness, extreme restlessness,
- ii. Abdominal pain, tingling sensation, shortness of breath, headache,
- iii. Burning of eyes and throat
- iv. Chest tightness
- v. Excessive salivation, thin stools, etc.

Primary treatment of an affected patient by Pesticide

- i. Laying the infected person lying in the open air
- ii. Arranging for Vomiting and urgently seeking medical attention

Topic	The outcome of the Project
What is Sustainable Agriculture, Importance, and Goal of Sustainable Agriculture?	<ul style="list-style-type: none"> • Participants will get an understanding of sustainable Agriculture. • Participants can understand the Goal of Sustainable Agriculture and try their best to achieve the Goal. • After completion the participants will realize the benefit of sustainable Agriculture, if they regularly follow the technologies of Sustainable agriculture, Production and soil fertility will increase.
Topics of Sustainable Agriculture	<ul style="list-style-type: none"> • Participants will implement all kinds of topics for the benefit of the farmer, farm, and community.
Topics of Sustainable Agriculture	<ul style="list-style-type: none"> • The participants will get the necessary action to apply all kinds of initiatives, knowledge, and effort.
Topics of Sustainable Agriculture	<ul style="list-style-type: none"> • Participants will apply the different topic to ensure high production, a good environment, and expand natural resources. • Protection of the environment and expansion of the natural resources supply • Sustainment of the Economic viability of Agriculture Systems
Training and workshops	<ul style="list-style-type: none"> • Improve the knowledge of participants on Sustainable Agriculture.
Implementation of activities on Sustainable Agriculture.	<ul style="list-style-type: none"> • Participants will be capable to practices of Sustainable Agriculture. • Participants will Produce sufficient human food, feed, fiber, and fuel to meet the needs of a sharply rising population

<p><i>Approach-1 components of sustainable farming using natural sources</i></p> <p><i>Approach-2 Crop diversity and rotation</i></p>	<ul style="list-style-type: none"> • Including trees, shrubs, and grasses grown at the edges of crop fields and along streams—can serve as resources for farmers. • Pollinators and other beneficial wildlife, such as birds, bats, and bees are lives by a landscape approach • Uncultivated areas can boost farm productivity and reduce costs.
<p><i>Approach-3 Cover crops</i></p> <p><i>Approach-4 Integrating crops and livestock</i></p>	<ul style="list-style-type: none"> • Growing a greater diversity of crops would allow farmers to reap the environmental and energy advantages of longer, more complex crop rotations • Possible to Control pests and weeds with less reliance on chemical pesticides and enhance soil fertility with less need for synthetic fertilizers.
<p>Five Techniques to Implement Sustainable Agriculture on Your Farm</p> <ul style="list-style-type: none"> ➤ Crop Rotation ➤ Cover Crops ➤ Soil Enrichment 	<ul style="list-style-type: none"> • The participants will adapt to grow cover crops to protect and build their soil during the off-season, or for livestock grazing or forage. Commonly planted cover crops include hairy vetch, annual ryegrass, and crimson clover. • As a result, reduce nitrogen and phosphorus fertilizers leach into groundwater or runoff into streams and rivers.
<ul style="list-style-type: none"> ➤ Natural Pest Predators ➤ Bio intensive Integrated Pest Management 	<ul style="list-style-type: none"> • After following this approach Reduce soil erosion, increase soil fertility, store carbon, and provide habitat for beneficial organisms. • Soil fertility will increase, and Production will increase to a satisfactory level.

Sustainable Agriculture:

Sustainable agriculture practices are very important to protect the Environment, Expen the natural resources base, maintain and improve fertility and live eco-friend Insect, Birds, and animals and develop soil fertility.

The Goal of Sustainable Agriculture:

- Establishment of Profitable Agriculture Farm
- Increase the Income of established Agril.Farm
- Develop the Environmental condition
- Development of Socio-economic Status and maintaining the equality
- Enhance the quality of life of farm families and the community.

Importance of Sustainable Agriculture

All stakeholders of Agricultural activities such as Growers, food processors, distributors, retailers, dealers, input suppliers, consumers, stockiest, and waste managers can play a vital role in ensuring a sustainable agriculture system.

- To produce sufficient human food, feed, and fiber for own generation and other community
- To produce fuel to meet the needs of a sharply rising population of the Community.
- To Protect the environment for a healthy environment and expansion of the natural resources supply
- To establish the Economic viability of Agriculture Systems

Many common Agricultural Activities are being done by relevant people which are helpful to established sustainable agriculture and sustainable food systems.



Fig 9.: Practical Use of Pheromone trap in Brinjal

- The farmer (Producer) - They use different kind's methods to develop soil fertility, ensure effective water use, and lower pollution levels on the agricultural farm.
- Dealer (Input Supplier) – They use to supply the best quality input or different materials for agriculture production.
- Consumer General- They want to buy nutrition-based food/vegetables from the market for
- Retailer- They collect value-based food, vegetables, or crop that are grown using different kinds of methods that are environmentally friendly.
- Agricultural Researchers- Sustainable agriculture often cross-disciplinary lines with their work: combining biology, economics, engineering, chemistry, community development, and many others
- Waste Manager- They are concerned to destroy the agricultural waste in organic system which will help to develop soil fertility and maintain an unpolluted environment.

Topics of Sustainable Agriculture:

1. To Ensure Food Security
2. To Ensure Food security
3. To Ensure Agroforestry
4. To Ensure Biofuels
5. Conservation Tillage
6. Controlled Environment Agriculture (CEA)

7. Cover crops cultivation
8. Dairy waste Management
9. Direct Marketing (Energy Efficiency & Conservation)
10. Self Employment in Food and Agriculture
11. Food Labeling/Certifications
12. Food Waste Management
13. Genetically Modified Crops
14. Global Sustainable Sourcing of Commodities
15. Institutional Sustainable Food Procurement
16. Development of Biologically Integrated Farming Systems
17. Establishment of Integrated Pest Management
18. Nutrition & Food System Education
19. Soil Nutrient Management
20. Post Harvest Management Practices
21. Introduce New technologies
22. Introduce Urban Agriculture
23. Value-Based supply chains
24. Efficient use of Water
25. Quality use of Water
26. Use Quality transport
27. Prevent Soil Erosion

Different Approaches are popular for sustainable agriculture:

I. Landscape approach

Farmers have not isolated from one another farms and are farther according to the nature. In an uncultivated area of land, different kinds of tree, shrubs, and grasses at the edges of a definite crop field is living zone for Birds, bats, and bees which help pollination and control bad Insects. For this help to reduce the cost of production. So maintaining the environment increase the profitability of the farm.

II. Crop Diversity and Rotation approach

If follow the Crop diversity and crop rotation, helps to uptake plant nutrients from different layers and protect against disease and Insects.

III. Cultivation Cover Crop

Without cover crops Wind, rain, and snowmelt erode the bare soil, and nitrogen and phosphorus fertilizers leach into groundwater or runoff into streams and rivers. This loss of soil and nutrients adds costs for farmers and causes severe and expensive and occurred environmental and public health problems in agricultural communities severe.

- To control weed and Pest
- To develop Soil Fertility

IV. Integrating Crop and Livestock

Integrated Crop and livestock rearing reintegration can be accomplished on a regional basis or on individual farms; distributing animal operations would produce a range of benefits, from reduced nutrient pollution to enhanced soil fertility. And integrated livestock production would support local markets for forage crops such as alfalfa, helping to facilitate longer crop rotations and conservation practices in the region.

Risk and challenges:

During the **COVID-19 Pandemic**, the respondents did not interest to participate in the training session. So, the ASTER team motivated the participant individually in their residence.

They were advised to take all necessary safety measures (such as both will wear mask, washing their hand properly, disinfecting the seating place, etc.) following the guideline. The ASTER distributed health safety measures especially masks accordingly before the training.

Some recommendations are suggested:

- (i) A Significant program should be taken for giving motivation to the farmers of the vegetable cultivated areas is to be taken to reduce the pesticide use in vegetable cultivation.
- (ii) A significant Awareness build-up program would be taken for other farmers of the project area to know the harmful effects of more pesticide use in vegetable cultivation. If the farmer follows the strategies of IPM and Sustainable Agriculture. The production cost will be reduced.
- (iii) Establishment of a nontoxic vegetable market is very important at both sub-district and district levels. So, a nontoxic vegetable market should be established for the betterment of Farmer.
- (iv) Workshop and different kinds of round-table dialogue with different level stakeholders should be conducted such as Scientific Officers and Principal Scientific Officer and other researchers of BARI (Bangladesh Agricultural Institute), Representative of pesticide companies, Local Input suppliers or dealers, vegetable growers, consumers general, Agricultural policymakers, Agricultural officer, NGO agricultural officer, etc. on Various issues.

Conclusions:

Farmers in the training area reported facing different kinds of problems with the marketing of their vegetables. When vegetable supply is unlimited, they can not store their vegetables for more income if necessary. They sell their product in the local market for all vegetables except carrot and coriander, which are mostly sold at farmgate. A small portion of all other vegetables is sold at farmgate. But no farmer was found to sell their product in the distance market for a better price, although the area is not far from Dhaka City. The reasons could be poor road transport, lack of market linkage particularly with the super shops. The singair sub-district is a carrot production area that is more familiar to all. They used to wash their carrot with more expenses and more time. So they need an auto carrot washing machine. If possible CEMCA could provide Transport facilities, vegetable storage, Carrot washing machine

Annexure I
DURGAPUR, Manikgonj Date: 10.10.2021



DOSHANI, MANIKGONJ Date:12.10.2021



MIRER CHOR_1, MANIKGONJ Date: 13.10.202



KHASER CHOR_1 (Date: 17.10.2021)



KHASERCHOR_2, MANIKGONJ (Date: 17.10.2021)



KOMOLNAGAR, MANIKGONJ (Date: 24.10.2021)



SHAMPUR_1, MANIKGONJ(Date: 19.10.2021)



SHAMPUR_2, Saver Dhaka 24.10.2021



Dholla, Manikgonj 19.10.2021



Farm Visit



Certificate Distribution

