Safe Vegetable Cultivation under National Agricultural Technology Project: Phase-I

The Case of Crop CIGs in Kuliar Char, Kishoreganj
Acknowledgement

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Executive Summary

This case study analyses the experiences and the successful factors in Safe Vegetable Cultivation of two Common Interest Groups (CIGs) developed under the National Agricultural Technology Project: Phase-I (NATP) in Bangladesh.

The NATP is the first five-year project of a 3 phased program that seeks to improve the effectiveness of the national agricultural technology system through strengthening the National Agricultural Research and Agricultural Extension Systems in Bangladesh. The objective of this project is to increase national agricultural productivity and farm income. The project has four components: (i) agricultural research support component, (ii) agricultural extension support component, (iii) supply chain development component and (iv) project coordination and management component.

Uttar Shalua CIG Foshol Dol has been selected by NATP as the CIG farmers as well as non-CIG farmers have successfully adopted the integrated pest management in sweet pumpkin cultivation as a result of the project’s intervention. The farmers of Moddhyo Goboria Bilpaar CIG Foshol Dol, on the other hand, were the first ones to adopt the same technology in their area. Both CIGs have experienced significant positive impact in their farm productivity due to adoption of this improved technology promoted by NATP.

The project facilitated the formation of CIGs each consisting of 20 farmers with a common interest such as sweet pumpkin cultivation. The CIG has generated a fund through mandatory monthly savings which they use to invest in production and post-production activities. As part of the capacity building of the CIG, the project provided training on sex pheromone trap use for pest management, how to produce good quality seeds, use of balanced fertilizer, rice yield gap minimization, fruit tree care and management and foot pump use (for fruit trees). The project also encouraged both CIG and non-CIG farmers to apply intercropping method in vegetable cultivation in order to increase the yield per land. The project motivated both CIG and non-CIG farmers to adopt the use of pheromone traps for pest management. The project also transferred the knowledge of making compost using available organic waste around the households. The project has set up an irrigation system with buried pipe to ensure effective use of water.

Due to gradual adoption of acquired knowledge through the project, the farmers in the project area have been benefited. Use of pheromone trap in the field has proven to be more effective in pest management compared to the use of pesticides. Use of pheromone trap has also reduced the cost of production. This in turn has motivated the farmers to increase the scale of production. Uttar Shalua village now produces sweet pumpkins in large scale.

Due to adoption of different improved methods and techniques, productivity of the vegetable farmers has increased. This has led to an increase of income for the farmers. Using proper fertilizer in field has helped to retain the soil fertility which has also positively impacted the productivity. Irrigation using buried pipes has ensured effective use of water in the field. Even with all the advances in technology adoption, there is still a lack of availability of good quality seeds for vegetable production.

Through NATP both CIG and non-CIG farmers have gained access to continuous flow of information through SAAOs, CEALs, LEAFs and FIAC in the project areas. FIAC, run by DAE, DLS and DoF, is successfully being used by the farmers as a platform for knowledge sharing and problem-solving regarding agriculture, livestock rearing and fisheries management.

It is recommended that the project continues to scale up demonstration of technology in other geographic locations through Field Days, exposure visits etc. in its next phase. Country-wide campaign and advertising can be used to motivate all farmers to adopt the use of pheromone traps for pest management. Backward linkage for safe vegetable production has to be strengthened in order to ensure good quality input supply such as seeds, pheromone lures etc. In order to increase the demand for safe vegetables the project can focus on creating a brand for the vegetables free from pesticides and promote the products in both urban and rural areas. The project can continue to promote and encourage both CIG and non-CIG farmers in the area to make compost in their house. In order to create access to information and technologies the project can establish FIACs in other areas of the country.
1. Introduction

This case study analyses the experiences and the successful factors in Safe Vegetable Cultivation of two Common Interest Groups (CIGs) developed under the National Agricultural Technology Project: Phase-I (NATP) in Bangladesh. The Uttar Shalua CIG Foshol Dol (Crop CIG) is located in the village of Uttar Shalua under Shalua Union of Kuliar Char Upazila in Kishoreganj, Bangladesh. The other CIG Moddhyo Goboria Bilpaar CIG Foshol Dol is located at Moddho Goboria village under Goboria Abdullahpur Union of the same upazila in Kishoreganj.

The study was conducted by INAFI (International Network of Alternative Financial Institutions) Bangladesh and PROCASUR Corporation in collaboration with NATP, and thanks to the full support provided by the International Fund for Agricultural Development (IFAD).

Information pertaining to the case was collected from both primary and secondary sources. Literature review included NATP’s various documents including Annual Reports and Impact Assessment Report of NATP Phase I. Field visit to Kuliar Char, Kishoreganj included household visits to CIG farmers and focus group discussions (FGDs) with both CIGs. The team also visited Farmers’ Information and Advice Center (FIAC) located at Union Parishad of Goboria Abdullahpur Union.

Uttar Shalua CIG Foshol Dol has been selected by NATP as the CIG farmers as well as non-CIG farmers have successfully adopted the integrated pest management in sweet pumpkin cultivation as a result of the project’s intervention. The farmers of Moddhyo Goboria Bilpaar CIG Foshol Dol, on the other hand, were the first ones to adopt the same technology in their area. Both CIGs have experienced significant positive impact in their farm productivity due to adoption of this improved technology promoted by NATP.

Section two of this document provides an overview of the project including details on CIG formation methodology and technology dissemination; section three describes the experiences of the two crop CIGs involved in safe vegetable cultivation and the impact of NATP in their farming activities; sections four and five focus on lessons learned from the project and recommendations for the next phase respectively.

2. Overview of the National Agricultural Technology Project: Phase-I (NATP)

2.1 The Project

The National Agricultural Technology Project: Phase-I (NATP) was approved in February 2008 with the financial support from the World Bank, the International Fund for Agricultural Development (IFAD), and since 2014 also from the United States Agency for International Development (USAID). NATP, which started activities in October 2008, is the first project of a three project program. The project is being implemented in 120 upazilas (sub-district) of 25 districts spread throughout the country. During the whole project implementation, 330,000 households are expected to be benefited from this. NATP seeks to improve the effectiveness of the national agricultural technology system by strengthening the National Agricultural Research and Agricultural Extension Systems in Bangladesh. The objective of this project is to increase national agricultural productivity and farm income.

The Project has four components: (i) agricultural research support component, (ii) agricultural extension support component, (iii) supply chain development component and (iv) project coordination and management component.

Under the research component, different high yielding crop/vegetables were developed, existing technologies have been refined and improved and new production strategies have been verified. Trainings were provided on different technologies under this project to farmers by establishing Common Interest Groups (CIGs). Trainings have also been provided to the project staff. The adoption of new technologies was promoted through demonstration, farmers’ field days, agricultural fair at upazilas and district levels, tours to the research center etc. which have resulted in increased productivity, income and profitability. The project also established a one-stop advisory service center at Union level called Farmer’s Information and Advice Center (FIAC). Through FIAC even the non-CIG farmers can have access to new information and technologies. Under the supply chain development component Commodity Collection and Marketing Centre (CCMC) was established which provides the CIGs linkage with various marketing companies.

Footnote: 1 The literal meaning of ‘Foshol Dol’ is ‘crop group’. NATP identifies all the agriculture or crop CIGs as ‘CIG Foshol"
The project has been a collaborative effort of Department of Agricultural Extension (DAE) under the Ministry of Agriculture, Department of Livestock Services (DLS) and Department of Fisheries (DoF) under the Ministry of Fisheries and Livestock, Bangladesh Agriculture Research Council (BARC), Krishi Gobeshona Foundation (KGF) and Hortex Foundation.

2.2 Formation of Common Interest Groups (CIGs)

The project has successfully created a platform for the farmers in their respective areas to discuss problems and share experiences to improve their farming activities and to increase the overall productivity of their farms. Under NATP, three types of CIGs have been formed depending on the common interest of the farmers: Crop CIGs, Livestock CIGs and Fisheries CIGs. In total, 20,010 CIGs have been formed of which 13,450 are Crop CIGs, 3,892 are Livestock CIGs and 2,668 are Fisheries CIGs. Each CIG is established focusing a specific product or activity. For example, a Crop CIG may include 20 farmers involved in the cultivation of sweet pumpkins; or a Livestock CIG may include 20 farmers involved in either dairy cow rearing or beef fattening (not both at the same time).

As the first step to forming CIGs, general meetings were organized in target areas in order to share advantages of becoming associated with the project through forming a CIG such as receiving training on new methods and technology for dairy cow rearing or beef fattening (in case of livestock), starting their own savings and credit activities etc. The meetings were organized by Sub-Assistant Agricultural Officer (SAAO) for Crop CIGs, Community Extension Agent for Livestock (CEAL) for Livestock CIGs and Local Extension Agent for Fisheries (LEAF) for Fisheries CIGs. Groups were then formed of no more than 20 members from one single village or two to three adjoining villages. The CIGs were formed based on the concentration of agricultural activities in the villages. During formation of the CIGs some of the following selection criteria were followed:

- **Group size**: a group should have 20 members.
- **Socioeconomic status**: members of a group should be of the same socioeconomic status and of a specific gender, male or female; but in case of livestock and fisheries, there could be mixed groups.
- **Category of groups**: small and marginal farmer groups 80 percent, medium and large farmer groups 20 percent and women farmer groups 30 percent of all groups.
- ** Dwelling status**: the member has to be a permanent resident of the concerned para/village.
- **Membership**: one from one family.
- **Other considerations**: the above criteria may be flexibly considered, in areas where these are difficult to follow. In such cases, process has to be recorded very clearly.

Each CIG has a nine-member Executive Committee (EC), which is responsible for the overall management of CIG and the contributory fund maintained by the group. Each CIG maintains a bank account for accumulating the fund. The CIGs usually invest the savings in various production and/or post-production activities. After the group is formed a contract is signed between the EC of the CIG and the Upazila Extension Coordination Committee (UECC) to formalize the establishment of the CIG. As part of the CIG development and management, the Chairman, Vice-chairman and Treasurer of each group receive training on leadership and group management.

2.3 Technology Dissemination

The project provided trainings to the CIGs on respective interest areas. For example, the crop CIGs received training from the Department of Agricultural Extension at their respective Upazila or Union Parishad Office. The trainings on agriculture included methods of pest management using sex pheromone trap, good quality seed production, use of balanced fertilizer etc. It was noted in the Impact Assessment Report that the farmers applied these techniques in their farming activities and were benefited by it. The farmers also expressed their willingness to continue the application of the newly acquired knowledge pertaining to their farming activities.

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3 CEALs and LEAFs are temporary technical service provider in the community for livestock services and fisheries respectively. SAAOs, on the other hand, are directly employed by the DAE for this project. SAAOs, CEAL and LEAF are part of the Union Extension Facilitation Team (UEFT) that is responsible for CIG formation and providing continuous support.
3. The Case of Safe Vegetable Cultivation under NATP: Phase-I

3.1 Background and Location: The CIGs

Kuliar Char upazila in Kishoreganj district is located about 100 km away from the Capital of Bangladesh. The upazila has 523,092 acres of arable land and agriculture is the main economic activity. 90 percent of the households in the area are involved in agriculture related activities. Though main crop cultivated here is Boro, a type of rice paddy, vegetable is also cultivated in large scale. During 2012-2013, sweet pumpkin was cultivated in more than 200 acres of land in Kuliar Char upazila. Among other vegetables, cauliflower, tomato, brinjal, radish, beans, different types of gourds and leafy vegetables grow in plenty in the area.

Uttar Shalua CIG Foshol Dol

NATP started its activity in Uttar Shalua Village in 2009. The main objectives of the project were to encourage farmers to form a CIG in order to receive support from the project, to get organized as a group based on some common interest (such as producing pumpkins) and to start savings to generate their own fund. In order to motivate the farmers, the SAAO responsible for the area first visited the village to inform the farmers about the upcoming activities of the project in the area. The activities included training, technology transfer and advice and guidance related to modern methods of agricultural production. The SAAO informed the farmers about the benefits of becoming involved in the project as well as CIG. Uttar Shalua CIG Foshol Dol was established with 20 interested farmers involved in pumpkin cultivation.

As part of the capacity building of the CIG, the project provided training on sex pheromone trap use for pest management, how to produce good quality seeds, use of balanced fertilizer etc. The CIG also received training on rice yield gap minimization, fruit tree care and management and foot pump use (for fruit trees).

The village currently has many farmers who are cultivating mishti kumra or sweet pumpkins (Cucurbita moschata) in large scale. Even before NATP, the farmers used to produce pumpkin but only near the homestead in a small scale. Mr. Jinu Mia, a non-CIG farmer, was the first one to start growing sweet pumpkin in the area 7 to 8 years ago. From his initiative many other farmers got to know that their land is very much suitable for growing sweet pumpkin.

Uttar Shalua CIG Foshol Dol is involved in commercial sweet pumpkin production. The success of this CIG is attributed to adoption of integrated pest management using sex pheromone technology.

The farmers do not have to worry about marketing the produce as the linkage is well established. The area has been well known for vegetable production for quite some time now. Trucks from as far as Dhaka come to the fields to collect the pumpkins. The wholesale buyers who work as the link between the farmers and the market visit the fields before the pumpkins mature and agree on the price. The buyers buy an entire pumpkin field. The price is decided upon based on the number of pumpkins per field. For instance, in 35 decimals of land, 1000 to 2000 pumpkins can grow per season. Farmers get BDT 20,000 to 30,000 for each such field.
Modhdo Goboria Bilpaar CIG Foshol Dol

The farmers of Modhdo Goboria Bilpaar CIG Foshol Dol are some of the first farmers in the area to adopt the use of sex pheromone trap in their fields. NATP introduced the farmers to this organic way of pest management to produce pesticide-free vegetable. NATP started its operation in the village in 2009. The CIG was formed with 20 interested farmers who were involved in both rice and vegetable cultivation. The CIG has all male members. However, women in each household play an important role in agricultural production by working in the field alongside the farmers.

The CIG farmers received training on rice yield gap minimization, compost, sex pheromone trap and fruit garden management. All CIG farmers have used this newly acquired knowledge which has boosted agricultural production in their fields.

The CIG farmers sell most of their produce to the cold storage at Pirozpur market on a regular basis. The cold storage is 1 to 2 km away from the village. Wholesale buyers from Dhaka, Kishoreganj, Sylhet, Narayanganj buy vegetables directly from their field.

3.2 Vegetable Cultivation in Bangladesh: The Traditional Way

Bangladesh is blessed with highly fertile agricultural land as it is a delta originated from the sedimentation of the Bay of Bengal. Despite increase in the shares of livestock and fisheries, crop sub-sector still accounts for more than 60 percent of agricultural contribution to the GDP (BBS, 2011). More than 100 vegetables, 70 fruits and 60 spices are produced represented by different species and varieties. Vegetable production is 2.9 million tons from 0.356 million ha while fruit production is 4.2 million tons from 0.142 million ha of land. Some major vegetables are egg plants, cucurbits, yard long bean, okra, radish, cauliflower, cabbage, tomato, beans, aroids, carrot, leafy vegetables etc.

Little use of organic methods of pest management

Traditionally, farmers in Bangladesh depend on synthetic insecticides as they are readily available, highly promoted, easy to apply and quick acting. However, these insecticides also kill non-target arthropods, typically insects involved in pollination and predators such as spiders and ground beetles. Insecticide residues find their way into water sources, particularly in rice cultivation, and affect the drinking water. Furthermore, quite often the indiscriminate and unscientific use of pesticides has led to many problems such as pest developing resistance.

The farmers have easy access to chemical pesticides which are also harmful for the environment. Most farmers have not become familiar to organic methods of pest management.

Lack of use of organic fertilizer

In recent years, almost all the farmers have become aware of the need for using fertilizer in the field in order to retain the soil fertility and to maintain their nutrient levels which are essential for any cultivation. However, most farmers still usually follow the traditional farming practices and depend largely on chemical fertilizers for higher yield without or less application of organic fertilizers or compost. Such fertilizer management causes substantial deterioration in soil fertility with less than 2 percent organic matter content. The desired organic matter level in the soil is 5 percent. Hence, traditional fertilizer management practices results in decreased soil fertility in turn adversely affecting the agricultural productivity.

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4 Hortex Foundation, Bangladesh; website: http://www.hortex.org/produces.htm
6 Rashid, Syeda Zinia; Composting and Use of Compost for Organic Agriculture in Bangladesh (2011); Proceedings of the 4th International Conference for the Development of Integrated Pest Management in Asia and Africa (20-22 January 2011)
Less intensive intercropping

Growing of two or more crops simultaneously in the same piece of land in alternating rows or in set of rows is called intercropping. Intercropping has been practiced by the farmers for a long time. However, this practice had been mostly used in homestead cultivation and for personal consumption. In case of commercial production of vegetables, application of intercropping method had been limited.

Irrigation using traditional canals

In traditional irrigation system using canals a significant amount of water gets absorbed by the soil. More water needs to be pumped for a given land area as some of it gets wasted before it reaches the targeted field. In some areas some of the farmers have used rigid canals with cement lining for irrigation in order to prevent the water from being absorbed by the soil. However, this is more of a permanent structure that causes problem during ploughing before each season.

3.3 Project Activities

CIG Savings

One of the main objectives behind the formation of CIG was to create a platform for the farmers to exchange their views and mutually solve problems regarding agricultural production. One of the main activities of the CIG is to create its own fund which will be invested in various production or post-production related activities. The CIGs have mandatory savings scheme where each member has to deposit a specific amount each month. The amount depends on the affordability of the members. The monthly amount is deposited into the bank account maintained by the CIG. The EC of CIG is responsible for collecting the savings. The EC is also responsible for making the investment decisions regarding the fund in consultation with all CIG members.

Pheromone Trap Use

The project provided training on the use of pheromone traps in the field as part of organic methods of pest management. After the CIG was formed, a demonstration was organized in one of the CIG farmers’ pumpkin field to demonstrate the impact of using sex-pheromone trap instead of pesticide for pest control. After using the traps in the field, production increased almost two fold. The increase in output prompted other CIG farmers and non-CIG farmers as well to adopt this organic method of pest management.

The basic idea of pheromone technology in pest management is to identify and duplicate the scent (hormone) a female insect emits in order to attract the male of its species and to use this hormone, known as the sex pheromone, to control the males of that species. A specially designed trap is used with the ‘lure’ to attract and destroy the males for population control. The traps are placed in regular interval throughout the field. The pots are designed in a way such that the male insect enters the pot following the scent of the lure (pheromone) which is hung inside the pot and becomes trapped.

Different lure has to be used depending on the type of vegetable. Even though many farmers are now using this technology for integrated pest management, use of pesticide still remains quite high.

Intercropping

Most farmers in the area have been cultivating vegetable for a long time. However, in commercial vegetable production, intercropping was not a common practice among the farmers. The project actively promoted intercropping and encouraged both CIG and non-
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CIG farmers to adopt this technique. After the project interventions, the farmers have been using intercropping method to grow 2-3 vegetables at the same time in the same field. This ensures an increased harvest from a given area of land. There is no fixed combination for intercropping. The farmers use their experience to determine which vegetables can be grown together. One farmer, for instance, is growing garlic and potato in his field. Another farmer will grow coriander, cauliflower, green pumpkin and cucumber in the same piece of land.

Intercropping: Here, garlic, potato and red spinach have been sown in the same field.

**Compost Making and Use of Balanced Fertilizer**

The project provided the farmers training on making compost. Since almost all farmers in the village are involved in rice cultivation, each household has one or two bulls that are used to plough the land. The farmers use the animal waste and crop residue to make compost, use of which in the field has demonstrated effective results in increasing soil fertility. In homestead of each CIG farmer, there is a space for pit composting where all the waste products are kept for 15 to 30 days. After that urea, potash and TSP are added to the mixture to make the fertilizer. This fertilizer then can be used in the field.

**Irrigation Using Buried Pipes**

NATP has set up buried pipes for irrigation in Moddho Goboria Bilpaar village. Water is channelized through the unground pipes which minimizes the loss of water. The owner of the water pump operates it and is responsible for supplying the water. The water pump runs on diesel as there is no electricity in the area. The pump runs from 9 am to 12 am during the irrigation period mostly for rice cultivation. The users have to pay BDT 800 for using the pump on 40 decimal of land for 3 months. This only covers the rent of the machine. The users have to buy their own diesel as required to run the pump. However, flow of water cannot be maintained in all four pipes simultaneously as the diameter of the pipe is too small. So at a time only two pipes are used to supply water.

**3.4 Impact of Behavioral Changes among the CIG Farmers over Time**

After receiving training from the NATP, the CIG farmers of Uttar Shalua and Moddho Goboria Bilpaar villages started applying their knowledge in their cultivation. The behavioral changes over time let to increase in productivity, decreased cost and improved quality of the fresh produce.

**Using CIG Fund for Investment**

The fund generated from savings is usually invested in production activities such as rice cultivation, mortgaging land and cultivating in that land, and post-production activities such as buying vehicle to transport the produce.

The members of the Moddho Goboria Bilpaar CIG Foshol Dol initially started with BDT 50 per month per person. The CIG has a bank account in their name at local branch of Sonlai Bank. The CIG has given a loan of BDT 10,000 to Mr. Teku Mia, one of the CIG members, to buy a bull. He plans to sell it during the next Eid-ul-Adha and the profit will be shared 50-50 between the CIG and Mr. Teku Mia.

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The members of the Moddho Goboria Bilpaar CIG Foshol Dol initially started with BDT 50 per month per person. The amount is collected and deposited in Janata Bank, Lokkhipur Branch each month. In 2010 they increased the amount to BDT 100 per month per person. However, not all CIG farmers could afford the increased amount so from the middle of 2011 the CIG lowered the mandatory savings amount to BDT 50 per person per month. The CIG has a very active 9 member Executive Committee (EC) that is responsible for the decision to invest their fund profitably. Till January 2014 the CIG has accumulated BDT 90,785 including interest earnings and have invested BDT 80,000.

One of the CIG members Mr. Abdul Ohab has mortgaged 40 decimal of land to CIG. Another CIG farmer Mr. Habibur Rahman has been given access to this land for cultivation. The agreement between Mr. Habibur and the CIG is that he will cultivate crop in the land with his own resources and give one-third of the total amount produced to the CIG. This will be done twice a year. During the last harvest the CIG received approximately 336 KG of rice paddy. The amount received from selling this paddy will be added to the CIG’s fund. The CIG has provided BDT 20,000 to one of its members for buying a bull. The farmer will return the borrowed amount to the CIG with 50 percent profit from selling the bull.
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Reduced Cost of Vegetable Production Resulting from Reduced Use of Pesticide

Through NATP, the farmers have become familiar with the sex pheromone trap for pest management. Previously, the farmers would use harmful pesticides in the field in order to reduce the attack of the insects. The farmers use water trap (see picture) to lure the insect. The bottom of the trap is filled with soap water. The male insect is attracted by the lure and gets trapped in the water.

Using this technology has helped the farmers reduce cost for pest management. Pesticides, though more easily available, can be costlier as it requires more vigorous application due to increasing resistance to chemical insecticides.

The pot for the trap costs BDT 30 and lasts for 3 to 4 years. The pot can also be made at home using plastic bottle or tub. The medicine or the lures come in a packet of 5 which costs BDT 125. 10 traps are sufficient for 35 decimals of pumpkin field. Each lure lasts for one season. So the cost for pest management per 35 decimal (1 bigha) is BDT 450 per season using pheromone trap which used to be from BDT 1,500 to BDT 2,000 for the same land area using pesticides. Lower cost has contributed to increased profitability for the farmers.

Commercialization of Vegetable Production

The suggested changes in cultivation methods by the project have increased the overall production of vegetable in the area. Aside from adopting the use of pheromone traps, the farmers are now able to produce good quality seeds for the vegetables. They also use balanced fertilizer in the field which increases production. The application of this knowledge acquired from the trainings provided by NATP has helped the farmers to commercially produce vegetable. The farmers cultivate vegetable not only in their own land but also on leased land.

Increased Income of the Farmers

With the gradual adoption of modern methods of vegetable cultivation and large scale production of vegetable has increased the income of the farmers. Due to adoption of pheromone technology, the quality of the produce has also improved.

Pumpkin cultivation is less labor intensive than rice cultivation. In case of rice cultivation, a farmer has to irrigate the land around 20 times whereas for pumpkins it is done only 2/3 times. The farmers engage extra labor on daily basis if the field area is too large. The cost of labor is BDT 300 per day per person. Through commercialization of vegetable production, many farmers are now cultivating vegetable instead of rice in their land. As a result, cost of production per land has decreased and the income has increased.

Increased Productivity in Vegetable Cultivation due to Adoption of Pheromone Technology

The CIG farmers feel that the project has had positive impact on the productivity of their farm as production has increased due to adoption of pheromone technology and other trainings from the project. Before the project, the farmers used pesticides. They would be able to save only 30 to 40 percent of the total number of pumpkins in the field. Now by using the pheromone trap, at least 80 percent pumpkin in a field can be saved from the insects. As a result, yield per field has increased significantly.
Improved Soil Fertility due to Usage of Proper Fertilizer

NATP has provided training to the CIG farmers on pit composting. The farmers recycle animal waste and add necessary minerals to make the fertilizer. The use of this fertilizer has improved the soil fertility in the area which in turn increased production.

Continuous vegetable cultivation in the same piece of land can cause imbalance of the necessary minerals in the soil. Through NATP the farmers learned that every 2-3 years rice paddy needs to be grown in that land in order to restore the balance of minerals and to sustain the quality of the soil.

Lack of availability of good quality seeds

For vegetable, the farmers usually preserve the seeds from the vegetable they have grown in the fields. The rice paddy seeds are available in the market. Bangladesh Agricultural Development Corporation (BADC) dealers sell different seeds at the market. However, in recent years the quality of seeds has deteriorated. NATP at its demonstrations uses their own seed which is of high quality. There is good demand for NATP seeds at the market. However, they are producing seeds only at a small scale which cannot meet the farmers’ demand. BADC is currently the only dependable source for collecting quality paddy seeds.

Higher yield per land through intercropping

Intercropping has been encouraged by the project in order to ensure higher yield per land. All CIG farmers as well as non-CIG farmers have adopted the intercropping method. Before NATP only some of the farmers used to follow this method. However, after learning the proper method of intercropping through NATP, the farmers are able to maximize the yield per field.

Significant impact on income of the farmers

With the reduction in production cost, profitability of vegetable cultivation has increased. This has motivated many farmers to increase the scale of production by taking lease of new land and cultivating vegetable in them. Intercropping has increased the yield per land. All these factors have contributed to significant positive impact on the income of the vegetable farmers.

Irrigation using buried pipe ensures effective use of water

Irrigation through buried pipes has ensured effective use of water. Unlike mud canals, the usage of buried pipes prevents the water from being absorbed by the soil. As a result, the water directly reaches the target field.

The diameter of the pipe is only 5 inch which cannot sustain the continuous flow of water and the pressure created by the pump. According to the farmers, in order to maximize the flow of water, the width of the pipe needs to be increased.

4. Lessons Learned

Demonstrating positive impact due to more effective dissemination of technology

NATP included both training and technology demonstration in order to disseminate modern methods of safe vegetable cultivation. Even though only CIG farmers received trainings from the project, many other farmers in the village also adopted the methods such as pheromone trap for pest management, intercropping etc. as they observed the success of the CIG farmers using the newly acquired knowledge. Demonstrations of positive impact on productivity of the farms have been more encouraging for other farmers to adopt similar methods.

Significant impact on production due to decentralized agricultural support

One SAAO is responsible for one block (NATP’s administrative area unit). Number of CIGs in a block depends on the area covered by the block. Each CIG farmer has direct access to the SAAO. Through the SAAO, the farmers had access to information and advice regarding cultivation. Both CIG and non-CIG farmers had access to this service. As a result, the productivity of the farms increased. CIG members confirm that information and advice provided by the SAAO in addition to the trainings have been beneficial for them to improve their agricultural activities.
**FIAC for technology dissemination especially among the non-CIG farmers**

An innovative approach of disseminating technology among the farmers is establishment of Farmers’ Information and Advice Center (FIAC) at Union level. FIAC is the focal center for integrated agricultural service. FIAC is open to all farmers in the area for all types of agricultural extension support and technological information.

FIAC is run by DAE, DoF and DLS in coordination with one another. The SAAOs, CEAL and LEAF for the Union sit at the FIAC. Various technologies such as pheromone trap, Urea Super Granules (USG) applicators etc. are available at FIAC. Both CIG and non-CIG farmers come to FIAC to share their problems. The problems are listed in a register copy with the solutions offered.

Through FIAC the farmers have access to information on modern methods of agriculture, livestock rearing and fish culture which has proven to be beneficial for them and has had positive impact on the farm’s productivity. The farmers can record their problems at FIAC and receive required solution for improved farming activities. IT has also created an opportunity for the farmers to learn and use necessary agricultural equipment, extension materials etc.

**Improved access to information related to farming for both CIG and non-CIG farmers**

Through NATP, the farmers in the project area now have continuous access to information relevant to their farming activities. Apart from FIAC, the farmers also have direct access to the SAAO for any agriculture related queries. The CEAL and LEAF are also available over the phone if the farmers need any information related to livestock rearing or fish farming. The crop CIG farmers who own livestock also received advice from the CEAL. For instance, the farmers used to feed their cows mostly straw and grass. With the advice of CEAL, the farmers now provide additional vitamins and minerals as prescribed by the CEAL. The CIG farmers share such information and advice with the non-CIG farmers as well.

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*FIAC has various samples of seeds, fertilizers, technology for demonstration. The staff including SAAOs, CEAL and LEAF offer advice and solution to the problems of farmers visiting FIAC.*

*Clockwise from top left: Posters illustrating life cycles of various insects; Samples of various seeds; A Urea Super Granules (USG) applicator available for demonstration; Register copy to record the problems encountered by the farmers in farming activities and solutions offered to them by the respective project staff.*

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*Union is the lowest administrative unit of government in Bangladesh*
5. Recommendations

Following recommendations are provided for the second phase of the project:

**More rigorous campaign to promote sex pheromone technology**

Farmers in most areas are still using harmful pesticides in vegetable production as they are easily available albeit more expensive than the pheromone technology. Country-wide campaign and advertising is required in order to motivate all farmers to give-up the use of chemicals for pest management and to adopt the use of pheromone traps to produce safe vegetables.

**More demonstration on sex pheromone traps in new geographic locations**

Demonstration of the result of using sex-pheromone traps has had significant positive impact on behavioral change among the farmers. Even the non CIG farmers have been motivated to adopt this method. Demonstrations in other geographic areas can inspire the farmers to adopt this environment friendly technology.

**Strengthen backward linkage for safe vegetable production**

For good quality safe vegetable production two factors are very important: good quality seeds and availability of pheromone lures. According to the vegetable farmers, there is still shortage of high quality seeds. The seeds preserved by the project are of high quality. NATP could expand its seed production and market them in order to provide the farmers access to improved quality seeds.

The lures, the most important part of the pheromone traps, are now available in local markets in the project areas. However, more efforts are required to make them easily available in other areas as well. A focus on strengthening backward linkage for vegetable production may encourage farmers to adopt the new methods.

**Promote safe vegetables as a separate brand**

There is high demand for safe vegetable in Bangladesh. However, proper branding is required to promote such products. The project can focus on creating a brand for the vegetables free from pesticides and promote the products in both urban and rural areas. This may motivate more farmers to come under the same umbrella by adopting pesticide free technology.

**Promote and encourage compost making**

Almost all households in the rural area have one or two livestock that is used for either agricultural purpose or to meet the daily nutritional requirement of the family. The animal waste can be used to make good quality compost that can be very useful for agricultural production. The project can continue to promote and encourage not only the CIG farmers but also all the other farmers in the area to make compost in their house.

**Expand operations of FIAC in other unions**

FIAC has been developed as a one-stop service center for the farmers. Currently FIAC is only functional in 732 Unions in the project areas. FIAC can be established in other areas of the country where the farmers will have access to modern agricultural technologies, and information and advice to increase the farm productivity.
About IFAD:
The International Fund for Agricultural Development (IFAD) invests in rural people, empowering them to reduce poverty, increase food security, improve nutrition and strengthen resilience. Since 1978, we have provided about US$15.8 billion in grants and low-interest loans to projects that have reached some 430 million people. IFAD is an international financial institution and a specialized United Nations agency based in Rome – the UN’s food and agriculture hub. IFAD has been working in Bangladesh since 1978. With 29 projects, IFAD and the Government of Bangladesh reached more than 9 million household. www.ifad.org

About INAFI Bangladesh:
INAFI Bangladesh is the country chapter of global INAFI (International Network of Alternative Financial Institutions), a network of development practitioners. INAFI envisions a world where the poor are empowered and ensured sustainable livelihood with dignity. INAFI has more than 300 NGOs/ MFIs globally as members and 28 member NGOs/MFIs in Bangladesh. INAFI works on various thematic issues such as microfinance, migration and development, mainstreaming gender and micro insurance among others in development sector through capacity building, research and knowledge management, and advocacy. http://inafiasia.net/bangladesh_chapter.htm

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