

Information Sheet:

Farmer's innovative method on plant health management, 2007

Pesticides are often used indiscriminately and at very high rates of application and very frequently without knowing the actual purpose of the pesticide being applied. At present about 30 thousand metric tons of pesticides are used every year in Bangladesh.

In order to protect high value non-rice crops against pest and disease losses, farmers are becoming increasingly dependent on the frequent and inappropriate use of dangerous and highly toxic pesticides. Moreover, pesticide adulteration by wholesalers and retailers is a growing concern of many farmers who are unsure whether insects are becoming more insecticide resistant or insecticides are being adulterated to the point of ineffectiveness. In most cases, farmers use pesticides in their fields based on recommendations and advice from their local pesticide dealers. In general, the dealers, themselves are not professional crop/soil/pest specialists and thus we have a situation of the 'blind leading the blind' with certain incentives for both farmers and dealers to advocate the use of inappropriate and/or excessive pesticide levels. Excessive and indiscriminate use of pesticides in crop protection has been creating hazards in many ways; as a result farmers noticed several consequences such as diminished populations of fishes, frogs, birds etc; as well as suffering deterioration in human health in Bangladesh.

Even the modified sets of "safe and effective" plant health management strategies are not widely understood by Bangladesh's tradition bound risk-averse farmers. It would be in the best interests' farmers, scientists, extensionists and private sector participants to work together to find-out the most appropriate, safe and cost-effective combination of plant health management technologies and strategies for Bangladesh at its present stage of development.

We have often observed that some farmers are successfully controlling a variety of major pests with their own, unique and **innovative methods**; for example, the creative combination of some indigenous methods in combination with lower levels of safe chemical use or no chemical use. Such methods were cheap, effective and readily available and could be used where it is difficult to achieve safe and cost effective control with chemicals

AAS has identified and documented (Partly) 27 farmer's innovative methods of 15 non-rice crops during last three year period under a plant health services initiative sponsored by CABI Bioscience, presently known as CABI, UK. Most of the farmer's innovative methods are relevant to insect pests. A short description of two such methods for cutworm and Brinjal shoot and fruit borer control along with an innovative improved management practices for mango orchard follows:

(a) Protect young plant of vegetables from cutworm with poly-enclosure:

Cutworms are quite common pest problem. They can have a serious impact on the productive capacity of gourds, cauliflower, cabbage, brinjal, chilli, tomato, potato etc; particularly during the young and tender seedling stage. Cutworms are a particularly serious problem for vegetable crops being produced on light soil areas in Bangladesh. The larvae of cutworms cut off the young plant bases at night and kill them. During the daytime, cutworms hide themselves under dead foliage and clumps of loose soil in the field. Chemical control of this insect is difficult and expensive. Moreover, the recommended chemical methods are not useful for several reasons. Because farmers cannot afford the more expensive chemical options and frankly are increasingly suspicious about their efficacy; they are eager to adopt those alternative, indigenous methods that have been proven effective at protecting their early stage crops from cutworms.



[Above] Small branches enclosure of Papaya Young Plant

The poly-enclosure method is one such method that has been found suitable and cost-effective for

protecting various seedling stage crops from cutworms. Farmers in Pakundia and Hossainpur upazilas of Kishoreganj district have been using poly-enclosure methods for the last 10 years or more to protect their commercial gourd crops (cucumber, bottle gourd, bitter melon and others) in their seedling stages. Before using poly-enclosure, they used to use the small branches of various trees. The poly-enclosure method evolved through the patient application of trial and error methods, which have finally evolved into a highly effective set of practices. Such methods and practices are called **farmer innovative methods**.

Farmers use a cylindrical poly bag, which is 3-4" in dia and 4-5" long, with its bottom cut off. The poly bag is placed on the soil immediately after seed sowing or during seedling emergence or immediately after emergence of the seedling. One of the open ends of the poly bag is placed on the soil around the emerging seedling and is held in place by three to four small thin bamboo sticks. The base of the poly bag is held in place with 3-4 clods of soil. Since no insecticide is used, the method is seen as being environmentally friendly and free of human health hazards. The poly bag can be re-used for several cropping seasons. Worn and damaged poly bags can be burned to avoid contaminating the rural environment. This particular farmer innovative crop protection method is more cost effective (Tk. 250/acre) than recommended chemical method to deal with the same problem (Tk.1500/acre).



[Above] Poly-enclosure of Chilli

(b) Naphthalene application for controlling Brinjal shoot and fruit borer:

Brinjal (Egg Plant/Aubergine) is an important vegetable crop in Bangladesh. Brinjal shoot and fruit borer is a major and serious insect pest. It is destructive only in the larval stage and damages the



Larvae of shoot and fruit borer of Brinjal (Left), Naphthalene (middle) and Naphthalene broadcasted under the brinjal tree (right)

new growth shoots that are responsible for flower and fruit production on the Brinjal plant. There are more than 20 recommended pesticides available in the market to control this insect. To protect the brinjal shoot and fruit borer, farmers must use the pesticides almost every day and in some cases, 150-200 times in a single crop season. Indiscriminate use of both authorized and unauthorized pesticides at very high concentrations and at very frequent intervals was found to be exceedingly common method of controlling the shoot and fruit borer of brinjal. Accordingly, farmers have developed a large number of innovative methods for controlling brinjal shoot and fruit borer infestation. Among these innovative methods, most of them are non-pesticide based. Naphthalene application for controlling brinjal shoot and fruit borer is one such method. Farmers have been using this method for the last five years or so in Natore district. Naphthalene has well known insect repellent properties and thus its application in a brinjal field has been found to discourage both the adult and larval stages of the brinjal shoot and fruit borer. For this method, farmers broadcast super granules of Naphthalene all over the brinjal field. In general, farmers apply 3 kg Naphthalene

per acre and it emits an effective and discouraging smell for about 3 weeks depending on a crop's canopy and the prevailing weather condition.

Farmers strongly believe that this method is very effective against brinjal shoot and fruit borer. This method is also cost-effective (Tk. 250/acre/application) in comparison with the chemical (Pesticide) methods (Tk. 1500/acre/application). The Naphthalene method is environment friendly and does not have any bad effects on standing crops or on the soil/ecosystem. The method is free of known human health hazards.

(c) Farmer's Innovative Improved Management Practices for Mango Orchard:

The mango is delicious and nutritionally superior fruits amongst all fruit of the world. Among various reasons for improvement of mango production the attack of insects/pests and diseases is of particular importance. Insect pests and diseases not only reduce the yield but also sometimes account for a complete crop failure. The absence of soil management, irrigation, and application of fertilizer may result in lessened production or less-than-optimum yield, whereas the attack of even one particular insect, in some cases, may damage a crop from 20 to 100 percent. Therefore, a person owning a mango orchard, or even one or two mango trees, shall have to learn these maladies and how to prevent them and control them through human health hazard free improved management practices to achieve higher yield and quality. A description of the farmer's innovative improved management practices for mango orchard as follows:

At Motabari mondalpara village under the union Parishad of Baraigram upazila in Natore district, Md. Abdus Sattar about 50 years old, son of late Akkas Ali, who is inhabitant of this village and has been involved with various crop production system from his childhood. Presently, Mr. Satter is very much popular as model mango orchard management and it's marketing within and outside of his union parishad. But he was not popular back in 1982.



[Above] Abdus Sattar applying water around the Mango tree

In 1982, Mr. Sattar leased in a mango orchard by borrowing money from moneylender. There was profuse flowering on the mango trees of his leased orchard, but almost all flowers were shed (drop down) due to heavy infestation of insects and diseases. Then he was very much up-set about mango cultivation. In the same season, he met a group of mango businessmen (from Chapai Nawabganj) in Dhaka and he explained to them about his failure in mango cultivation. However, as per advice of the mango businessmen, he purchased a foot pump spray machine and he learnt lot about effective control measures of mango's pests and diseases from them. Following year in 1983, he sprayed various insecticide and fungicides as per suggestion made by the mango businessmen from Chapai Nawabganj before and after blooming of mango trees of his orchard.

He harvested bumper mango yield and earned higher profit in 1983. Based on the success of Mr. Sattar, his many neighbors and villagers were sprayed mango trees with various insecticides and fungicides by foot pump spray machine in their mango orchard from following year in 1984. Thus the pesticide spray strategy for mango orchard disseminated and followed by scaling-up in Natore district, Mr. Sattar strongly claimed. Following years they introduced fertilization, irrigation and cleaning the trees and thus, they evolved an improved package or management practices for mango orchard in Natore district. Description of the innovative improved management practices for mango orchard as "Sattar" model as follows:

Insect and disease management:

- ✓ **First Spray:** Any one insecticide from Relothrin, Basathrin, Ripcord, Cymbush etc. of cypermethrin group with recommended dose should be sprayed on the mango trees before 20-35 days of blooming on the trees. The first spray should be done after cleaning the trees.
 - ✓ **2nd spray:** should be administered with same insecticide of the 1st spray along with a fungicide from Indofil, Knowin, Bavistin etc after flower emergence and before opening of the flowers with recommended dose for both of the insecticide and fungicide.
 - ✓ **Third spray:** should be administered with only the same fungicide of the second spray after fruit set (pea size) with recommended dose.
 - ✓ **4th spray:** should be administered with 20 ml lebacide 50 EC mixing in 10 L water at marble size of the fruit for preventing mango weevil.
 - ✓ **5th spray:** should be administered during April-May (Joistha) at the early maturity stage of the mango with 10 gm or recommended dose of sevin powder in 10 L water to protect mangoes from fruit fly.
- The spray should be done by foot pump spray machine
- Mr. Satter suggested for at least five sprays on each tree during a mango cropping. But number of spray depends on the occurrence of rainfall. If there is any rainfall during and following day of spray, then spray must be repeated.



[Above] Mr. S. Costa spraying with foot Pump spray machine

Mango harvesting:

The mangoes are harvested at their right maturity stage or when mangos' skin changes into light



[Above] Mangoes are kept for drying the latex

yellow with jute rope net basket (pocket) at the end of the thin bamboo. After collecting, the fruits are to be kept on the rice straw for the drying the latex of the harvested fruits. After drying, fruits are placed one by one on straw in the bamboo made basket (Tukri) and mangoes are marketed with those basket.



[Above] Mangoes in bamboo basket

Post harvest management practices:

- After one month of mango fruit harvest a ring round the base of the surface soil of each mango tree should be prepared by spading the soil with suggested depth. Well decomposed cow dung 20-25 Kg, 2-3 Kg TSP, 1.5-2 Kg Urea and 1.5-2 Kg MOP per tree should be applied in the ring followed by mixing with soil need to be done. After application of fertilizers, adequate watering needs to be done.
- If dead branches and parasite plants are found on the mango trees, those need be cut and this practice needs to be administered through out the year. Clean mango orchard is one of the pre-requisite for successful and quality mango production. Mr. Satter believes wider spacing (45-60 ft) is favorable for healthy mango trees of the orchard with higher yield and quality mango production.

For further information:

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