INTEGRATED PEST MANAGEMENT(IPM)

The most sustainable way to control pests is a carefully designed integrated pest management (IPM) program. In this approach, each crop and its pests are evaluated as parts of an ecological system. Then farmers develop a control programe that includes cultivation, biological and chemical methods applied in proper sequence and with the proper timing.

The aim of IPM is not to eradicate the pest population completely but to keep the crop damage to economically tolerable level. Farmers monitor the field and when they find the pest level to be high enough, they first use biological methods and cultivation practices to control and then use small amounts of insecticides mostly insecticides derived from plants as a last resort.

(a) Biological control includes Natural predators, parasites and pathogens of the pests are used. Examples are:

• Pest on cucumber plant called red spider mite is controlled by using a predatory mite that feed on red spider mite.

• Citrus fruits in California heavily damaged by scale insects which were controlled by Australian ladybird which ate away the insects.

• Mealy bug pest of Cassava plant were controlled by a parasitoid wasp which was its natural enemy .

• Hormones are used that disrupt the insects normal life cycle, thereby preventing it from reaching maturity and reproducing and multiplying.

(b) Cultivation practices A variety of cultivation practices like crop rotation, polyculture and inter cropping etc. can be used to get rid of the pests. This has been discussed in details earlier in this lesson.

(c) Some amounts of insecticides, mostly of plant origin (e.g. Pyrethrum and Rotenone neem product) are applied as a last resort.

(d) Pest and disease resistant crop plants can be produced by genetic engineering. Example is Bt cotton, insecticidal for bacterial gene (Bacilus thuringinesis) introduced into cotton plant making cotton plant resistant to pest.

disadvantages:

• Farmer should have an expert knowledge about each pest.

• It acts more slowly than conventional pesticides.

• Methods developed for a crop in one area might not apply to areas with even slightest different growing conditions.

• Initial cost may be higher but in the long-term cost become very low .

21.9 BIOTECHNOLOGY AND MODERN AGRICULTURE

With conventional breeding practices reached their saturation point, the “gene revolution” seems to hold lot of potential.

Agricultural biotechnology or gene technology or genetic engineering may act as the second “green revolution” that can be used to create high-yielding crop varieties that are:

(i) herbicide tolerant, (ii) insect resistant, (iii) resistant to pathogens like virus, bacteria and fungi (iv) have better nutritional value and other commercial properties. The crop plants produced by these

techniques are called “transgenics” or genetically modified (GM) plants or genetically modified organisms (GMOs).

By using the technique of genetic engineering it has been possible to genetically transform large number of agricultural and ornamental crops.

Transgenic have been produced with the following aims:

• Crop resistance to herbicides.

• Crop resistance to insects and diseases.

• Atmospheric nitrogen fixation by cereal crops.

• T olerance to high salt soils and to flooding in crops.

• Drought resistance in crops.

• Improving nutritional quality of crops.

• Prolonging shelf life of fruits and vegetables.

Some important examples of transgenics or GMOs are:

1. Bt cotton produced by incorporating Bt gene which encodes for BT toxin (insecticidal protein in Bacillus thuringiensis) in the cotton plant. The plant becomes insect resistant and this gene has been incorporated in corn, potato, tomato, tobacco etc. making them insect resistant (bio pesticides). Such

plants can reduce our dependence on chemical pesticides which will save us money and our environment.

2. “Golden Rice” a transgenic with enhanced vitamin A content producing nutritionally rich rice to save many lives. Salt and flood tolerance genes have been incorporated in rice so that Bt rice in China shows higher yield and a huge reduction in pesticide use. Such rice can be grown on saline soil.

3. By slowing down and controlling ripening in tomato by introducing a bacterial gene that prevents ethylene formation thus delaying ripening. Such tomatoes are easy to handle during transportation and remains on the shelf for a long time.

4. Cold damage to crop plants can be minimized by introducing genes for antifreeze proteins (AFPs) found in the blood of artic fishes. Frost resistant tomatoes have been produced by introducing gene for antifreeze proteins from polar fish living in ice water . Plant biotechnology can help to make intensive agriculture less damaging to the environment as well as help the country to spend less money on fertilizers, pesticides, herbicides etc.

Source : http://nagahistory.wordpress.com/2014/03/20/sustainable-development/