## Ecological pest management

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The nature is ours, but not ours alone. If there is a way to protect his agricultural produces from pests, no farmer will like to kill the pests. Fukoka, the Father of Natural Farming says that there exists always a relationship between plants and pests. Any attempt to control the pests without understanding the relationship among them is futile. Pest management is not a simple problem in chemical farming. Great efforts are always made to reduce the damages done by the pests. Different types of pesticides are used to control the pests at different stages. i. e, systemic pesticides for sucking pests, penetrating pesticides for stem borers, vaporizing pesticides for pests that hide in safe places within plant and so on. But every pesticide is sold with a certificate that it will kill only the elected insects, leaving their predators undisturbed.

We know that there are 4 stages in the life span of a pest – egg, larva, pupa and moth. When a chemical is sprayed to manage the pest damage, only the larva stage can be attacked. Chemicals can never effectively control the pests in three other stages. In larva stage also, only the larvae that come in direct contact with chemicals or the larvae that eat the chemical sprayed leaves are affected. The other larvae are not only unaffected, but become more resistant to those chemicals. Any technology will be a successful one, only when it is beneficially used and wisely managed. It is possible to manage pests by following certain practices like the use of botanical insect repellents, neem extracts, trap crops, mixed cropping, crop rotation etc. Crop rotation creates a natural pest predator relationship. Diversity is the best and cheapest form of pest control. No chemicals may be used for fungus and weeds also. For seed treatment also it is preferable to use traditional methods like organic manure, ash, cow urine, beejamruta etc. Sustainable farms minimize their purchased inputs (fertilizer, pesticides, energy and equipment) and, rely as much as possible on the renewable resources of the farm itself. Let us imagine that we eradicate the damaging pests (that are all pure vegetarians) by 100 %, in one field. Then what will happen to the predators that are all pure non vegetarians? What will happen to the eco system among the insects?

It is interesting to note, how a botanical insect repellant acts and protects an agricultural produce. A botanical repellent is the extract of three or more medicinal plants (The plants that are not eaten by cows and goats can be treated as medicinal plants, for this purpose). First, let us prepare the extracts of the three following plants, say 1 liter, each - Clerodendran inerme, Aloevera and Neem leaves.We mix the extracts of these three plants and get a concentrated solution. If possible, a small quantity of cow urine can also be mixed with the solution. Then we get a spray fluid by mixing 30ml of the solution to one liter of water. Let us try to understand what happens when the spray fluid is applied on a tomato plant. A worm approaches the fruit to eat it. All the living beings (including human being) select their food only by smell. Because of the bad smell of Clerodendran inerme , the insect gets confused and hesitates to eat the fruit. Some insects may go away, without damaging the fruit. But some may still try to eat the fruit owing to hunger. When they touch the fruit by their tongue, an itching effect is experienced by them, because of the presence of Aloevera. Some insects go away at this stage, and only a few insects may continue to try to eat the fruit. When they eat, they can't eat enough, because of the bitterness of neem added to the repellant. Thus, the insects are never allowed to eat to full stomach. By making them to starve, their health is affected and they will not be able to move fast. The slow movement helps their predators to catch them easily. Because of the continuous starvation, they also become so weak, that their reproduction is affected. Thus the number of unfavorable insects are reduced. In the absence of chemicals, the reproduction of predators will be high. Examples of plants that can be used as pest repellents are Vasaka, Aristolochia, Ginger, Datura, Calotropis, Nux Vomica, Dalmation Pyrethrim, Jatropha, Custard Apple, Aloevera, Holy Basil, Marigold, Bitter guard, Wild Almond, Flame of Forest, Garlic, Pongam, Lucky Nut, Turmeric, Acorns, Dhudi, Fenugreek, Neem, Vitexnegundo and Lantana.

The first step in ecological pest management was accepting the principles of IPM (Integrated Pest Management), which is a strategy of combining biological and limited chemical use together with cultural management. Now it is NPM *i.e.,* Non Pesticidal Management, accepted and practiced successfully.

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