

GUARDIANS OF THE PADDY CROP

MANOHARI SANDANAYAKE

Scientific Officer

Natural Resources, Energy and Science Authority of Sri Lanka

Rice is our staple diet and paddy occupies the most important place among our food crops.

In order to feed the growing population, every possible effort has been made to increase the output of paddy through expansion of cultivation and by improving the yield.

However, the achievement of these objectives has been seriously affected by several factors, and insect pests remain the most formidable threat of all.

On a conservative basis, it has been estimated that insect pests account for as much as 20 - 30% of the loss in the potential yield of paddy.

Application of chemical insecticides has been the major means used in the control of insect pests, but even after a sustained usage over a long period of time, these chemical agents have not been able to eradicate or even bring down to minimal levels - the threat posed by insects.

Although, from a short term perspective, a certain degree of success has been achieved through chemical agents, the time is now ripe for a realistic long term assessment of the advantages and disadvantages of chemical insecticides.

The major drawback inherent in chemical insecticides is related to the problem of toxic chemical residues that remain in the crop and eventually enter and accumulate in the bodies of human beings. The second aspect is the ability of insects to develop resistance to many insecticides. Once a particular insect species develops resistance to a specific insecticide, invariably it requires a more toxic agent to bring them under control.

The development of such insecticides requires time, effort and money and the new insecticides tend to be expensive and beyond the means of ordinary farmers.

Usually, a range of insect species are found in any paddy field. The majority of these are really protectors of the paddy crop. The cultivator, who cannot distinguish between the useful and harmful insects resorts to indiscriminate application of insecticides, thereby inadvertently laying the foundation for a more sinister long term threat.

Therefore, the ability to distinguish between these two types of insects is an absolute necessity in paddy cultivation.

Insect Pests

First, let us look at the pests. The major insect pests of paddy (in the dry zone as well as in the wet zone) are;

1. Yellow Stem borer {*Tryporyza incertulas* (Walker)}
2. Leaf folder {*Cnaphalocrocis medinalis* (Guenee)}
3. Paddy gall midge {*Orseolia oryzae* (Wood-Mason)}
4. Brown plant hopper {*Nilaparvata lugens* (Stal)}
5. Rice leafhopper :
 - 5a. {*Nephotettix virescens* (Distant)}
 - 5b. {*Nephotettix nigropictus* (Stal)}
 - 5c. {*Nephotettix impicticeps* (Ishihara)}
 - 5d. {*Tettigella spectra* (Distant)}
 - 5e. {*Inazuma dorsalis* (Motchulsky)}
6. Rice thrip {*Baliothrips bififormis* (Bagn.)}
7. Paddy bug {*Leptocoris varicornis* (Fabricius)}

In addition to them, there are also several insect species which can be termed "minor pests". These are : Stem fly, Whorl maggot, Case bearer, Leaf eating larvae and the Paddy bug.

The two insects, yellow Stem Borer and Leaf Folder (1 and 2) damage the paddy plant in their larval stage. The female insect lays eggs on the paddy leaves. The larvae that come out of these eggs either bore through the stem or make nests by folding and sticking the paddy leaf. Thereafter, they feed on the plant sap,

leading to withering and eventual death of the plant. The other insects usually attack paddy plants in their adult stage. They feed on the plant sap from stems, leaves or even suck the paddy kernel while it is in the liquid stage. Dead and dying plants with withered buds and whitish leaves as well as empty seeds (white in colour) are the indications of the presence of these pests in paddy.

Let us now look at the predators and parasites of these pests.

Predators of insect Pests

The colourful Lady Bird Beetle (Figure 1) is a small insect which spends all stages of its life cycle in paddy. From the time it is hatched out of the egg it feeds on the eggs, larvae, pupae and adults of all other pests.

The Cricket shown in Figure 2 is adept at jumping from plant to plant. In common with most insects that inhabit paddy, the female Cricket lays her eggs on the leaves of paddy plants. Like the Lady Bird Beetle, the Cricket also feeds on pests in all stages of their life cycle (from the time it is hatched as a larva).

The Grasshopper (Figure 3) is a familiar insect. To a certain extent it feeds on the young paddy shoots but performs a much more valuable service in devouring all insect pests. A similar role is played by the Water Bug (Figure 4).

The Plant Bug shown in Figure 5 is an interesting insect, because it has the ability to catch insects several times bigger. To benumb its prey, the Plant Bug injects a poison into the intended victim. The poison sacs are conveniently located inside its mouth. Prey consists of larva of all insect pests, flies, moths and butterflies.

The Rice Thrip (Figure 6) is another interesting insect. The early stages of its life cycle are spent in water and it comes out to inhabit paddy plants as an adolescent. At this stage, it feeds on the larvae and pupae of paddy pests. The adult Thrip feeds on flying insects such as flies and moths.

One of the most efficient insects, the Paddy Bug, is shown in Figure 7. It is quite capable of locating and

feeding on the pupae of Yellow Stem Borers and Leaf Folders hidden in various parts of the paddy plant. It is estimated that the Paddy Bug devours about 20-30 larvae per day.

Several species of ants are shown in Figure 8. They too perform a valuable service by feeding on all stages of all pests.

Spiders (Figure 9) adopt a different technique for catching paddy pests. They are expert tappers, and the trap is none other than the cob web familiar to all of us.

Parasites

Paddy pests are not invincible beings. Apart from the predators described earlier, they have their own quota of parasites to contend with.

Three such groups of parasites are described below :

Group I

Two members of this group of parasites are shown in figures 10 and 11. They spend their entire life cycle within the eggs of paddy pests.

Group II

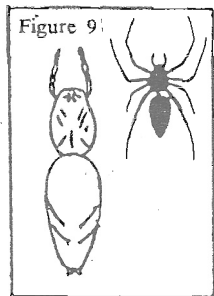
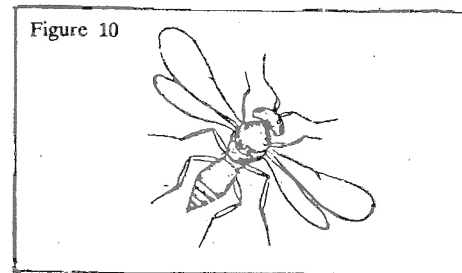
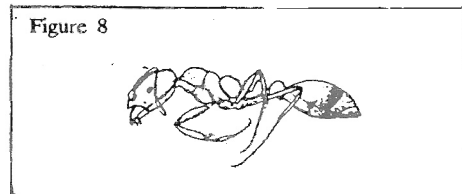
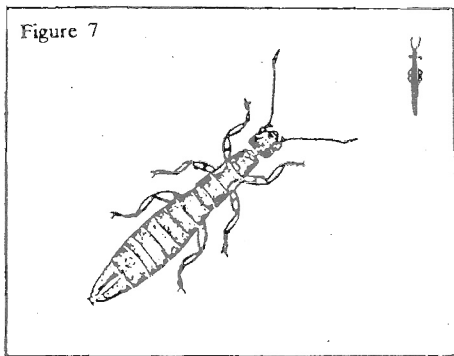
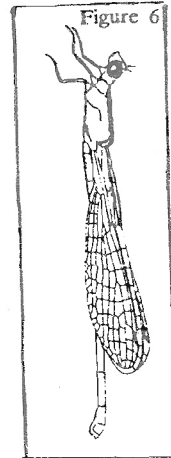
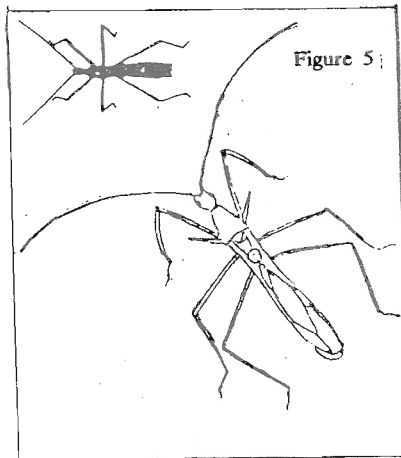
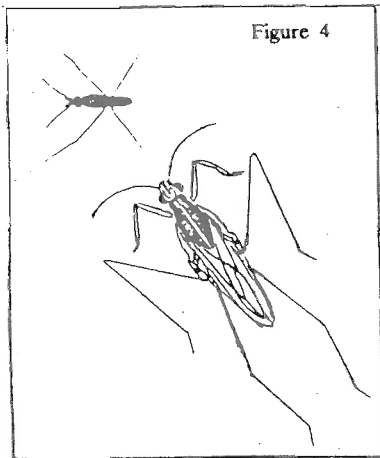
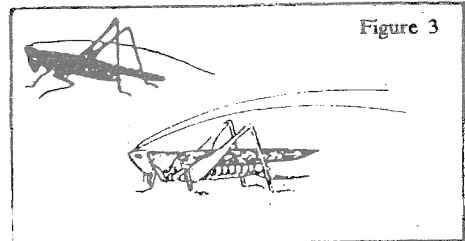
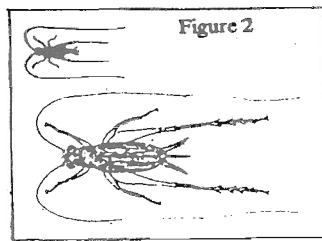
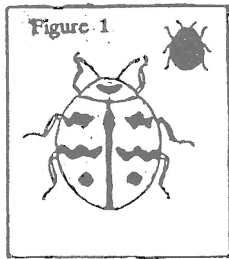
The life cycle of these parasites (of which one is shown in figure 12) is spent in the eggs and the larval stage of insect pests.

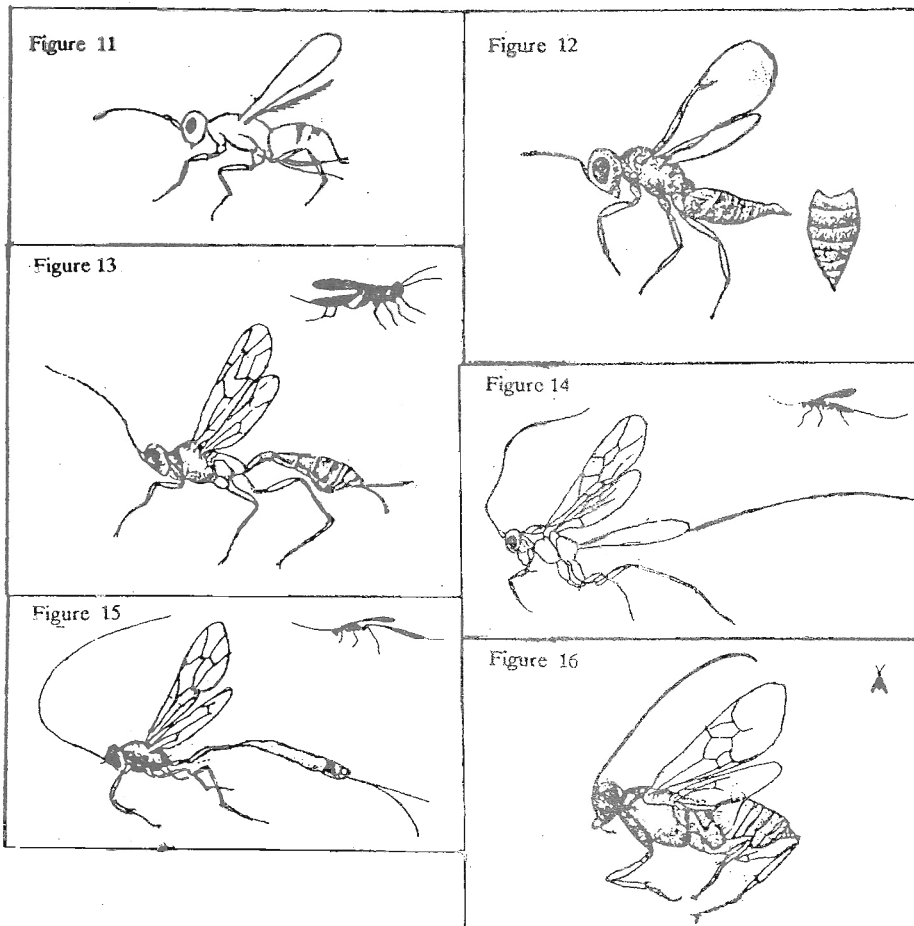
Group III

These probably are the deadliest enemies of paddy pests, because they lay their eggs inside the body of pests. Once the eggs are hatched, the emerging larvae feed on the body of the host, thus ensuring its total destruction. Four such useful parasites are shown in figures 13 - 16.

The facts given above reveal the useful role played by parasites in the control of insect pests in paddy plants.

In terms of destructive power, it may be noted that these parasites pack sufficient punch to knock off superior numbers of their adversaries. For instance, a female parasite lays between 40 - 160 eggs. Each of





these eggs in capable of destroying at least one pest insect and add another one to the parasite population.

The chief distiguishing feature of these parasites is the **ovipositor** that projects outwards like a tail. Several species (as mentioned earlier) have hidden ovipositors.

The pair of antennae is yet another feature, the function of which is well known.

The predators and parasites of paddy pests are really our first line of defence. It is our duty to recognise and look after those that man the forward defence positions.