

# Annex I

## **Non Chemical Methods of Pest Management**

### **Mechanical Methods**

Physical methods of pest control include picking pests from plant parts and killing them and removing plants or parts of the plant (e.g., leaves, buds or flowers) affected by pests and destroying them (Figure A1).

### **Cultural Methods**

Cultural methods of pest control include choosing a variety that is either resistant to pests or is less susceptible to pest attack; produces an acceptable crop even when attacked by pests; or grows at a time of the year different from the time when pest numbers are high. Information on such varieties is available from agricultural extension workers and agricultural departments. Pests can also be controlled by adopting cultural practices such as sowing the crop at a different time of the year so that pests are absent when the crop is most susceptible to attack; pruning, thinning, or allowing the crop to grow profusely depending on the crop. Mixed cropping and crop rotation also help to a great extent. The presence of weeds increases either the number of pests or the pests' natural enemies. Therefore, for some crops, weeding, and for other crops, not weeding, also help in pest control.

### **Biological Pest Control**

Biological pest control means killing the pests using their natural enemies. Natural enemies of pests include predators

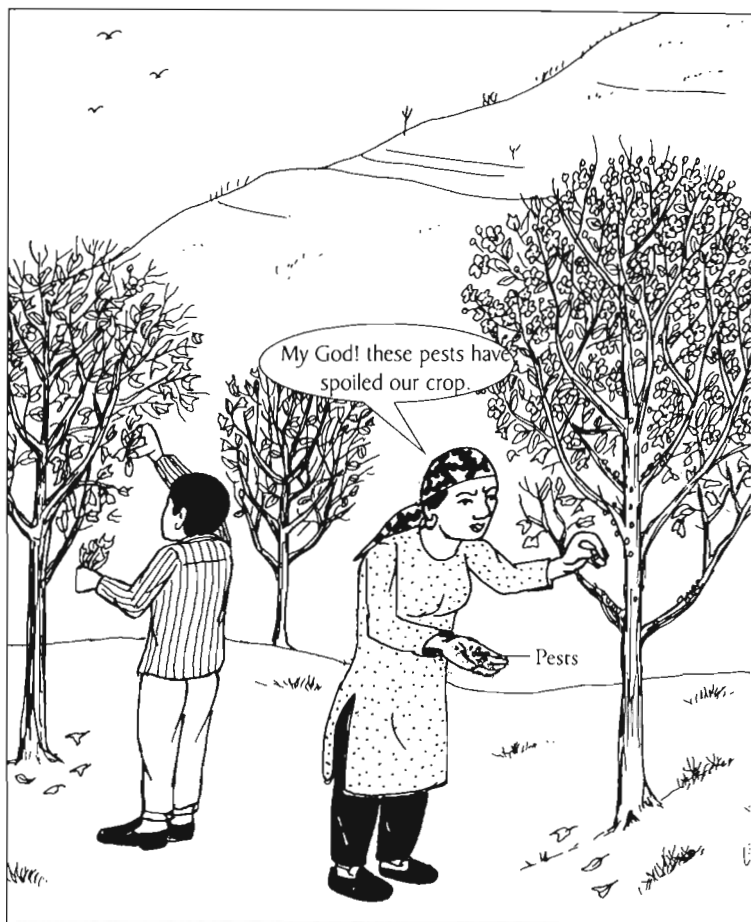


Figure A1: Pests can be controlled mechanically by picking them up and destroying them.

that feed on them, parasites that live on them, and pathogens such as bacteria, viruses, and fungi that infect them. These enemies keep pests at low levels over a long period. Therefore, such insects or parasites should be encouraged. If they are not present in nature in sufficient numbers, they can be reared and released on the crop when required (Figure A2).

The insect that causes San Jose apple scale is controlled biologically using its enemy the parasitoid, *Encarsia perniciosi*. This insect can also be controlled by ladybird beetles, *Chilocorus* spp (*C. infernalis* and *C. nigrinus*), and *Pharcoscymnus flexibilis*. Ladybirds are good predators of

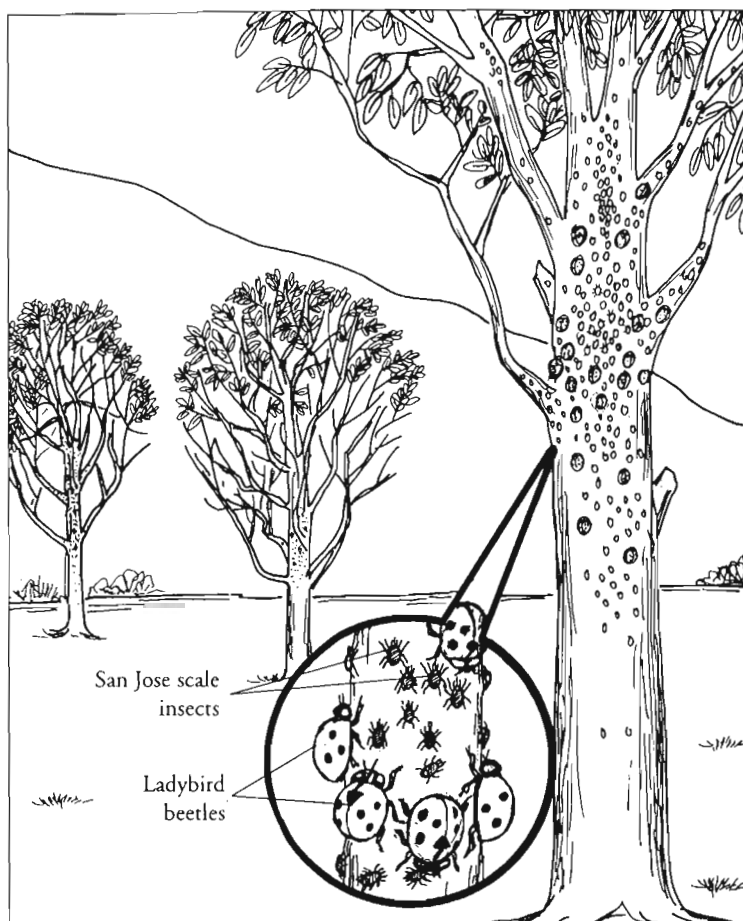


Figure A2: Biologically, pests can be controlled by using their natural enemies.

San Jose scale insect and keep its population below economic-injury level. In addition, white cabbage butterfly (*Pieris brassicae*), a serious pest of cabbage, cauliflower, and other members of the *Cruciferae* family, is controlled by the parasitoid, *Pteromalus puparum*. Farmers can obtain such biological control agents from biological control laboratories where they are mass-reared.

### Integrated Pest Management (IPM)

Integrated pest control uses a combination of physical, cultural and biological methods together with a low amount

of least toxic chemicals (pesticides). IPM is the best method of ensuring long-term pest control.