

if a beetle, a grub; and others have no special names. The larval stage is the growing and feeding period of the insect's life, when the most injury is done, and is usually the time when they can be most conveniently destroyed.

(3.) The third stage is the pupal or resting period, during which the insect remains quiescent and takes no food. In this stage the larval organs are broken down and built up again into the organs of the adult.

(4.) The fourth stage is the adult, or perfect form. The adult insect is usually winged, and during this period there is no further growth, only sufficient food being taken to maintain the vital activities of the insect.

Some insects have no pupal stage, and the second period in their life is called a nymph instead of a larva. Examples of this class of insects are grasshoppers, scale-insects, and aphides. Examples of those having all four stages are the tent-caterpillar, fall webworm, pear-tree slug, etc.

PREVENTION AND TREATMENT OF INSECT PESTS.

This, from the farmer's or fruit-grower's standpoint, is the most important side of the subject. There are several general headings under which such methods may be discussed. The following are a few of the most important:—

(1.) *Clean Culture.*—This consists in gathering all crop residues—prunings, etc.—and destroying by fire or the use of lime; by removing and burning all dead wood and by scraping off the loose bark from the trees.

(2.) *Maintaining the Vitality of the Plants.*—As is the case with diseases, plants weakened from any cause are less able to withstand the attacks of insect pests than those in a vigorous, thrifty condition. Great growth does not necessarily denote health or vigour, and a tree that has made a good normal growth is often in better condition than one that has made a large sappy one. The grower should therefore endeavour to so cultivate his trees that they will make a stocky, normal growth characteristic of the particular variety. Do not invite winter injury by late cultivation, late irrigation, or excessive pruning. By observing these precautions the grower will render more simple the problem of keeping his trees free from insect and fungous pests. Much has been written concerning the insecticidal value of fertilizers, but it is probable that their chief value lies in the increased vigour they give the plants.

(3.) *Hand-picking.*—This method is of value in the control of large, leaf-eating caterpillars that come in comparatively small numbers, but may be capable of devouring considerable foliage.

(4.) *Trapping.*—This has been successfully employed in the control of such insects as climbing cutworms and the wingless females of canker-worms. The trees are banded with some sticky substance like tree tanglefoot, and in this the insects are caught.

(5.) *Fall Ploughing.*—Certain pests can be destroyed in this way, though not many orchard insects. Wireworms, the larvae of click-beetles, may be reached by this practice. A late fall ploughing, followed by cultivation, breaks up the hibernating cases of the grubs, so that they perish. Other insects that winter in the soil may, in a like manner, be exposed to the action of the frost and to the attention of various insectivorous birds.

(6.) *Crop Rotation.*—This method is extremely valuable in the control of insects of general farm crops, and to a certain extent of vegetables and small fruits as well. It does not, of course, apply to orchard crops.

(7.) Lastly, we have *Spraying*. This, to be effective, should be timely, and must be well done. As too often practised, it is little better than a waste of time and money.