KILLING THE APPLE WORM.

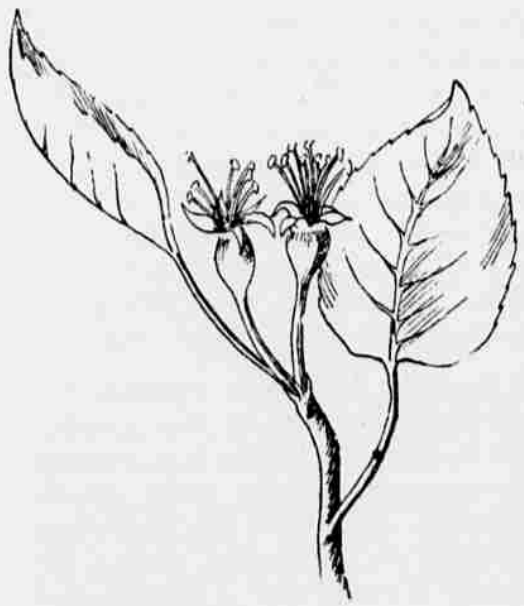
The apple worm has come to be looked upon by horticulturists as an almost unavoidable evil. Fruit growers meeting yearly with the crop of "windfalls" and the even scattering of deformed and bitter apples have come to regard as inevitable the ravages of this little pest which destroys yearly millions of dollars' worth of apples. Nevertheless, the apple worm can be fought and fought successfully. This has been demonstrated by experiments of Kansas farmers and fruit growers last summer, under the direction of Prof. S. J. Hunter, who is at the head of the entomological department of the University of Kansas.

Professor Hunter is best known to Kansans as the originator of disking as a method of fighting the grasshopper in alfalfa.

"We have found it to be the best policy," said he, "only to direct and suggest what is to be done, leaving the farmer to do the work, report the results and express his opinion on the treatment. Our fight against the apple worm last summer was conducted in this fashion, entirely through correspondence. Now the yield has been measured, and that of the treated apples found in most cases to be greater than those which were not. The apples which were experimented upon have been found to be of better quality than the others, and the long winter evenings will be spent by the farmers in discussing the merits of the treatment."

The Work of the Apple Worm.

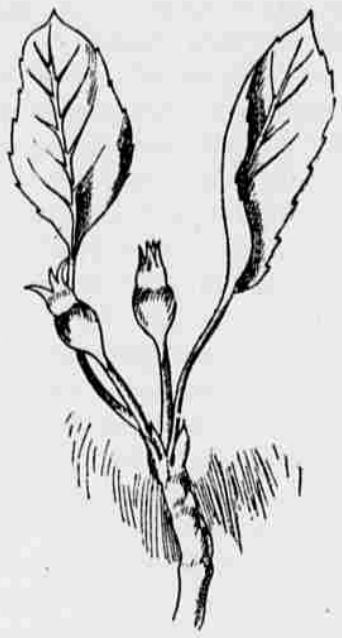
The apple worm is the progeny of a silky brown moth called the codling moth, which lays eggs on the leaves of the apple tree, and occasionally on the sides of the apple, from one to two



PROPER TIME TO SPRAY.

weeks after it has developed from the blossom. About one week is required for the worm to hatch out from the egg. After emerging from the egg the worm's first move is in the direction of one of the apples, where its work commences. Now the skin of the apple, which is still hard and green, makes the fruit invulnerable at the sides to the attack of the worm, but the soft blossom end is the apple's weak point, and it is to this that the little worm immediately goes. The first few days of the apple worm's life are spent in eating around in the blossom end.

This period of eating in the blossom end is the vulnerable point in the life of the insect, for it is at this stage that it can be killed by the poison spray in a manner which will be described. Leaving here after a few days, the worm begins to tunnel in the apple, with the core as his objective point. The center once reached, the apple worm remains there until he is fullgrown, feeding upon the core and the seeds, of which he



TOO LATE TO SPRAY.

seems particularly fond. When he has reached maturity the worm starts for the outside world again, digging his burrow straight out for the side of the apple; in the darkness of the night he leaves the apple and hies himself to a place of concealment in a hollow or crotch of the apple tree, in the bark, or in some pile of rubbish nearby, where he spins a cocoon about himself.

The first worms to spin themselves up in June and July soon transform to pupæ, from which, in about two weeks, the adult moth emerges and goes about laying the eggs for a second brood of the worms. In the northern parts of the country only a few of the worms develop into moths in the same season, but in the West a second and sometimes a third brood are developed. The little worms of the second brood, when hatched out, immediately attack the apples—this time from the side—eat their way through and out, weave a cocoon about themselves as did their parent, and go into retirement for the winter. They emerge in the spring, just as the petals are falling from the apple blossom, full grown moths now, and begin the work of egg laying.

The effects of the moths' occupation of the interior of the apple on the fruit is most disastrous. The early varieties ripen prematurely and drop from the tree, becoming what is called "windfalls," fruit which is used only to feed cattle and—must it be said—to make apple cider. The later varieties remain on the tree, but become bitter in flavor. The destruction wrought by the second brood is even greater. No longer does the side of the apple—soft and ripe now—offer any resistance to its progress, and straight in through the side the worm goes, disfiguring and ruining the fruit.

Spraying is Death to Them.

It is with the little worm just out of his shell that the horticulturist concerns himself. Many ways of fighting the pest in other stages of its development have been tried; killing the moth by smudges—fires of green fuel built under the trees—and collecting and destroying the pupa in its cocoon, but the moth is wary of smudges and the time taken to collect enough of the cocoons to have an effect on the breeding of the worms is worth more than the apples saved. Spraying is the only practical way of attacking the worm. As has been shown by the experiments last summer it is a successful way.

Professor Hunter's spray, which was used in the experiments, was made from the following formula: Paris green, one pound; freshly slacked lime, two pounds; water, 160 gallons. To have an effective mixture the Paris green must be pure, since some of the Paris green placed on the market is made up of colored lime, flour and other adulterants. A sure test for the quality of the article is to dissolve a small portion of it in ammonia. If the Paris green dissolves leaving no sediment, it is undoubtedly pure. Having been tested, the Paris green should be mixed with the lime in enough water to make a thin paste, the paste stirred into the rest of the water and allowed to stand twenty-four hours before using. A good spraying pump with a nozzle throwing both a coarse and a fine spray and having an agitator of some sort at the bottom of the tank should be used to apply the mixture to the trees.

The time for spraying is within a week after the blossoms fall. The object of the spraying is not to cover the leaves, the branches, not the apple itself, but to fill the rose or blossom end of the apple with the poisonous mixture so that the worm's first meals, taken while tunneling around in the blossom end, shall be largely composed of Paris green, a substance which will send him to the worm Valhalla before he has had time to commence his burrow towards the core. After the apple has been set four or five days the calyx lobes at the outer end of the apple begin to fold up, closing up the blossom end of the apple. If the blossom has been sprayed at the proper time, when the calyx lobes fold in, the Paris green is held safe and snug from