

# Democratic Watchman.

Bellefonte, Pa., Sept. 8, 1899.

## Fruit Trees in Pennsylvania and their Insect Destroyers.

Dr. H. T. Fernald, Former State Economic Zoologist Writes on Pennsylvania Fruit Trees—Facts that Every Horticulturist Should Know About the Apple, Peach and Plum Tree.

A bulletin just issued by the State Department of Agriculture discusses an exceptionally interesting subject to farmers, particularly those of Centre county, where so much attention is being paid, lately, to fruit growing. The article was prepared by Dr. H. T. Fernald, former economic zoologist of Pennsylvania and professor of zoology at the Penna State College. It treats of the various insects that destroy the life of fruit trees and advises as to the treatment of them. We publish it in its entirety because of the need our farmers have of knowing more than they do about the care of their orchards.

## SOME INSECTS ATTACKING FRUIT AND FRUIT TREES.

Fruit raising in Pennsylvania has for some reason been neglected and in consequence is an occupation of but small importance as compared with what it might easily be made. The census of 1890 shows that fewer bushels of apples were raised in Pennsylvania than there were bearing trees while the yield should average several times this. Moreover, the fruit which is obtained is, much of it, so injured by the attacks of insects and fungi as to greatly reduce its value, while a portion of that which at first forms is so quickly affected by one or another of these causes, as to soon drop off and be an entire loss.

The fruit tree, to pay, needs as much care as any other plant, and the person who starts an orchard and expects to reap any benefit from it without further care is sure to be disappointed.

Fruit trees are particularly liable to the attacks of insects, more than two hundred and fifty different kinds feeding on the apple alone. Fortunately most of these are seldom present in destructive abundance, and most can easily be coped with.

## THE CODLING MOTH.

This insect, often called the apple worm, does an enormous amount of damage each year in Pennsylvania. This loss may be divided into two parts. Many apples are infested when they first form in the spring, and are so injured that they soon drop off. Of those which remain, it is safe to say that a large portion are so wormy as to be unsalable, and perfect apples form less than half the number which are finally gathered.

Just how much Pennsylvania loses in this way cannot be estimated, but comparison with her northern neighbor, New York, may be of interest. In the latter State the average apple crop is estimated at 5,000,000 barrels, each at \$1.50 a barrel, would be worth \$7,500,000. It is also estimated that wormy apples form one third of the crop, making the loss to that state each year \$2,500,000.

The insect which causes wormy apples is a little moth in its adult state, measuring about three quarters of an inch from tip to tip of its outstretched wings. It appears in early spring about the time the blossoms fall and the little apples begin to form. It lays its eggs either on the apple, on the stem, or even on leaves close by, and usually not more than one or two at the same place. The moth lays from forty to one hundred eggs in all, then dies. The young caterpillar hatches from the egg in about a week and wanders about for a short time, but soon finds its way to the calyx of the apple, at the point opposite the stem—

"hollow end"—and in a few days it is between the calyx lobes which by this time have drawn together, leaving a little space within. Here it probably feeds for a day or two before beginning to eat its way in towards the core, where it feeds for two to three weeks. During this time it grows to a size of about six or eight inches, usually in the side of the fruit. After feeding a few days longer the caterpillar is ready to leave the apple and it passes out through the hole it has cut, pushing out the excrement which has for more or less completely filled up the hole. It then seeks some protected place in which to spin a cocoon around itself within which to pass through the changes necessary to change the caterpillar into the moth. If the apple leaves be still on the tree, this protected place is very often under some loose piece of bark on the trunk, but if the apple has fallen, it seeks any shelter it may find, under the protection of which it undergoes these changes. Usually this change occurs during July, and the change to the adult moth may be completed in three or four weeks, or it may be delayed till the following spring. In the former case the moths appear in August and lay their eggs for a second brood. The caterpillars of this brood work in the same way as those of the preceding one, but fewer of them enter the apple at the blossom end, entering instead on the side, and often feeding for a short time just beneath the skin of the fruit and producing large wormy spots which greatly disfigure it. After feeding till full grown the caterpillar leaves the apple and forms a cocoon in which to pass the winter, often after the apple has been gathered.

From this outline of the life history it is seen that there may be one or two broods a year. As a rule the more northern localities have but one brood while southern ones have both. In Pennsylvania it is probable that some which form cocoons in July remain in that condition over winter, while others emerge in August and in this way form a partial second brood.

Spraying at the proper time and in the right way is very successful for the control of the codling moth, but if it is done at the wrong time does little good. After the blossoms fall, the blossom end of the little apple which at this time is just forming, bears five small leaves arranged in a circle, and which, while the flower was in bloom formed the calyx. As the apple grows these become shelled up and in the ripe apple form the blackish material of the blossom end. At this time, however, they are quite large and for a short time stand apart and form the wall of a little cup. This end of the apple, pointing upward and only turning down later when the increase in weight of the apple causes its stem to bend. If the tree be sprayed with Paris green soon after the blossoms fall, and while these five calyx leaves yet stand apart the poison will fall into and be held in this little cup, and when the walls draw together and close, the cup will still hold the poison. After the calyx leaves have closed it is too late to spray as no poison can then get into the cup. Although this is true of the poison, it does not hold for the insect,

however, which, as already stated, works its way in between the calyx lobes where it feeds for a time, and if the poison be already there, the result is all that can be desired.

This treatment will probably destroy three quarters of the first brood, but those which escape should be destroyed in another way. As already stated, when full grown, the caterpillar leaves the apple and seeks for some protected place in which to spin its cocoon. If it can be induced to do this where it can subsequently be found and destroyed, much will be gained. To accomplish this, it is well to scrape off all pieces of loose bark from the trunk and larger limbs, and then put a band of cloth or even newspaper in several thicknesses loosely around the upper part of the trunk to provide a place under which the caterpillar may spin up and where they may subsequently be destroyed. This band should be put on about the last of June and examined two or three times during July, and all cocoons found under it destroyed. The success of this plan may be seen from the fact that in a single case, under one such band, forty-two cocoons were found and killed during July, 1898.

This method will destroy most of the caterpillars which leave the fruit while it remains on the tree. To destroy those which fall to the ground with the fruit they are in, letting poultry and hogs run in the orchard is usually sufficient, although picking up the windfalls and feeding them to stock is also advisable.

In this connection it should be remembered that the codling moth also attacks pears, and the same treatment for this is advisable, with this fact kept in mind—that the calyx lobes on pears do not draw together, and accordingly, though poison may easily be placed in the cup as in the case of apples, it is not held there but is washed out by the rains, and the spraying must be repeated once or twice, particularly if rain falls abundantly during this time if satisfactory results are to be obtained.

By following these methods at least three fourths of the fruit now lost by the codling moth can be saved, and at a very small cost of time and money.

## THE APPLE TREE TENT CATERPILLAR.

This insect, though familiar everywhere in Pennsylvania, is not usually so abundant as to cause serious loss, although in adjoining states it is often a great nuisance. It not only feeds on apple, but also on the peach, cherry, plum, wild cherry and other trees, and is easily recognized by the white silken tents formed in the small cracks of the trees, by the caterpillars. These are formed in the spring, however, and can therefore be easily distinguished from those by the web worms, which appear in July and August, at a time when the tent caterpillars are already dispersed.

This insect passes the winter in the egg. In the spring about the time the leaves appear, the eggs hatch, and the little caterpillars select some fork in which to begin their tents, and from which they spread in all directions to feed, returning to the tent at night, and often, also, between morning and afternoon excursions for food.

As they become larger they enlarge the tent until it is a very noticeable object, and wherever they go they spin a thread, as though for the purpose of providing a guide for them to follow back to the tent. In this way they feed and grow for five or six weeks, at the end of which they are nearly two inches long.

About the middle of June, or perhaps a little earlier, the caterpillars cease feeding, leave the web, and seek for a place in which to spin their cocoons. Within the cocoon the caterpillar transforms into the adult moth, a process which takes from two to three weeks, after which the moths appear.

The eggs are now laid on the twig of a tree, in a broad band entirely around the tree, each band containing two or three hundred eggs. At the edges of the band, it tapers down close to the twig, by which the egg mass may be distinguished from similar egg masses laid by certain other insects. The eggs remain in this condition during the remainder of the year and hatch the following spring.

The injury caused by this insect to the leaves, and as a full grown caterpillar will consume two leaves a day, a nest of them will destroy five hundred, or over, each day. The effect of this upon the tree, when the tents are abundant, is quite serious, the energies of the tree, instead of being directed towards maturing the fruit, being devoted to the production of new leaves to replace those it has lost.

A few years ago the apple-tree tent caterpillar was so abundant in various parts of Massachusetts that it stripped all the leaves from trees and shrubs over a large area. In order to check this devastation one or two horticultural and improvement societies in the infested district offered prizes for the largest collection of egg masses brought for destruction and in this way obtained and destroyed masses calculated to represent 25,000,000 eggs. So successful was the work, that the societies renewed their prizes for the following year, offering \$1.00 for every thousand masses brought in, and in consequence so reduced the insects that thereafter little trouble was caused.

The apple tree tent caterpillar is fortunately not a difficult insect to deal with. Its tents are easily seen, and the habit the caterpillars have of returning to them at night makes it a simple matter to destroy them all while gathered together, by the use of a torch at night, or before eight o'clock in the morning. The method mentioned above of gathering and destroying the egg masses is also an excellent one, and should be made use of during the winter months, when the trees are bare, and the egg masses may be more easily seen. Spraying the tree, particularly in the neighborhood of the nests, with Paris green, is also effective. Several parasites prey upon this insect and aid in keeping it in check, and if it appears in injurious numbers at any time, it may be considered solely as the result of neglect.

## THE CECROPIA EMPEROR MOTH.

This handsome insect is the largest moth which is found native in this part of the country. It is seldom seen, however, as it flies only at night, remaining concealed in the daytime.

It appears in May or June and lays its eggs to the number of two or three hundred, usually in pairs, on the under side of leaves of the trees the caterpillars are to feed on. As a general rule but few are laid on the same tree. After a week or ten days, the little caterpillars hatch and begin to feed, beginning with the new empty egg shells. Then they attack the leaves, and though at first very small, feed voraciously and in consequence, grow rapidly, till at the end of five or six weeks they are from three to four inches long, and as large round as a man's thumb. They are light green in color, with large red and yellow humps along the back and smaller blue ones on the sides. When the caterpillars are full grown they stop feeding and proceed to spin a cocoon within which to pass the winter.

Concluded on page 7.

## Medical.

## THE

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## Medical.

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Condensed Time Table in effect November 27th, 1898.

## EASTWARD—WEEK DAYS.

A. M.	M. A.	M. A.	M. P. M.	P. M.	P. M.
7:00	7:40	8:20	9:00	9:40	10:20
8:12	8:52	9:32	10:12	10:52	11:32
9:24	10:04	10:44	11:24	12:04	12:44
10:36	11:16	11:56	12:36	1:16	1:56
11:48	12:28	1:08	1:48	2:28	3:08
13:00	13:40	14:20	15:00	15:40	16:20
14:12	14:52	15:32	16:12	16:52	17:32
15:24	16:04	16:44	17:24	18:04	18:44
16:36	17:16	17:56	18:36	19:16	19:56
17:48	18:28	19:08	19:48	20:28	21:08
18:00	18:40	19:20	20:00	20:40	21:20
19:12	19:52	20:32	21:12	21:52	22:32
20:24	21:04	21:44	22:24	23:04	23:44
21:36	22:16	22:56	23:36	24:16	24:56
22:48	23:28	24:08	24:48	25:28	26:08
23:00	23:40	24:20	25:00	25:40	26:20
24:12	24:52	25:32	26:12	26:52	27:32
25:24	26:04	26:44	27:24	28:04	28:44
26:36	27:16	27:56	28:36	29:16	29:56
27:48	28:28	29:08	29:48	30:28	31:08
28:00	28:40	29:20	30:00	30:40	31:20
29:12	29:52	30:32	31:12	31:52	32:32
30:24	31:04	31:44	32:24	33:04	33:44
31:36	32:16	32:56	33:36	34:16	34:56
32:48	33:28	34:08	34:48	35:28	36:08
33:00	33:40	34:20	35:00	35:40	36:20
34:12	34:52	35:32	36:12	36:52	37:32
35:24	36:04	36:44	37:24	38:04	38:44
36:36	37:16	37:56	38:36	39:16	39:56
37:48	38:28	39:08	39:48	40:28	41:08
38:00	38:40	39:20	40:00	40:40	41:20
39:12	39:52	40:32	41:12	41:52	42:32
40:24	41:04	41:44	42:24	43:04	43:44
41:36	42:16	42:56	43:36	44:16	44:56
42:48	43:28	44:08	44:48	45:28	46:08
43:00	43:40	44:20	45:00	45:40	46:20
44:12	44:52	45:32	46:12	46:52	47:32
45:24	46:04	46:44	47:24	48:04	48:44
46:36	47:16	47:56	48:36	49:16	49:56
47:48	48:28	49:08	49:48	50:28	51:08
48:00	48:40	49:20	50:00	50:40	51:20
49:12	49:52	50:32	51:12	51:52	52:32
50:24	51:04	51:44	52:24	53:04	53:44
51:36	52:16	52:56	53:36	54:16	54:56
52:48	53:28	54:08	54:48	55:28	56:08
53:00	53:40	54:20	55:00	55:40	56:20
54:12	54:52	55:32	56:12	56:52	57:32
55:24	56:04	56:44	57:24	58:04	58:44
56:36	57:16	57:56	58:36	59:16	59:56
57:48	58:28	59:08	59:48	60:28	61:08
58:00	58:40	59:20	60:00	60:40	61:20
59:12	59:52	60:32	61:12	61:52	62:32
60:24	61:04	61:44	62:24	63:04	63:44
61:36	62:16	62:56	63:36	64:16	64:56
62:48	63:28	64:08	64:48	65:28	66:08
63:00	63:40	64:20	65:00	65:40	66:20
64:12	64:52	65:32	66:12	66:52	67:32
65:24	66:04	66:44	67:24	68:04	68:44
66:36	67:16	67:56	68:36	69:16	69:56
67:48	68:28	69:08	69:48	70:28	71:08
68:00	68:40	69:20	70:00	70:40	71:20
69:12	69:52	70:32	71:12	71:52	72:32
70:24	71:04	71:44	72:24	73:04	73:44
71:36	72:16	72:56	73:36	74:16	74:56
72:48	73:28	74:08	74:48	75:28	76:08
73:00	73:40	74:20	75:00	75:40	76:20
74:12	74:52	75:32	76:12	76:52	77:32
75:24	76:04	76:44	77:24	78:04	78:44
76:36	77:16	77:56	78:36	79:16	79:56
77:48	78:28	79:08	79:48	80:28	81:08
78:00	78:40	79:20	80:00	80:40	81:20
79:12	79:52	80:32	81:12	81:52	82:32
80:24	81:04	81:44	82:24	83:04	83:44
81:36	82:16	82:56	83:36	84:16	84:56
82:48	83:28	84:08	84:48	85:28	86:08
83:00	83:40	84:20	85:00	85:40	86:20
84:12	84:52	85:32	86:12	86:52	87:32
85:24	86:04	86:44	87:24	88:04	88:44
86:36	87:16	87:56	88:36	89:16	89:56
87:48	88:28	89:08	89:48	90:28	91:08
88:00	88:40	89:20	90:00	90:40	