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ROGUE RIVER VALLEY ORCHARD NOTES

BY CHARLES MESERVE
Secretary Grants Pass Fruit Growers Association

Codlin Moth in Rogue River Valley

The codlin moth is the most troublesome pest that the fruit growers of Rogue River Valley have to contend against. This is not due to inability to kill the pest for it has been found that an arsenate of lead spray is sure death to the larvae of the moth. But as this spraying must be done just before the larvae hatch, and a few days too soon or too late enables the worms to escape destruction, and the further fact that the different broods hatch at varying periods during the spring and summer, and the dates varying with each year as influenced by climatic conditions, the fruit grower is placed at a great disadvantage in fighting the codlin moth. At the request of a number of the leading fruit growers in the vicinity of Medford, George W. Taylor, fruit inspector for Jackson county, undertook last year a series of experiments to ascertain just when was the right time to spray for the codlin moth. The results of these experiments is embodied in the unjoined paper which Mr. Taylor read at a fruit growers meeting held in Grants Pass in February under the auspices of the Grants Pass Fruit Growers Association. Mr. Taylor is considered by Prof. A. B. Cordley, entomologist at the Oregon Agricultural College, and by the leading fruit growers of Rogue River Valley to be the best posted person in Southern Oregon on the habits of the codlin moth and on the methods of exterminating it. As the climatic and other conditions are almost the same in Josephine county as in Jackson county the information that Mr. Taylor gives in his paper will be as valuable to the fruit growers of this section of Rogue River valley as to the upper section.

The origin of the Codlin Moth has been discussed pro and con for many years, as many of you know, and any comment on it in this paper I think unnecessary. The Department of Agriculture in its reports show a loss to the fruit growers of many millions of dollars annually through the destruction of fruit by this pest. This being the case, I think it is our duty to carry on a series of investigation in order to ascertain the habits of the moth in the various fruit districts. You will find in Rogue River valley that the blossoms come and are gone and the calix closed before the moth appears. I think a number of hatchingeries should be established in this valley so that the exact date of the first brood could be ascertained.

With the limited knowledge that the fruit growers of Rogue River valley have of the life history of the codlin moth as affected by local climatic and other conditions, it is the most serious pest that we have to contend with. There is no lack of knowledge as to how to spray or what solution to use to kill this pest, but the time to spray to do the most effective work in killing the larvae, or

worms, is not known and herein is where the codlin moth causes such a heavy expense to the thorough fruit grower and such a loss of fruit to the careless orchardist. Owing to the varying periods when the different broods of the codlin moth appear during the season, and the further fact that spraying done a few days too soon or too late does little damage to brood, places the fruit grower at a disadvantage in subduing this pest. The thorough orchardist to make sure of the right dates for spraying sprays his trees from three to five times. This gives him from 95 per cent. to 99 per cent. perfect fruit, but entails heavy expense in time and for spray solution. The careless fruit grower, who sprays when his farm work makes it convenient and but few times, incurs but little expense but is in luck if he has 25 per cent. of his apples free from worms.

To ascertain when was the proper time to spray for the various brood of codlin moth I have carried on a series of experiments in breeding the moths. In my search for cocoons I had no difficulty in finding all I required and many times more in the various packing houses in the valley, which shows the carelessness of many of the fruit growers. Some 500 cocoons were found and on the first brood, which were collected from the packing houses of the valley, many were found in old paper and newspaper as well, on the rafters and in the packing benches, old boxes and new boxes, old disordered water pails, cow bells and some in the nail holes of the horse shoes that had been tacked up in the packing house for good luck. In one packing house was found a piece of timber 2x4 inches and 6 feet long, that contained 210 cocoons. Now, I would like to ask you how can you control the codlin moth when such conditions as this exist in our valley? These cocoons were collected on May 16th and found in various stages of development. Many of the moths at this stage are destroyed by parasites which eat out the body and leave the cocoon with a hole in the side. You will also find about one-fifth of them die during pupation. The pupation period of the larva of the winter brood of moth I have kept no record of as I thought it was of no interest to the fruit growers.

To carry on these investigations a tree was selected and enclosed by a large cage or house made of fine wire and wood work, the object being to give the moth all its natural conditions. In this cage or house breeding cages were placed with the cocoons in them and as they hatched they were released in the tree and a record kept of each moth.

The following is a list of the moths as they hatched from this first brood, which may be interesting as it shows when the largest number appeared:

May 22nd.....1	June 13th.....1
" 27th.....1	" 14th.....1

" 28th.....1	" 15th.....1
" 29th.....2	" 16th.....2
" 31st.....1	" 17th.....3
June 2nd.....1	" 18th.....3
" 3rd.....3	" 19th.....20
" 4th.....4	" 20th.....3
" 5th.....3	" 21st.....1
" 6th.....1	" 23rd.....11
" 7th.....1	" 24th.....1
" 8th.....1	" 25th.....1
" 10th.....8	" 26th.....2
" 11th.....6	" 27th.....1
" 12th.....1	

To find out the average duration of life of the codlin moth 10 moths were selected and placed in hatching cages and given all the natural advantages possible. The following is the result of the test:

June 26th to 30th.....5 days
" 27th to July 2.....6 "
" 28th " " 4.....7 "
" 29th " " 6.....8 "
" 30th " " 8.....4 "
July 1st " " 10.....10 "
" 2nd " " 5.....5 "
" 3rd " " 8.....6 "
" 4th " " 7.....4 "
" 5th " " 10.....6 "

Average life of a moth 6 1-10 days.

In from two to four days the moth deposits her eggs on the fruit and foliage of the tree. From close observation it will be found that many of the supposed eggs are only a coating the moth puts on the surface to make the egg adhere to the surface of the fruit or foliage. I have watched the moth deposit her eggs and find that most are deposited late in the evening and very early in the morning, and perhaps during the night. The largest number of eggs deposited was 28, although this moth made 88 marks on the fruit and foliage, but only 28 contained an embryo. 24 of these eggs hatched and the other four died in the egg. The following is a list of eggs selected and it shows the period of incubation:

June 1st to 12th.....12 days
June 1st to 13th.....13 days
June 10th to 18th.....9 days
June 17th to 28th.....12 days
June 20th to 29th.....10 days
June 21st to 30th.....10 days
June 22nd to 29th.....8 days
June 20th to July 3d.....14 days
June 28th to July 8th.....11 days
June 28th to July 10th.....13 days

Average 11 1-5 days

During the last day of incubation the life of the young larvae can plainly be seen through the shell of the egg by the aid of a good glass. The shell is composed of a white transparent gelatine like texture. The young larvae lie in a crescent shape in the egg and on that side of the egg where the opening is made to release itself, when the egg is deposited on the foliage, which I find is the case in the forepart of the first brood. The young larvae when released stops to feed on the foliage which often kills them. Others crawl direct to the apple and bore in the side. They work very fast and disappear in the apple in from two to five minutes. You will find that many of the larvae enter where two apples touch or a leaf touches the apple. Many of them while traveling over the apple hunting a place to enter select a spot of spray and it being rough gives him a good foothold. Many of them die on the surface of the apple and some get through and die beneath the skin. Many that enter the side return by the side of the apple and those that enter by the calix return by the calix and some by the side of the apple. By close observation you will find many wormy apples, in which the larvae has been eaten by ants and by small black beetles. I examined 20 apples and found 18 destroyed by the above insects. The larvae's life in the apple is some what varied as the following will show:

June 8th to July 9th.....31 days
June 10th to July 10th.....30 days
June 10th to July 4th.....24 days
June 10th to July 6th.....27 days
June 11th to July 3d.....22 days
June 11th to July 6th.....25 days
June 18th to July 12th.....24 days
June 19th to July 5th.....16 days

The first moth of the second brood was deformed. The larvae entered the apple on June 15th and came out on June 30th, and hatched out on July 9th. It had no legs and its body was deformed, but its wings were perfect. The following is a list of the second brood of moths:

July 9th.....1	August 26th.....40
July 17th.....1	August 27th.....9
July 23d.....2	August 28th.....7
July 25th.....1	August 29th.....4
July 26th.....2	August 30th.....2
August 8th.....2	August 31st.....3
August 9th.....1	September 1st.....1
August 10th.....2	September 2d.....3
August 12th.....3	September 6th.....2
August 13th.....3	September 8th.....1
August 14th.....1	September 10th.....1
August 15th.....2	September 11th.....2
August 16th.....4	September 16th.....1
August 17th.....3	September 19th.....1
August 19th.....10	September 23d.....2
August 20th.....4	September 25th.....1
August 23d.....18	October 5th.....1
August 24d.....7	October 6th.....1
August 24th.....12	October 8th.....2
August 25th.....14	

Life of the Moth of the second brood

July 17th.....July 20th.....4 days
July 22d.....July 27th.....6 days
July 25th.....July 29th.....5 days
July 26th.....July 29th.....4 days
July 28th.....July 31st.....4 days
August 3d.....August 6th.....5 days
August 3d.....August 6th.....4 days
August 3d.....August 7th.....5 days

To test the incubation of the eggs of second brood 10 female moths were placed in breeding cages. I selected two females and one male for each cage, but only two of the cages produced eggs—Cage No. 1, 30 eggs and cage No. 2, 27 eggs. In all of the other cages, the moths fought and killed themselves. These cages were all placed in the open trees, branches being inserted through the cages with good fruit and foliage on them. All eggs were deposited on the fruit and none on the foliage. In cages No. 1, 25 eggs hatched out; in No. 2, 15 eggs

hatched. From observation, I find that a larger per centage of eggs of the second brood hatch than the first brood. The climatic conditions may be the cause. As to the time the larvae of the second brood spend in the fruit I have been unable to ascertain for so many of the apples dropped prematurely and the worms crawled out and died.

I have failed to find any trace of a third brood of moths, which some of the growers of the valley claim we have. I think the prolonged period of the second brood gives them this impression. I have tried to force a third brood by artificial temperature and moisture but up to this date I have been unsuccessful. This closes my study of the first and second broods of the codlin moth, which began on March 4th, 1907. It has been a long and tiresome study but very interesting to me.

Ashland Fruit & Produce Assn.

M. C. Linniger, who has been recently elected secretary and manager of the Ashland Fruit & Produce association, was in Grants Pass Wednesday to consult with Secretary Meserve, of the Grants Pass Fruit Growers association, on points connected with the regulations for picking and shipping of fruit and the markets, and also to bring about a greater co-operation between the various fruit growers associations of Rogue River valley on matters of common interest.

The Ashland association now has 152 members and owns its warehouse. Last season the Association suffered a serious reverse by reason of a series of mishaps, but now a new start has been made and stringent regulations adopted and the outlook is good for one of the most prosperous years that the association has yet had. Last season two cars of pears were lost entirely by the manager allowing the growers to take their own time to pick and bring to the warehouse their pears. It was over a week from the day the first boxes of pears were brought to the warehouse before the cars were loaded. The result was that the pears were overripe and decayed when they arrived at the eastern market and barely sold for enough to pay the freight. Much trouble has been had heretofore by the growers putting up short weight and faulty and even dishonest packs.

New and stringent rules have been adopted that will insure an honest pack and the members have to sign a contract in order that the Association will handle their fruit and supply them with paper, boxes and straw material. The association charges the members a commission of eight and one-third per cent on all sales of fruit and a commission of three and one-third per cent on all supplies furnished. For this year the Association will pay Manager Linniger a salary of \$1000 and also hire during the shipping season bookkeeper. An inspector will also be employed who will inspect all fruit before it is accepted by the Association.

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Colonist Rates.

As has been the custom for several years past the Railroads leading to the coast have agreed on a colonist rate, a little higher than in years past, but still a very attractive rate, and it ought to have the effect of bringing a large number of immigrants to Oregon this spring. The rate is effective from March 1st to April 30th and is substantially as follows: from Chicago \$38; from Missouri river common points, Council Bluffs to Kansas City inclusive, St. Paul, Minneapolis, Denver, etc., \$30; St. Louis, \$35.50. Usual stopover privileges will be given on these tickets. 1-24 1/2



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