

Mr. Day: I think Mr. Treherne should be commended for what he has done; he has taken a very important step.

Mr. Treherne: I think it was taken up wrongly by the East as coming from this Society as a resolution passed at our last annual meeting.

FINANCES.

Mr. Treherne: The finances of this Society at the present time are in excellent shape. We received a Provincial grant of \$350 last April. The Minister of Agriculture has for the last two years allowed us \$250 each year. When writing him last spring I asked him for this grant of \$250, and informed him that we were \$100 odd in the hole, and he very kindly remitted us the grant of \$250 plus \$100, which more than covers the deficiency, so now at the present time our accounts have already been certified O.K., and the balance in the bank at the present time is \$183.30, and \$34 has been received in fees, and half of \$34 would be \$17, which added to the \$183.10 will give us the total sum we have in the bank. An account of the finances to date is published in Bulletin No. 5.

As a matter of form, I wrote to the Minister of Agriculture again and requested him for another further grant this year. I received a letter from Mr. Ellison in which he stated:—

“I note your request for a grant of \$250 this year as previously. In reply, would say that I shall endeavour to get this grant passed in the estimates, although I cannot say whether it will go through.”

I also wrote to Mr. Scott, Deputy Minister of Agriculture, and he replied:—

“Adverting to your letter of the 28th, I take pleasure in advising you that the Honourable Minister of Agriculture has authorized me to place the sum of \$250 on the estimates for your Society. This will accordingly be done, and provided it is passed by the Executive, will be payable at the beginning of the ensuing year for the work of your Society.”

I do not think there is anything else to bring up.

The President: I think the next business will be the reading of the papers. The first one is: “(a) Aphid Notes from British Columbia; (b) *Myzaphis (Aphis) abietina* (the Green Spruce-aphis),” by H. F. Wilson, Corvallis, Oregon.

Mr. Treherne: This is a paper Mr. Wilson wrote for our Society regarding his experiences when he was up here the summer before last. We are getting out a little bulletin which will be Bulletin No. 5, and this paper will be given there. It refers to the green spruce-aphis, which is doing more damage than any other insect on the Coast at the present time. It is a periodical visitant. This bulletin will be published in about ten days, so that I do not think it is necessary to take this matter up before the Society.

Afternoon Session.

The President: The first paper this afternoon is on “Insects of the Greenhouse,” by G. E. Wilkerson, Victoria, B.C.

Mr. Treherne: Mr. Wilkerson had to return to Victoria this afternoon, so handed in his paper to be read.

INSECT PESTS IN GREENHOUSES.

By G. E. WILKERSON, VICTORIA, B.C.

In dealing with this subject I will endeavour to give a short description of the different pests, and to go more fully into the damage that they do and how their presence may be detected, and the best way to eradicate them, or, at least, keep them in check. This I will give from my own personal experience in greenhouse work for the last twenty years in Victoria. I will endeavour to give only such descriptions as any person connected with greenhouses can understand.

GREENHOUSE THIRPS.

The first pests I will deal with are greenhouse thrips. The best description I can give is that taken from Bulletin, Volume 11, Nos. 1 and 2, of the "Monthly Bulletin of Injurious and Beneficial Insects of California," by E. O. Essig, which is as follows:—

General Appearance.—The adult insect is characterized by having the antennæ eight-segmented and twice as long as the head, while the surface of the body is distinctly reticulated. The abdomen is yellowish-brown, with head and thorax dark brown, and antennæ, legs, and wings colourless.

Life-history.—The very minute, bean-shaped, colourless eggs are inserted in the leaf-tissues of food-plants, usually on the under-side. They hatch in about ten days. Each female lays from ten to twenty eggs. The first hatched larvæ are colourless, with seven-segmented antennæ. As they age they become darker in colour and the antennæ become eight-articulated. The larval and pupal stages occupy from four to six weeks. All stages feed throughout their life-cycles. There are continuous and overlapping generations, estimated by H. M. Russell to be twelve a year.

Food-plants.—Food-plants are, with very few exceptions, all plants grown in greenhouses. My reason for dealing with Thrips first and giving them the most prominent place in this paper is because I consider that they do as much, if not more, damage than all the other pests combined, and are by far the hardest to control around Victoria District, but they cause most loss in carnations.

The grower may not suspect their presence until one-third, or I have known one-half of his crop ruined by this pest. The first indication he will notice of the presence of Thrips will be that the edge of the petals of the blossom is discoloured, having a dried or burnt appearance on the light-coloured flowers, and the red and crimson ones will have white spots on them. Now, by carefully pulling the flowers apart, there will be found from one to a dozen of these pests working very industriously.

Control.—This is a very difficult matter, as I am satisfied that Thrips work very little among the carnation-foliage, but lay their eggs and are hatched out in the bud of the carnation, and during this time they are almost hermetically sealed in the tight folds of the carnation-bud, so I consider spraying of very little value; at least, that is what I have found. I have tried heavy fumigating with red pepper and tobacco-stems to be of considerable value, but the best remedy, at least the one we have most success with, is fumigating with nico-fume, or Black Leaf 40. This is best applied by painting the return pipes and turning on the steam; as soon as this has been done, taking care that all ventilators are tightly closed. If the grower does not heat by steam, he can get the same results from hot water, providing he can heat the pipes to a temperature of not less than 190° Fahr., and more, if possible. Failing this method, the next best way is to vaporize the nicotine solution over a spirit or coal-oil lamp. The quantity of nicotine solution to use depends on the size of the house to be fumigated, but full directions are given on the tins containing these solutions, and I have found these directions very satisfactory.

By keeping the temperature of the houses in as moist a condition as can be done with safety, and by frequent syringing, it will have a strong tendency to keep these pests in check, as they do not like moisture. This can be done with comparative safety during the months of July, August, September, and the first two weeks in October in this district, these being the months in which the most damage is done by Thrips; after this time they practically disappear until the following season. A great help is to keep the greenhouse perfectly clean, allowing no rubbish, dead flowers, etc., to be around on the paths or on and under the benches.

Some growers use $\frac{1}{3}$ to $\frac{1}{2}$ oz. of potassium cyanide and 3 oz. of sulphuric acid, C.P., dissolved in 4 oz. of water; but, personally, I do not like this method, as it is dangerous unless very carefully handled, and the results are sometimes very disastrous to the plants. I have found when using cyanide that one time you get

apparently satisfactory results, with little or no damage done to the plants, and the next time I used it, although using exactly the same quantity, there was a large amount of damage done; this, I believe, is caused by a possible difference of temperature and humidity in the atmosphere of the houses.

The damage caused by Thrips on roses is similar to that on carnations, as they attack the rose-buds almost in the same manner, and the same treatment is applicable.

The procedure of attack on chrysanthemums is considerably different. When attacked, plants show on the tips of the leaves a slightly yellowish appearance, also a thickening of the young leaves. On the tips of the plants, upon close examination, numbers of the insects will be found on the under-side and sometimes on the top side of the leaves. To destroy these, spraying can be done, as, different from the carnation or rose, you can reach them with the spraying material. I have found that the nicotine solutions before mentioned, with a little soap added, to be very satisfactory, also the whale-oil soap and quassia-chips do very good work.

Take 1 lb. of quassia-chips and 8 oz. of whale-oil soap; boil together for one hour in 1 gallon of water, then strain. Make up evaporation caused by boiling so that you have 1 gallon of the liquid. When using, add twelve parts of water. This is a very economical and efficient spray.

Thrips attack most of the commercial pot-plants that are grown in greenhouses, such as gloxinia, cyclamen, fuchsia, etc.; but if taken in time, spraying or dipping in the before-mentioned remedies will be found efficient.

RED SPIDER.

This insect, I consider, is next in line as causing most loss and damage in the greenhouse.

General Appearance.—They are exceedingly small and individuals are seldom noticed. Their colour is red with a yellowish tinge, and usually with two darker spots on each side of the body. Their appearance will first be noticed by the leaves of the plants having a pale and unnatural green colour, and upon examining the under-side of the leaves there will be found numbers of these insects. It attacks nearly all plants grown under glass.

Control.—This pest, fortunately, is easily destroyed and kept under control. All that is required is heavy but careful syringing by water, but it is very necessary that the under-side of the leaves must be syringed, and there is no excuse for any grower who possesses a good water-supply to receive much loss from the depredations of this insect, although, if not kept in check, red spider will cause the loss of the whole crop of chrysanthemums and other plants.

Sometimes during the middle of winter, when it is unsafe to syringe carnations and roses very heavily, red spider will get a foothold, especially those plants close to the heating-pipes, but just as soon as the days lengthen and we get more sunshine, syringing can be resumed and little damage will have resulted, providing that the plants have been kept clean from this pest previous to such time when syringing had to be discontinued on account of weather conditions.

GREEN APHIS.

This insect hardly needs any description, as it is so commonly known. It attacks practically all plants grown under glass, and if not destroyed or kept in check will do a lot of damage; in fact, it will ruin any crop that it attacks unless means are taken to destroy them. Fortunately they are the easiest of all insects to kill.

I have found that any of the before-mentioned nicotine solutions will destroy them, used either as a spray or vaporized. The whale-oil soap and quassia-chips are also very effective, but vaporizing is the best method, as by that means you kill all of the young aphides, when by spraying you only kill those that come in contact with the spray.

Green aphid is active all the year round, but more particularly so from April to November. The best way to keep it down is by frequent fumigating and spraying, so as not to let it get a strong hold. If the greenhouses are fumigated regularly every week or ten days, little trouble will be experienced from this pest.

BLACK APHIS.

This insect is similar to the green aphid, excepting in colour, but does not attack as many varieties of plants. In fact, I have found that the only serious attack has been on chrysanthemums, and the same remedies as advised for green aphid will do for the black aphid. In fact, I have found it easier to exterminate than the green aphid.

WHITE FLY.

This is the common name that this insect is known by in the Victoria District, but from the same authority as quoted *re* Thrips, I do not think I can give a better description, which is as follows:—

General Appearance.—The adult white flies are about $\frac{3}{50}$ inch long, the males being slightly smaller than the females. The bodies are yellow and the wings pure white. The eggs are exceedingly small, oblong in shape, at first light green, growing black with age and attached by a short stipes. The larvæ are light in colour, transforming to flat pupæ about $\frac{3}{100}$ inch long; oblong oval in shape; light green and supporting noticeable wax-like rods or spines, which make this species readily distinguishable from all others.

Life-history.—The eggs are laid upon the leaves of the plants, each female depositing over one hundred. These hatch in about two weeks into larvæ, which begin feeding very shortly, and after three moults, covering nearly a week, they become pupæ, which after two more weeks are ready to emerge from the old pupal skins as adult insects. The adult feed constantly throughout their existence of some thirty days.

Food-plants.—Tomatoes and cucumbers seem to suffer most from the attacks of this pest, though a large number of other plants are infested, including the bean, egg-plant, melon, lettuce, grape-leaves, aster, chrysanthemum, salvia, lantana, fuchsia, rose, coleus, geranium, primrose, ageratum, etc.

This insect, I have reason to think, was imported into this district some eight years ago. That is when it first came to my notice. I think it must have been brought in on plants imported from Eastern Canada and the Eastern States, as previous to seeing them here I had noticed their presence mentioned in the different trade papers, and inquiries made about them and as to the best way to combat them. In this district they are most troublesome to the tomato-grower, and I have known instances when the plants have been infested with thousands of them. Some growers use the Gerod process of fumigating to destroy them, but, unfortunately, I have known as much injury, if not more, has been done by this than what the insect would do. So far, I have found the best method is to fumigate with the nicotine solution as soon as the pest is noticed. By this means we have been able to keep it in check sufficiently, so that our loss has been very slight, but we take great care that all plants, after the crop has been gathered, are burnt up.

If the grower, after his crop is gathered, and the plants burned and the greenhouse is empty of all other plants, I believe that it would be a good plan to fumigate with potassium cyanide, but care must be exercised that the walls between the house fumigated and the adjoining house are tight—that is, if the houses are adjoining—and as a matter of precaution the adjoining houses should have their ventilators left open while the affected house is being fumigated. I think that the resin spray, as recommended by the Provincial Board of Horticulture, as a summer spray, should prove of value in fighting this insect, and if we are troubled with it very much this season I intend to try it.

CUTWORMS.

These cause considerable loss, especially in chrysanthemums, but as soon as their presence is noticed they can be easily eradicated and destroyed by the use of poison bran. Take a pail of bran and thoroughly mix in about 1 to 1½ oz. of Paris green, then moisten with sweetened water and spread on the ground and on the benches on which the plants are attacked, and in the course of a day or two these pests will have disappeared.

In this paper I have not dealt with all the insect pests that cause loss to the grower of plants, etc., under glass, but have dealt with the most important which trouble us in this district.

In conclusion, I would strongly impress upon the grower to keep a close watch at all times for any signs of attack, and at once use the remedies recommended. Do not consider the expense of purchasing the different sprays, as you will lose ten times the amount that these will cost by allowing your plants to be overrun.

I would like to call the attention of this Society to the advisability of approaching the Dominion Government regarding the removal of duty on all nicotine solutions, such as nicotinic acid, nicotine, nico-fume, Black Leaf 40, etc. As far as I know, they are not manufactured in Canada, or likely to be so. Now, as these preparations are only used for the extermination of the natural enemies of the growers, I consider it would be a good policy to enable the grower to procure these at the least possible expense.

Mr. Day: Any questions you would like to ask about this paper? Mr. Treherne will be pleased to give you any explanations he can.

Question: What is the best way to destroy insects that get down into the root of the cabbage?

Mr. Treherne: That is a fly known as the cabbage-maggot, and it is a little white grub at the root of the cabbage. It is the worst insect found in truck-gardens, as it is believed to destroy 75 per cent. of the cabbages in this part of the world. The best remedy against it is to get a piece of tar-paper and insert around the plant on the surface of the ground.

Question: I tried it last year, but it did not have any effect.

Mr. Treherne: Perhaps your paper was too light; if it is not heavy enough it will curl with the sun. Under experimental work we have had 90 per cent. efficiency during the last two years with this same method. There is a solution you can use; carbolic acid and soap mixed into a solution and dilute it 1 to 15 and pour about 5 oz. around each plant once a week during the early part of the season, and it will take about eight applications, but this solution will not give you as good results as the tar-paper.

Mr. T. Wilson: Talking about this same thing, I was talking to a gentleman at Chilliwack, and he had tried both methods with a good deal of success. He used this carbolic solution which I had told him about and he added so much arsenate of lead, and before planting he dipped the roots into this solution and he had 80 per cent. success.

Mr. Lyne: I believe that arsenate of lead diluted at the rate of 2 lb. to 50 gallons of water would not be injurious to the plant, and would be a sufficient quantity to stay on the plant; and if it did it would be perfectly impossible for the larvæ to consume any of the plant.

Question: I would like to hear more about the tar-paper.

Mr. Treherne: Do you know how it works? You make a disk of the tar-paper about 3 inches diameter with a slit in the centre, and as you put your plant in the ground you place this disk flush to the surface of the ground around the neck of the plant. The idea is that if the tar-paper is fresh it will keep the fly away; and if it does not, the eggs will be laid on the surface and often perish.

Question: How long do these plants have to be protected before the maggots cease to act?

Mr. Treherne: The fly will be laying eggs until September, but probably the plant will be so well established by the middle of July that further control against it would not be of practical value.

The President: I will now call on Mr. F. H. Getchell, Vancouver, B.C., for his paper on "Insects of the Lower Fraser Valley."

NOTES ON SOME INSECTS OF THE LOWER FRASER VALLEY.

BY F. H. GETCHELL, FIELD INSPECTOR, PROVINCIAL DEPARTMENT OF FRUIT PESTS.

During the past three seasons I have had the opportunity of collecting a few notes on the habits of insects frequenting the orchards of the Lower Fraser Valley. Through the courtesy of my Department I am permitted to give the Society a record of some of the notes obtained under their authorization. Many of the insects I have recorded in my notes have already been well reported in an article by Mr. Treherne in Bulletin 4 of the British Columbia Entomological series, and consequently it will not be necessary to deal at any length with any one individual insect. I have, however, several notes of local importance which may well supplement the facts already recorded.

THE WOOLLY APHIS (*Eriosoma lanigera*).

This insect is found in nearly every orchard in the valley. During the past season I have spent considerable time both in spraying and investigating this insect in the orchard owned by J. H. Lawrence, Hatzic, which numbered 2,500 trees from four to seven years old. Upon my first inspection I found one corner of the orchard, consisting of about 300 trees, seven-year-olds, badly infested with woolly aphids; the old stem mothers and the young brown aphides having, for the most part, wintered over on the trees. As a result of their work the small limbs and spurs were split and covered with the usual galls. A spray of Black Leaf 40, 1-800, and ordinary soap, 2-50, was applied, combined with lime-sulphur. In another set of experiments the lime-sulphur was replaced by soluble sulphur, a new spraying compound freshly come on to the market in these parts. The Government Bean power-sprayer, with Friend nozzles, was used at a pressure of 200 lb., and at a moderate estimate 75 per cent. of the aphides were killed at the first spraying. Although it is perhaps a trifle premature to make any definite statements about the relative virtues of the two sprays, lime-sulphur and soluble sulphur, yet I may say that, from this past summer's experiments, I have so far seen no difference in the effective values.

Twice during the summer they were treated by hand with coal-oil, once immediately after spraying. They were again sprayed with the machine the second week in August, with Black Leaf 40 from 1-800 to 1-1,000, and whale-oil soap 2-50. During this spraying I found it necessary to leave the district temporarily, but in a week's time I took the work up again. I soon discovered the aphides were migrating to a greater extent than I have ever observed before, and some of the older forms were dying. The date was the first week in September.

Later I observed a few of the migrants settled on the main bodies of the pear-trees in the neighbouring orchards. This is in itself an interesting observation, but I noted, further, that pear-trees as late as October still contained specimens of woolly aphides on them. These aphides were observed to be quite active when not even disturbed. I judged that, as the species does not habitually frequent the pear, they were ill at ease. Besides the movement to the pear, I noticed that a migration also took place to apple-trees where apparently the aphides localized and would remain there until the following year. I have no doubt, further, that many of the migrants, in searching for suitable trees on which to settle, failed to locate, and