

a very limited knowledge of Botany myself, I have found that little of immense value in my collecting trips, and have often been puzzled by an attempted description of some plant on which other collectors have perchance taken rare specimens. Hence I have ventured to bring to the notice of this Society the value of some Botanical knowledge, so that we may remind ourselves that (excuse the paraphrase) "it is never too late to learn."

### EFFECT OF FUMIGATION ON CERTAIN INSECTS

BY W. H. LYNE, VANCOUVER, B. C.

The danger of nursery stock carrying objectionable insects from one country to another might be entirely overcome if the stock could survive the treatment necessary to destroy the insects.

Fortunately the San Jose Scale (*Aspidiotus perniciosus*), is one of the species of insects hydrocyanic acid gas will kill without injury to the trees or shrubs exposed to the fumes. Provided, of course, the correct formula and exposure are used. This, of course, has reference to the ordinary application of the gas not applied under vacuum pressure.

It is, of course, understood that the San Jose Scale, being ovoviviparous, there are no eggs to contend with, simply the old or young insects, both of which are affected by the gas and so the extermination is complete; unless a very unique instance with which I happen to be familiar may be taken as an exception. On one occasion, after fumigating some apple trees infested with San Jose Scale, I examined a well developed female specimen with my hand lens and noticed a newly born specimen almost attached to the old one. Within half an hour an examination was made under the microscope and we were very much surprised to discover three newly born specimens all alive. The old female was apparently dead, but the young ones lived for several hours. There were several other specimens on the same tree, but all were dead after exposure to the gas.

Other species of *Aspidiotus* scale insects giving birth to living young include *ostreaeformis* and *hederae*, on which the hydrocyanic acid gas should be just as effective as with *Aspidiotus perniciosus*.

#### EGG-PRODUCING SCALE INSECTS

*Aspidiotus ancyclus* and *forbesi*, *Diaspis*, *Chionaspis*, *Mytilaspis* and *Lecanium*, from which the young hatch from eggs deposited by the female, present another problem. The mother scale may be killed by the gas, but the eggs are liable to survive its effect.

Under the circumstances the only recourse is that of dipping the stock in a caustic solution, such as lime sulphur, whale oil, soap and nicotine or distillate oil emulsion. The hardy nature of the stock would suggest the best formula to use.

Were we to expose the stock to a cyanide or carbon bisulphide gas sufficient to kill all egg infestation, it would probably result in fatal injury to the stock as well as the egg.

The amount of injury to the stock would likely be according to the amount of moisture it contained.

Other interesting experiences we have had in connection with the fumigation of nursery stock has been with such insects as Browntail Moth larvae, Gipsy Moth egg clusters, Black, Woolly, Green and other aphids, Red Spider, Phylloxera, Narcissus Fly, etc. Also several species of root and stem borers.

That with Browntail Moth larvae, subjected to the usual formula of Hydrocyanic gas, resulted as follows:

Where the larvae remained undisturbed within their closely woven nest of silk web, the gas apparently had very little or no effect. In nests that were torn open, before exposure to the gas, some of the larvae appeared to be dead and others more or less seriously affected; they all appeared to be dead within about forty-eight hours.

#### GIPSY MOTH

In spite of fumigation, a cluster of Gipsy Moth eggs from France hatched out to a fine, robust colony of young larvae. They were not turned loose, however.

#### APHIS

Many of the adults of the different species of Aphis were killed by the gas, but the eggs survived. The adults of the Woolly Aphis (**Eriosoma lanigera**), appeared to be the most resistant, and we have often been in doubt as to many of them ultimately surviving.

#### RED SPIDER

The adults of the red spider evidently were all killed, but the young spiders commenced hatching from the batches of eggs when exposed to the warm rays of the sun shortly after coming out of the fumigation chamber.

#### PHYLLOXERA

Adults of the grape phylloxera (**vastatrix**), did not survive the cyanide fumes, but there was always a possibility of eggs being overlooked. For that reason any vines showing the phylloxera galls on the roots were discarded and burned, or returned to the shipper.

#### PEACH ROOT BORER

It would require a much stronger formula of hydrocyanic acid gas than is used for ordinary fumigation of nursery stock to kill the peach root borer (**Sanninoidea exitiosa**), although many of the larvae extracted from their borings in the roots of peach, apricot, plum and cherry trees, appear sometimes to be seriously affected by the gas. On some occasions

they appear to be dead, but usually survive. This may perhaps be owing to some of the larvae being more securely embedded in the roots or crown of the tree than others, or some variation in the temperature and humidity within the fumigating chamber. Although 65° to 70° Fah. is the temperature usually maintained within the fumigating chamber, the humidity may vary owing to outside atmospheric conditions.

#### BLACKBERRY ROOT BORER

The blackberry and raspberry root borer (*Bembecia marginata*), is about as immune to the ordinary fumigating process as the peach root borer, and, to insure against distributing either of these pests, all the trees, bushes, vines and canes are thoroughly inspected. Any sign of the castings or borings of the insects condemns the tree, etc., to the bonfire.

#### VACUUM FUMIGATION

I have referred to the foregoing treatment of insects as applying to the ordinary fumigating process for the following reason:

We have great expectations regarding the vacuum process, by which we hope to get better results as regards the destruction of certain insect pests without injury to the stock or products they infest.

Vacuum fumigation is not entirely new in connection with the treatment of certain products, such as cotton, etc., but there are still a few problems that require working out to perfection regarding the treatment of certain nursery stock.

Mr. D. B. Mackie, of the California State Department of Agriculture, has already done excellent work solving the problems referred to. I could not do justice to his work were I to try and explain in detail all that he has accomplished. But we may look forward to a greatly improved method of nursery stock fumigation in the near future.

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### THE PEACH TWIG BORER, (*Anarsia lineatella*) IN BRITISH COLUMBIA

BY R. C. TREHERNE, ENTOMOLOGICAL BRANCH, OTTAWA.

In the years just preceding 1915 the peach growing industry of southern British Columbia was somewhat depressed. Prices had not been good and much disheartenment was in evidence. In 1915 the price for No. 1 wrapped peaches varied between 45 cents and 75 cents per 20 pounds. In 1916 the price varied between 60 cents and \$1.00. In 1917 the peach industry showed signs of revival, the prices being received in this year varying from 75 cents to \$1.25 to the grower. Much concern, however, was shown over the depredations of the Peach Twig Borer or Peach Worm, an insect which had been allowed to increase to such proportions in the