INSECT CONTROL IN NURSERIES

by

R. L. Furniss

In the western forest nurseries, insect pests have been relatively less important than in other parts of the country. What insect pests there are seem to be rather specific to particular nurseries. Relatively little work has been done on these insects. The most intensive work was done on the guayule program. That work was largely of an agricultural nature and will not be reported here. The following control recommendations are largely taken from the literature and from the experiences of various nurserymen.

Perhaps the best place to start is with the seed source. There are several kinds of seed and cone infesting insects (moths, flies, and weevils) that cut down on the amount of available seed and increase the cost of seed collecting. Unfortunately these insects seem to be relatively more abundant during poor seed years than in good seed years. There isn't much that can be done about these pests except to wait for years when there are enough seeds for both the insects and the seed collectors.

In this group of seed-infesting insects there are some, chiefly chalcids of the genus Megastigmus, that live inside the seeds and reduce the germination per cent. There is no readily identifiable sign of attack until the insects emerge; or is there any known practical way to prevent attack. One thing that should be done is to prevent the spread of these insects, both going out of and coming into the United States. Control can be effected by heat treatment or by fumigation with such materials as methyl bromide. Information is needed on the effects of these treatments upon the germination of individual tree species.

In the seed beds there are several insects and related animals that cause trouble in western nurseries. The practice of rotating seedbeds and summer fallowing between crops of trees minimizes insect-caused losses. Occasionally more direct control measures are necessary.

White grubs. Probably the first insect that comes to the mind of most nurserymen are the white grubs. These insects seem to have given most trouble in the Central States and the Lake States. According to the available records, white grubs have not been much of a problem in forest nurseries of the West.

Control of white grubs is usually a cultural problem. It is good practice to break sod at least one year prior to setting out new seed beds. Rotation of seed beds and summer fallowing between crops of trees are practices that also cut down on white grub populations. Plowing at least twice with rotary plows during June, July, or August is recommended when large numbers of white grubs are known to be present.

Wire worms. Wire worms behave much like the white grubs and cause the same type of damage. There seem to be no recorded cases of damage caused by wire worms in forest nurseries of the West.

Cultural control of wire worms is more difficult than with the white grubs. Recently ethylene dibromide has been effectively used for controlling wire worms

in field crops. It is possible that this material would also be effective in forest nurseries. Exact dosages would have to be worked out.

Grasshoppers and Jerusalem crickets. On the dryland areas there is some threat of invasion of forest nurseries by these insects. Here again there are no recorded cases of such damage. Both of these insects can be effectively controlled by spreading poison baits. Chlordane and toxaphene baits are both highly effective.

Pine tip moths. The spread of these insects on pine nursery stock has caused a great deal of trouble in the Nebraska plantations and elsewhere. MacAloney and Secrest, speaking of conditions in the Lake States, recommended periodic inspection and destruction of infested stock. Similar precautions should be taken in other parts of the country.

Strawberry root weevils. These insects do occur widely in the West and have caused considerable damage to coniferous stock in forest nurseries, particularly in Oregon and Washington. There are several commercially prepared baits that are readily available and which give good control. A cheap and effective bait can be made up in the following proportions:

Bran - 50 pounds
Water - 5 gallons
Sugar - 10 pounds
Calcium arsenate or
sodium fluosilicate - 5 pounds

Baits should be spread at a rate of about 50 to 70 pounds per acre. Control by cultural methods can be achieved in the same way as with white grubs.

Seed-corn maggot. This is a commonly destructive pest on agricultural crops, especially on wet sites in the spring of the year. It is recorded only occasionally in forest nurseries. In the Forest Industries Tree Nursery at Nisqually, Washington, the seed-corn maggot has been destructive to Douglas fir and Sitka spruce. Effective control at this Nursery is reported with a spray mixed at the rate of 2 pounds of 50 percent wettable DDT to 100 gallons of water. The spray is applied at the rate of 2½ gallons to 1000 square feet of bed just as the seedlings begin to break through the ground.

Symphilids. These small, white, centipede-like animals are serious pests of agricultural crops in many parts of the country. They seem to be very spotty in distribution. In forest nurseries they have been reported only at the Oregon State Nursery at Corvallis, where they are destructive to hardwood species.

No generally feasible method of controlling symphilids is known. They can be controlled on lands that can be completely flooded, but so far no chemical treatments have been practical. There are numerous synthetic soil fumigants that have been recently developed and which warrant testing against symphilids. For the present nothing specific can be recommended.

General. Occasionally various insects such as scales, cutworms, and leaf feeders cause local damage in forest nurseries. They are seldom of much importance and need not be considered separately. Most of these insects are likewise pests on agricultural crops upon which effective control measures have been developed. The same measures are applicable to forest nurseries.

Question: What about the use of DDT?

Hagenstein: We had an infestation in 1944 of a certain corn maggot. We had the help of the agricultural experiment station. We tried bichloride of mercury which kills the insects, but noticed damage to the trees, chlorosis. In 1946 we had some more of the insects and we tried DDT. Two pounds to 100 gallons of water. Two and one-half gallons of the solution applied to 1000 square feet. We held the insects in check. In 1947 we encountered plenty of the adults. Now we have learned how to treat them. As soon as seed is sowed, DDT is applied. We also spray the DDT in the grass adjacent to the nursery. We now have pretty good control. It is the type of insect that could run a nursery out of business over night. The cost of DDT is 96 cents per pound. At two and one-half gallons per 1000 square feet, 25 or 30 pounds is sufficient. The cost is slight. At least one entomologist at W.S.C. suggested the danger of the use of DDT, as it can build up a toxic condition in the soil with continuous use.

Chairman Webster: How did you apply the DDT? Spray or drench?

McDermitt: Spray. 60 pounds pressure. 10 inches from the ground over the bed.

Chairman Webster: How often is the spray applied and do you apply the first spray just as soon as you sow the seed?

McDermitt: First spray is applied as soon as seed is sown. With lots of rain, one or more later applications should be made.

Hagenstein: Control measures should continue for 6 or 8 weeks until the seedling is out of the ground. You watch for a little white larvae that looks like rice.

Ward: How wide is your isolation strip around the nursery?

McDermitt: We sprayed out in the grass along the highway and the dike, 8 or 10 feet down from the dike, which we think helped to control the corn maggot.

Turner: Our worst enemy is the white grub worm.

Chairman Webster: What control do you use?

Turner: No control measures have been established.
(Exhibited a June beetle which was in alcohol.)

Furniss: Have you tried cultural methods there?

Turner: Nothing except the cultivation.

Dill: How long has this been in the nursery? Answer: About 5 years and is increasing.

Dill: We had the loss of 5 or 6 million trees by the same thing in the east. We built another nursery and moved the stock. Took the better stock out and left the rest. Finally the bugs disappeared.

Furniss: This type of grub is sometimes affected by disease which greatly diminishes the infestation.

Turner: It takes three years to develop. They work in the soil for three years before they emerge.

Engstrom: Do you have large trees adjacent to the nursery? In the east we found that the grub worm would affect seedlings adjacent to big trees.

Turner: This is a June beetle, red striped.

Furniss: A rototiller will kill some of these. Lake States Experiment Station recommends deep cultivation.

McDaniel: I have read of a nursery having grub trouble. There were a number of skunks in that area. They furnished protection for skunks in this nursery. Skunks will destroy the grubs.

Furniss: Are the soil conditions there sandy?

Turner: Yes, sandy loam.

Furniss: It is characteristic for that grub to concentrate in sandy areas. I am familiar with it in Washington and Oregon and they seek out the sandy soil.

Turner: This year we will probably get a heavy flight. In digging up some areas this year we find all adult grubs. They start in June and continue into the month of September. I thought they were weevils so I fed them weevil bait, but these grub worms thrive on it. Arsenic.

Engstrom: I have seen a crow coming to the nursery in the mornings. He would pick up the grubs after the tractor.

Turner: The robins and birds follow the plow and eat the grubs.

McDermitt: I think that a rototiller would be more satisfactory for control.

Lanquist: We had trouble with white grubs in Wisconsin. Finally got a rototiller and eradicated them 95%.

Turner: We can only work 1/3 of our area if we would do it that way, which leaves the other 2/3 without control.

Chairman Webster: Thank you, Mr. Furniss. Another specialist we are glad to have with us today is Dr. Ernest Wright of the Bureau of Plant Industry. Dr. Wright will discuss Nursery Diseases and Control measures.