BI-MONTHLY

RESEARCH NOTES

A selection of notes on current research conducted by the Forestry Branch, Department of Fisheries and Forestry of Canada

BIOLOGY

Rooting of Douglas-fir and Western Hemlock Cuttings.—Grafting has been used extensively in propagation of selected Douglas-fir plus trees for the establishment of seed orchards and clone banks. However, many trees propagated by grafting several years ago have shown signs of reduced vigor or have died. In some orchards more than half the trees are affected. The reduced vigor is caused by an unexplained incompatibility between the scion and the root stock. The partial failure in grafting has severly affected the Douglas-fir tree improvement program. Propagation by rooting of cuttings from mature Douglas-fir would eliminate this problem, but a satisfactory rooting technique has not been available. This is a report of one of many chemical and physical treatments which have been tested to promote rooting of such cuttings.

In mid-November 1967, current-year shoots of four Douglas-fir trees more than 100 years old were collected in the lower ¼ of the crowns. The shoots were cut to about 3-inches in length and leaves were removed from the first 1¼ inches from the base. The cuttings were then placed in 100 ppm indolebutyric acid solution for 24 hours. The cuttings were divided into three groups of 50 from each of the four trees and set in flats containing a soil mixture of equal parts of perlite, peat moss and coarse sand. The flats were placed in three greenhouse compartments under the following temperature conditions: air and soil not heated (I); air not heated but soil heated to 20 C (II); both air and soil heated to 20 C (III). The average air temperature (°C) for treatment I were:

	Dec. 1967	Jan. 1968	Feb. 1968	Mar. 1968	Apr. 1968
High	9.4	10.0	15.0	16.1	17.2
Low	4.4	4.4	6.0	8.9	8.9
Mean	6.7	7.8	10.0	12.2	12.8

The soil was heated with a leaded heating cable controlled by a thermostat. High air humidity was maintained by enclosing the cuttings in a clear polyethylene sheet. The propagation bed was shaded from direct sunlight.

By the end of August 1968, 32, 22, 20 and 18% of the cuttings from the four trees had rooted with treatment II, whereas none had rooted with the other two treatments. Rooting took place mainly in the last half of March and in April, but a few rooted as late as August.

In mid-December, 25 cuttings from each of eight Douglas-fir trees over 80 years old were set in the cold-air warm-soil condition. These trees were of a superior phenotype selected for a tree improvement program. The cuttings, collected in October and stored in polyethylene bags at 2 C, rooted with an average percentage of 20, range 8–40%. Similar cuttings in the other two treatments did not root. The success of treatment II was confined to cuttings collected in the fall and early winter. Those taken in January and up to the time of bud burst did not root well.

In support of a recently initiated tree improvement program for western hemlock in British Columbia, a study on rooting of cuttings of this species was undertaken. Preliminary trials have been made with the same treatments described above. On 4 Dec. 1967, current-year shoots were collected from the lower part of the crowns of two hemlock trees about 80 years of age. Cuttings were prepared and treated as described for Douglas-fir. From each tree 50 cuttings were set in each of the three temperature regimes. Treatment II was beneficial to rooting of hemlock, but in contrast to Douglas-fir, the best result was obtained with treatment I. For treatments I, II and III, the rooting percentages for one tree were 94, 66 and 32, respectively, and for the other 30, 2 and 0. Many cuttings from the latter tree suffered leaf drop in the first few weeks after collection, which may be the reason for the relatively poor results. Most of the roots on hemlock cuttings appeared in May and June, or about 2 months later than for Douglas-fir.

Several possibilities for improving the rooting technique described are being tested.—H. Brix and H. Barker, Forest Research Laboratory, Victoria, B.C.

ENTOMOLOGY

Pupae of the White-pine Weevil Survive Freeze-drying.—During the preparation of immature insects for reference and display purposes by the freeze-drying technique, and interesting phenomenon was discovered with larvae and pupae of the white-pine weevil [*Pissodes strobi* Peck.] Two prepupal larvae and nine pupae were removed from infested shoots of white pine from near Normandale, Ont., placed in small vials and stored in a freezer at −23 C for 3 hours. These specimens were then freeze-dried for 18 hours in the vacuum chamber of the freeze-drier. The vacuum ranged from 28 to 40 microns of mercury. Examination of the specimens after they had been removed and exposed to room temperatures for about 3 hours revealed that all nine pupae were still alive. Although the larvae were dead, their bodies were soft with no dehydration apparent. The pupae transformed to adult weevils within 3 days and at the end of 2 weeks the adults were still alive. A group of 12 caterpillars of *Halisidota maculata* Harr. (Arctiidae), that received the same freezing and drying treatment and at the same time, were completely dehydrated and crumbled to powder under light finger pressure.

A second test was made with three *P. strobi* larvae and five pupae from near Sault Ste. Marie, Ont., with the same freezing and drying treatment. Three of the pupae were found to be alive approximately 3 hours after removal from the freeze-drier; two pupae and three larvae were dead but still soft with little or on evidence of dehydration. In subsequent tests insect species from 15 different families representing the orders Hymenoptera, Lepidoptera, Coleoptera and Homoptera were successfully freeze-dried under virtually identical conditions as those survived by *P. strobi*.

The white-pine weevil is a pest of regeneration spruce in the northernmost parts of Ontario and of pine farther south. During the summer, larval and pupal stages exist within infested shoots where the danger of desiccation is slight and the need for cold hardiness unnecessary. Nevertheless, it would appear that the insect possesses hardiness which would, if required, safeguard its survival during late summer and early fall under the severest dry or cold weather conditions likely to occur.—Wm. J. Miller, Forest Research Laboratory, Sault Ste. Marie, Ont.