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Chemical Control Trials on the Northern Pitch Twig Moth in Alberta

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Four years of soil drench tests with seven insecticides exhibiting systemic activity were inconsistent in controlling high populations of the northern pitch twig larva. Cultural control and the use of dimethoate as a soil drench will reduce attack to an acceptable level.

The northern pitch twig moth (*Petrova albicapitana* (Busck) attacks jack pine (*Pinus banksiana* Lamb.) and lodgepole pine (*Pinus contorta* Dougl. var. *latifolia* Engelm.) throughout most of their ranges in North America and damages Scotch pine (*Pinus sylvestris* L.) in plantations. Although low populations of *P. albicapitana* may occur in most natural stands of all ages, particularly high populations have been found in Alberta in nursery-grown lodgepole pine 0.3 to 2.0 meters tall. Northern pitch twig moth attacks on the lateral and leader shoots of these small trees resulted in weakened and occasionally girdled stems that were more susceptible to wind breakage (fig. 1) and the development of multileaders. During 1975 to 1978, a series of soil drench treatments was conducted in a nursery near Devon, Alberta, in an attempt to reduce twig moth larval populations.

Figure 1.—*Wind breakage injury and dead leader caused by 2d-year northern pitch twig larva.*

The life history of *P. albicapitana* has been described by Turnock (*1*). Newly hatched larvae feed on succulent new growth, making a small excavation in the bark and covering it with silk and pitch to form a small nodule (fig. 2). The larva overwinters within this shelter. The next spring, feeding is resumed and the nodule is enlarged. In June, the larva moves to the main stem, where feeding continues at a branch crotch and a new, larger nodule is formed (figs. 3, 4).

Figure 2.—*First-year nodule of northern pitch twig larva.*

Materials and Methods

Plots for chemical treatments consisted of five lodgepole pine trees (1.0 to 2.5 m tall and 2.5 to

Figure 3.—*Second-year nodule of northern pitch twig larva.*

5.0 cm basal diameter) in a random block design. Each treatment was replicated in two plots, with two similar control plots receiving no treatment. In early spring, seven insecticides with systemic activity (table 1) were placed in holes dug within the crown dripline at the base of each tree. Application was at the rate of 5.6 milliliters active ingredient (a.i.) per centimeter basal diameter for emulsifiable concentrates and 4.5 grams a.i. per centimeter for granular forms. Treated plots were watered soon after application to help dissolve the chemicals for absorption by the root system. All treated and control plots were examined before treatment, and counts of all 1st- and 2d-year nodules were recorded. Posttreatment analyses were made from counts of living and dead larvae and incidence of adult emergence 8 to 10 weeks later. The percentage of insect control was determined by applying Abbott's (2) formula to these data.

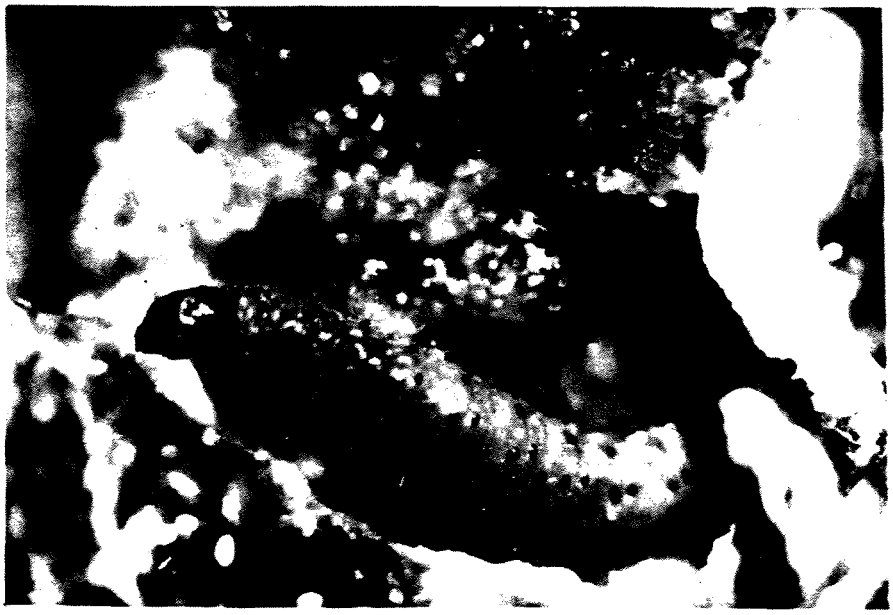

Figure 4.—*Mature northern pitch twig larva inside nodule.*

Results and Discussion

Pretreatment and posttreatment counts of living and dead larvae found in 1st- and 2d-year nodules and the percentage of larval mortality are presented in table 1. No phytotoxicity was recorded in any of the treatment plots.

The percentage of control in most tests was less than that expected. In some instances, this may have been because of prolonged dry periods shortly after chemical application, which resulted in poor translocation by the root system. The very high populations in the plots made control more difficult. Posttreatment counts showed that 72 percent of all mortality occurred to larvae in the enlarged 1st-year nodule; no dead 1st-year larvae were found in the control plots. The average mortality of 2d-year larvae in the control plots was 6 percent. Pretreatment counts of 2d-year nodules at the branch crotch and counts of posttreatment emergencies showed that 54

Table 1.—*Chemical control of the northern pitch twig moth,* Petrova albicapitana, *in field tests, 1975–78*

Material[1]	Year	Pretreatment: New nodules		Posttreatment: 1st-year larvae		2d-year larvae			Percent control
		1st year	2d year	Dead	Empty[2]	Dead	Live	Emerged	
Acephate 75 SP	1975	15	17	6	9	4	6	6	42
Acephate 75 SP	1977	16	29	0	15	4	13	19	7
Acephate 75 SP	1978	18	21	9	5	0	11	9	27
Aldicarb 10G	1976	55	51	27	32	4	24	49	28
Carbofuran 10G	1975	31	31	20	2	17	13	5	65
Carbofuran 10G	1976	42	63	8	30	4	59	31	9
Carbofuran 10G	1977	17	32	5	1	16	9	15	45
Dimethoate 4E	1975	24	27	12	13	6	0	8	67
Dimethoate 4E	1976	51	35	45	2	13	0	23	71
Dimethoate 4E	1977	24	45	3	13	3	26	26	6
Dimethoate 4E	1978	11	19	0	6	0	15	7	0
Oxamyl 10G	1976	56	60	2	48	3	75	32	2
Oxydemeton-methyl 25 EC	1976	76	70	68	12	11	29	34	55
Oxydemeton-methyl 25 EC	1977	15	31	12	1	0	14	17	25
Oxydemeton-methyl 25 EC	1978	9	14	2	9	0	7	8	6
Propoxur 1.5 EC	1976	45	52	1	33	1	33	31	0
Propoxur 1.5 EC	1977	27	58	1	23	2	28	33	0
Control plot	1975	88	27	0	90	5	92	12	95[3]
Control plot	1976	51	53	0	51	3	65	26	97[3]
Control plot	1977	24	47	0	22	3	39	27	96[3]
Control plot	1978	37	42	0	36	4	41	27	94[3]

[1] SP = soluble powder, G = granular, E and EC = emulsifiable concentrate.
[2] Empty 1st-year nodules.
[3] Percentage living larvae in control plot.

percent of the larvae from both treated and untreated plots successfully pupated and emerged as adult moths. This would seem to indicate that many 3d-year larvae had completed their feeding before translocation of the chemicals.

Results of the 4 years of soil drench tests were inconsistent and indicate that successful chemical control of the twig moth is unlikely in young lodgepole pine once high populations have become established. Chemical control can significantly reduce 2d-year larvae, but should be followed with cultural control such as squashing the nodules in early May. This practice should be continued for at least 2 years to be effective. No chemicals are registered for control of *P. Albicapitana;* however, the 1975 and 1976 soil drench tests using dimethoate (Cygon) applied at the rate of 5.6 milliliters a.i. per centimeter basal diameter in late April or soon after the frost has left the ground gave good control (67% and 71%). Irrigation soon after chemical application is essential.

Literature Cited

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