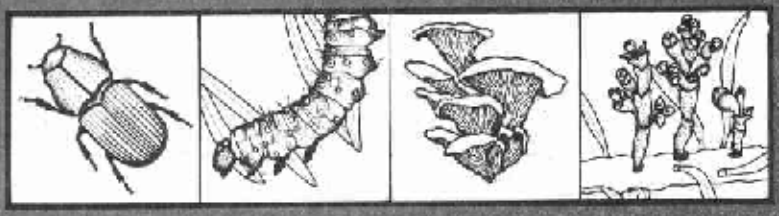
Forest Pest Management



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SUPPRESSION OF CRANBERRY GIRDLER DAMAGE IN BEDS OF DOUGLAS-FIR SEEDLINGS, COEUR D'ALENE NURSERY, IDAHO PANHANDLE NATIONAL FOREST - 1984

by

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ABSTRACT

The cranberry girdler, Chrysoteuchia toparia Zeller, has caused increasing damage to tree seedlings in the Coeur d'Alene Nursery since 1980. Heaviest feeding has occurred on the tap roots of 2+0 Douglas-fir stock. By 1983, 8.2 percent of the seedlings examined in seedbeds were injured by this moth. A spray program was adopted in 1984 to reduce the amount of damage. Three applications of Diazinon[1] at 1 lb. active ingredient per acre were used to kill adult moths, and three applications of Dursban[1] at the same rate were used to reduce larval populations in the soil of Douglas-fir beds. Results of the insecticidal treatments were determined in November 1984 during lifting operations. In sprayed beds, only 0.01 percent of the 2+0 Douglas-fir seedlings examined were injured, and 0.9 percent of the 3+0 Douglas-firs examined were injured. There were no beds of unsprayed Douglas-fir seedlings to use as a check. Because damage was 8.2 percent in beds during 1983, and moth populations were high in 1984, damage in unsprayed beds could have been 8 percent or greater in 1984. Nurseries consider damage tolerable when it is below 1.0 percent.

INTRODUCTION

Damage by the cranberry girdler, Chrysoteuchia toparia Zeller, has been noticed in the Coeur d'Alene Nursery since the mid-1970's. At harvest time, many 2+0 Douglas-fir seedlings were culled because bark had been eaten from around their taproots just below ground line. In 1981, it was verified that this moth was causing the damage and in 1982, degree of damage was determined (Tunnock 1982).

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[1]Use of brand names is for convenience only and does not imply endorsement of those products by the USDA Forest Service.

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Damage surveys were made again in 1983 and indicated that damage was increasing with each succeeding generation of cranberry girdler. In 1981, 1982, and 1983, 2+0 Douglas-fir seedlings, as they were being lifted, showed 0.9, 3.3, and 8.2 percent injury, respectively, from girdler larvae.

At the D. L. Phipps State Forest Nursery in Elkton, Oregon damage can range from 10 to 20 percent. They calculated their seedlings are worth $111/thousand and stated that it is highly cost effective for them to use insecticides when damage from the cranberry girdler exceeds 1 percent.[2] They use Diazinon to reduce adult populations and Dursban to kill larvae.[2] Both insecticides are registered by the Environmental Protection Agency against this pest.

METHODS

Girdler larvae will feed on the tap root bark of most species of seedlings, except pines, in the Coeur d'Alene Nursery. However, most damage is found in beds of 2+0 Douglas-fir (D-F). Therefore, treatment was directed mainly at the 2+0 D-F stock and a small area of 3+0 D-F. About 2 acres of 2+0 Engelmann spruce (ES) and 1 acre of 2+0 grand fir (GF) were also sprayed.

Cranberry girdlers overwinter as larvae in hybernacula in the soil around the roots of grasses and seedlings. In the spring they feed for several weeks, then pupate by the end of May. Moths start emerging from the soil at that time (Kamm and Robinson 1974). To monitor weekly moth emergence, pheromone-baited sticky traps were placed from May to October in lawns and beds of seedlings that were to be sprayed. The first treatment was to be applied after the start of moth emergence, which occurred during the first week in June.

The Diazinon-Dursban spray program developed at D. L. Phipps Nursery[3] was used at Coeur d'Alene, but was modified slightly. The Phipps' schedule recommended two Diazinon and two Dursban treatments, but at Coeur d'Alene three Diazinon and three Dursban sprays were applied to the Douglas-fir seedling beds (Table 1) because of the extended period of moth emergence (Table 2).

Diazinon AG 500^{R} was used at the rate of 1 qt. (1 lb. active ingredient)/100 gallons of water/acre. One pint of Sorba Buffer[3] and 1 ounce of Triton Sticker were added per 100 gallons.

Because Dursban 4E^{R} was not available, Dursban 2E^{R} was substituted and used at the rate of 2 qts. (1 lb. active ingredient)/100 gallons of water/acre. No buffer or sticker was added.

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[2] Telephone conversation with Paul Morgan, Phipps Nursery, May 1984.

[3] Telephone conversation, June 8, 1984.

Table 1.--Spray schedule.

Insecticide	Insect stage	Date	Acres	Remarks
Diazinon AG 500[R]	Moths	June 12	11 D-F	Applied 1 week after moth emergence
Diazinon AG 500[R]	Moths	June 26	11 D-F	
Diazinon AG 500[R1]	Moths	July 17	11 D-F	
Dursban 2E[R2]	Larvae	August 9	11 D-F, 1 GF	Applied near end of peak moth flight
Dursban 2E[R]	Larvae	August 29	11 D-F, 1 GF	
Dursban 2E[R]	Larvae	Sept. 7	2.25 ES	Only ES beds were sprayed
Dursban 2E[R3]	Larvae	Sept. 20	14.25	Included DF, GF and ES beds

[1]This third Diazinon spray was applied because moths continued to emerge at high numbers in July and we were not sure of our spray schedule this first trial season.

[2]The first application of Dursban was not "watered in," but the last three were.

[3]This fourth Dursban spray was applied because moths continued to emerge into late September (Table 2).

Table 2.--Weekly catches of cranberry girdler male moths in pheromone traps at the Coeur d'Alene Nursery during 1984.

Location of traps	Trap no.	Collection dates 6/18	6/26	7/2	7/9	7/16	7/23	7/30	8/6	8/13	8/20	8/27	9/4	9/10	9/17	9/24
		Number of male moths/trap/week														
Lawn near seed beds	1	0	4	27	5	49	3[1]	3	7	2	3	1	0	1	1	1
	2	0	4	22	12	27	0	1	9	3	7	1	0	0	0	1
	3	1	17	37[1]	13	69	13	2	6[1]	18	2	0	0	0	1	1
Within 2+0 D-F seed beds	4	2	4	19	10	30	3	5	4	5	1	0	0	1	1	0
	5	1	1	3	0	23	4	7	10	5	1	1	0	1	1	5
	6	0	5	13	1	27	4	3	10	6	0	1	0	1	3	1
	7	0	5	18	5	32	5	4	12	4	2	2	1	0	1	1
	8	1	11	14	3	21	4	6	6	1	0	0	0	2	0	2
	9	1	8	14	2	35	10	4	3	0	1	0	0	0	0	0
	10	3	10	2	0	39	5	4	5	5	2	1	0	1	1	0
	11	1	11	21	12	18	16	7	3	4	0	0	1	0	1	0
	12	4	8	18	5	49	11	7	3	2	0	0	0	0	0	0
Within 2+0 E. spruce seed beds	13	9	7	30	8	29	37	15	27	78	5	10	4	8	1	3
	14	2	6	9	5	22	43	11	12	16	0	13	6	1	1	2
	15	2	5	26	8	34	22	18	42	20	2	8	9	6	2	2
Office lawn	16	1	50	89	44	120	53	25	1	-	-	-	-	-	-	-
TOTALS		28	156	362	133	624	233	122	160	169	26	38	21	22	14	19

[1]Wind blew trap off hanger that week.

Results of the spray program were determined during lifting operations in November 1984. Seedlings in sprayed beds of 2+0 and 3+0 D-F, and 2+0 ES were examined for "girdled" tap roots as they were lifted out of the soil. A few unsprayed seed lots of 1+0 western larch (WL) and 2+0 lodgepole pine (LPP) were also examined in the field. In the packing shed, cull seedlings on the floor were examined for damage. Nine unsprayed seed lots of 2+0 WL, and one unsprayed seed lot of 1+0 WL and sprayed 2+0 D-F were checked. Culls were examined because these seed lots had been lifted before we could check them in the field. Seedlings from the sprayed bed of grand fir were lifted and packed before they could be examined for injury.

RESULTS

Pheromone traps were used to monitor weekly moth emergence. One preliminary trap (no. 16) was placed in the lawn near an office building on May 22, but it did not catch any male moths until June 12. However, moths were reported flying in 2+0 D-F beds during the first week in June.

Moth emergence from June 18 until October 24 is recorded in Table 2. The highest number of male moths collected in the 16 traps was on July 16. Moths continued to emerge at 10 trap locations as late as October 24.

Data in Table 3 show insecticidal treatment reduced cranberry girdler damage in beds of 2+0 and 3+0 D-F seedlings to tolerable levels. Out of 31,522, 2+0 D-F seedlings examined, only 0.01 percent were injured, and out of 3,590, 3+0 D-F seedlings, 0.9 percent were injured. No injured 2+0 ES seedlings were found. There were no beds of unsprayed D-F seedlings to use as a check. However, results of evaluations from 1981 to 1983 showed damage increased annually from 0.9 to 8.2 percent in the beds. Because of the high number of moths present in 1984, and the amount of damage detected in cull seedlings from unsprayed beds of WL, we suspect damage in the D-F beds would have been in the 8 percent range or greater.

In the packing shed, cull seedlings from WL and D-F beds were examined. Out of 1,955, 2+0 WL seedlings, 6.4 percent were injured by the cranberry girdler. One seed lot of 2+0 WL had 20.3 percent injury. Only one seed lot of 1+0 WL was checked and 10.5 percent of its seedlings were injured. Only one seed lot of 2+0 D-F was examined in the shed and out of 801 seedlings, 0.1 percent were injured (Table 3).

Costs of Spray Operation

Insecticides and additives	-	$ 640
Labor	-	697
TOTAL		$1,337

Table 1 shows that 11 acres of D-F were sprayed five times; 3 acres of GF were sprayed three times; and 2-1/4 acres of ES were sprayed two times. This adds up to a total of 68.5 acres that were treated during 1984 at a cost of $19.50 per acre. If you consider that an average of 12 acres (all species) of seedlings were treated with six applications for $1,337, then the cost would be $111.42 per acre.

Table 3.--Cranberry girdler damage in seedling beds at the Coeur d'Alene Nursery - November 1984.

Seed lot number	Number seedlings examined	Number injured	Percent injured
Field Examination (Beds)			
2+0 D-F			
4300 M	1,135	2	0.1
3388 M	698	2	0.2
2756 M	402	1	0.2
60 other lots	29,287	0	0
TOTALS	31,522	5	0.01
3+0 D-F			
9 mixed lots in 1 acre in NE area	3,590	35	0.9
1+0 Larch			
1219 M	266	0	0
0642	207	0	0
2+0 LPP			
3253	414	0	0
3375T	379	0	0
2+0 ES			
4215 M	472	0	0
2955 M	121	0	0
Packing Shed (Cull Seedlings)			
2+0 D-F			
4886 M	801	1	0.1
1+0 Larch			
Lot from Lolo	114	12	10.5
2+0 Larch			
4118 M	338	19	5.6
2805 M	252	35	13.8
2189 M	177	36	20.3
3386 M	181	7	3.8
3393 M	190	6	3.1
4265 M	127	12	9.4
4119 M	176	11	6.2
2817 M	308	0	0
4046 M	206	0	0
TOTALS	1,955	126	6.4

DISCUSSION

The spray program was successful in reducing cranberry girdler damage to acceptable levels in the Coeur d'Alene Nursery. Nurseries consider damage tolerable when it is below 1.0 percent. This will have to be an annual operation if cranberry girdler populations continue to be high in this area. Several of the huge commercial grass seed fields north of the nursery were plowed up and converted to another crop this year. The elimination of this source of migrating moths may reduce populations in the nursery. Pheromone traps should help us determine if moth populations are high enough to require control in 1985. In 1985, we may be able to eliminate one Diazinon and one Dursban spray because we now have a better schedule of moth emergence in the nursery. The elimination of these two sprays would reduce costs, and it might be possible to follow the spray schedule developed at the D. L. Phipps State Forest Nursery.

At Phipps Nursery, they apply the first Diazinon spray after the first moths emerge in June; second Diazinon spray the first week in July; first Dursban spray near the end of moth flight if moth population is very high, or first Dursban spray 2 weeks after the end of moth flight if moth population is low; second Dursban spray about 2 weeks after first Dursban spray. Diazinon sprays are applied to dry foliage, but are not applied if rain is predicted that day. Beds are not watered after spraying. However, it was recommended that Dursban be "watered in" after application. Kamm et al. (1983) found that grasslands bordering nurseries and not nursery beds were the primary source of adults moths. They suggested also spraying these bordering grasslands when beds of seedlings were being treated. To reduce cranberry girdler populations in a nursery, Kamm et al. (1983) also suggested eliminating "grass" weeds and using a nonhost-cover crop in vacant beds.

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