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Further Tests of Band Placement of Insecticides for Clover Root Borer Control¹

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Weaver & Haynes (1955) described a method of placement of insecticides in bands under red clover seed that achieved control of the clover root borer, *Hylastinus obscurus* (Marsh.). Band placement was as effective at 0.75 pound of toxicant per acre as broadcast treatments at 1 pound or more as reported by Gyrisco et al. (1954) and App & Everly (1950).

Since the 1951–53 tests were carried out in one location on small plots and applied by a farm crew experienced in experimental procedures, it was desired to test the band placement method more extensively. Tests in 1954–56 were conducted at seven different locations, using different band seeding equipment operated by farmers as well as technically trained personnel. The results of these trials are reported in this paper.

Band Seeding Tests

In 1954 at Wooster, Ohio, in two separate tests, insecticides at different rates were seeded with oats. The same basic technique of planting as that described by Weaver & Haynes (1955) was employed. Each treatment was replicated three times with individual plots measuring 24 × 45 feet.

Aldrin at three rates and heptachlor at two rates were compared in one test. Either insecticide at 0.75 pound of toxicant per acre gave satisfactory root borer control and increased yield. Results are tabulated in Table 1.

Table 1. Clover root borer control with various rates of aldrin and heptachlor in band seedings of red clover. Wooster, Ohio. 1955.

Insecticide	Pounds per acre	Percent control ^a	Yield tons/acre
Aldrin	0.25	30.0	1.88
	.75	87.1	1.88
	1.50	92.8	1.94
Heptachlor	.25	57.1	1.73
	.75	98.7	1.97
Check			1.67
L.S.D. at 5% level			0.19

a. Based on borers in 30 roots per treatment. The untreated check had 2.33 borers per root.

Lindane at three rates was compared with aldrin at a single rate in the second test. All rates and each insecticide gave good control of the root borer. Yield values were erratic because of an infestation of ladino clover in some of the plots. Nonsignificant differences were therefore recorded. At both the second and third cuttings, however, all the treatments resulted in more yield than the check (Table 2).

Table 2. Clover root borer control with aldrin and lindane in band seedings of red clover. Wooster, Ohio. 1955.

Insecticide	Pounds per acre	Percent control ^a	Yield (tons/acre)	
			2nd cutting	3rd cutting
Aldrin	0.75	85.6	2.01	0.71
Lindane	.75	78.5	1.95	.72
	1.25	85.6	1.88	.67
	1.75	88.6	1.88	.71
Check			1.80	.58

a. Based on borers in 30 roots per treatment. Untreated check had 2.33 borers per root.

During the period 1954–56 nine additional band placement tests were observed. In 1954–55 insecticides in band seeding were applied to two red clover variety trials in Wood and Mahoning Counties. In these tests duplicate blocks of several varieties received 0.75 pound of aldrin in the fertilizer while other duplicate blocks were band seeded without insecticide. In four other tests observed in 1954–55, one- to three-acre portions of single fields were band seeded with insecticide while the remainder of the field served as a check.

Three variety trials were conducted in 1955–56, one each in Wayne, Wood, and Mahoning Counties. Again, duplicate blocks of several varieties were treated with two other blocks serving as checks. Root borer populations in these nine trials are given in Table 3.

Table 3. Clover root borer control with band placement of 0.75 pound of aldrin per acre in several locations in Ohio, 1955–56.

County	Roots per treatment	Borers per root in		Percent control	Yield ^a (tons/acre)	
		Aldrin	No Aldrin		Aldrin	No Aldrin
1955						
Wood	100	0.25	1.28	80.5	1.96 ^b	1.38
Mahoning	100	.35	2.59	86.5		
Van Wert 1	30	.10	5.27	98.1		
Van Wert 2	30	.87	2.97	70.7		
Van Wert 3	30	.00	2.27	100.0		
Trumbull	30	.06	4.70	98.7		
1956						
Wayne	120	.02	1.94	98.8	1.01 ^c	0.95
Wood	100	.09	0.79	88.6	0.5 ^b	0.5
Mahoning	100	.11	1.00	89.0		

a. Second cutting.

b. L.S.D. at 1% level = 0.14.

c. Not significant.

Considering only the 0.75 pound toxicant rate of aldrin, heptachlor, or lindane, the band placement method in these 11 tests gave an average of 89.3% control of borers, the range of control varying from 70.7% to 100%. In every case but one where yields of second and third cutting were measured, the treated plots yielded more than the check plots. The average increase in second cutting yields in seven trials was 430 pounds of dry weight of hay per acre.

From these trials one can conclude that band seeding of red clover with 0.75 pound of insecticide will result in satisfactory control of the clover root borer with a resulting increase in yield of hay.

The band seeding method described has been employed with most success in legume seedings with oats or summer seedings without a companion crop. Band seeding has not been as successfully adapted for seeding in wheat. Therefore, some other method of applying a seed insecticide combination needs to be developed.

Surface Application

In March 1955, red clover seed was mixed with a granulated formulation of aldrin (10% on Attaclay AA, 30 to 60 mesh) and sown in wheat in a randomized block design with four replications of 30 × 35 foot plots. The seed tubes of the drill were extended so that they came close to the ground and placed the seed insecticide mixture in bands along the ground. Proportions of seed and clay were regulated so that a dosage of 0.0, 0.75, and 1.5 pounds of actual aldrin was delivered per acre. In August 1956, the plots were sampled by taking a total of 40 roots from the check and 80 roots from each treatment. The borers per root averaged 1.48 in the check, 0.35 in the 0.75-pound treated areas and 0.06 in the 1.5-pound treated areas. The method was successful enough to warrant further testing under a variety of conditions.

The land upon which the 1952–53 trials were conducted was carried through the usual corn, small grain, hay rotation. In 1955, red clover was seeded in oats without further application of insecticide. In 1956, the root borer populations were recorded. The average borers per root in the various treatments was 3.31, in the checks 3.67. Apparently little carry-over effect of the insecticides remained 4 years after their application. For continuing root borer control the band application of insecticide would require renewal in each rotation.

Summary

Field trials were conducted in several locations in Ohio to establish the effectiveness of band placement of insecticides for control of the clover root borer. Aldrin was used most extensively, although lindane and heptachlor were also included. In 13 trials, 0.75 pound per acre of one of the three insecticides gave an average of 89.3% control. In seven trials in which yields of hay were taken the insecticide-treated plots yielded an average of 430 pounds per acre more than the untreated plots.

In a single test, insecticide placed on the surface of the soil with the seed at the normal seeding time in wheat gave good control of the clover root borer.

Residual action of materials placed in the soil was not sufficient to control borers in a planting made 4 years later.

Notes

1. Accepted for publication November 16, 1956.
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