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The response of Kentucky bluegrass turf to insecticidal treatments

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The Response of Kentucky Bluegrass Turf To Insecticidal Treatments

by E. A. Heinrichs, Leonard C. Lehman, Lloyd M. Callahan, C. J. Southards, and Ellis L. Matheny*

The most common insect pests of Kentucky bluegrass (**Poa pratensis** L.) in Tennessee are sod webworms and white grubs. Attempts to control these insects with insecticides has, at times, resulted in the entire destruction of the lawn by sod webworms. Pass (1965) has shown that applications of aldrin, chlordane, and dieldrin increased the webworm population 2-3 fold. Streu and Vasvary (1966) found the same phenomenon in chinch bug control. Both Pass and Streu believed that this population increase of the target pest may have been related to an interference in some population-limiting mechanism, such as the natural enemies, but neither investigator definitely proved this.

In view of the problem that home owners have had after applying insecticides for webworm and grub control, it was decided to conduct a study to determine the over-all effects of insecticides on bluegrass. The research reported herein covers only a preliminary phase of that study: the effect of insecticides on botanical composition of a bluegrass turf.

Materials and Methods

The study area consisted of a Kentucky bluegrass turf at the University of Tennessee Plant Science Farm near Knoxville. The insecticides tested, their formulations, and rates of active ingredient per 1000 square feet were:

1) Dieldrin, 10% Granules (G), 2 ounces
2) Dylox(R), 5% Granules and 80% Soluble Powder (SP), 2 ounces
3) Akton(R), 24% Emulsifiable Concentrate (EC), 2 ounces
4) Carbaryl, 80% Wettable Powder (WP), 2 ounces
5) Biotrol(R), FBB (fungus), 5% Wettable (W), 200×10^9 spores.

In order to gain information concerning the plot size required to obtain meaningful differences in the effect of insecticides on plant species populations, two sizes were used. All treatments were applied to 7- $\times$ 14-foot plots. Only dieldrin and the Dylox granular were applied to 50- $\times$ 50-foot plots. Each treatment, including an untreated check, was replicated three times.

Application dates were June 3, June 25, July 16, and August 10, 1969 except for Biotrol FBB and dieldrin. Biotrol was applied July

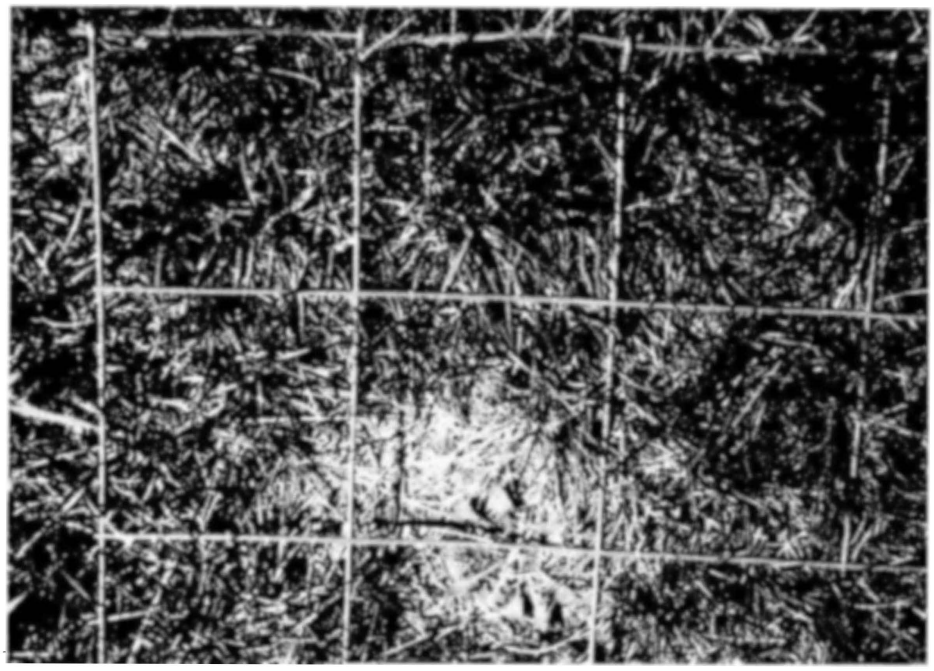

Figure 1. Portion of a grid used to determine botanical composition. Light area is dead grass.

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1, July 17, and August 10, 1969. Dieldrin was applied only on March 19 in the large and June 3, 1969 in the small plots.

Plots were evaluated September 25, 1969, to determine the percentage of bluegrass, weeds, and dead grass. A 36- × 36-inch section of concrete-reinforcing wire containing 36 six-inch squares was used as a grid (Figure 1). In the large plots 10 counts were made. Each time the number of squares containing predominantly bluegrass, weeds, or dead grass was counted. A buffer zone 12 feet from the plot edge was not sampled. In the small plots four counts were made. Thus 360 six-inch squares in the large and 144 in the small plots were counted.

Results and Discussion

As indicated in Table 1, plot size had no significant effect on plant composition. No significant differences existed between treatments on the small and large plots of dieldrin, Dylox 5 G, or the check plot, respectively. Thus large (50- × 50-foot) plots are not required to provide meaningful differences among treatments. This information is of major importance in selecting the plot size in future work.

Table 1. Composition of a Kentucky bluegrass turf treated with insecticides

Treatment	Plot size[a]	Percent[b]		
		Bluegrass	Weeds	Dead grass
Dylox(R) 5 G	Large	67.6[a]	31.3[a]	1.1[a]
Akton(R) 24 EC	Small	58.0[ab]	42.0[a]	0[a]
Check	Large	55.0[abc]	43.0[a]	2.0[a]
Dylox(R) 5 G	Small	52.7[abc]	46.6[a]	.7[a]
Biotrol(R) FBB 5 W	Small	51.7[abc]	47.7[a]	.6[a]
Dylox(R) 80 SP	Small	49.7[bcd]	48.7[a]	1.6[a]
Check	Small	41.6[cd]	56.8[ab]	1.6[a]
Carbaryl 80 WP	Small	35.3[d]	63.0[ab]	1.7[a]
Dieldrin 10 G	Small	16.3[e]	79.3[bc]	4.4[a]
Dieldrin 10 G	Large	8.7[e]	88.0[c]	3.3[a]

[a]Large = 50- x 50-foot; small = 7- x 14-foot.
[b]Means followed by the same letter in a given column are not significantly different at the 5% level. Duncan's multiple range test.

There was a significant difference (Table 1) in turf response among the various treatments. Percent bluegrass ranged from 67.6% in the large plot Dylox 5 G treatment to a low of 8.7% in the large plot dieldrin treatment. It is readily apparent that the chlorinated hydrocarbon dieldrin had some undetermined effect which resulted in weed encroachment (mostly Dallisgrass, **Paspalum dilatatum** Poir.). The mechanism involved was not determined. A possible explanation is that dieldrin was especially harmful to the natural enemies of the sod webworm allowing the webworm population to increase in numbers, destroying the bluegrass. Later, due to a lack of competition from the bluegrass, weeds readily invaded the affected areas. Research is continuing to determine the effects of insecticides on populations of potential sod webworm enemies.

Regardless of the actual mechanism involved, enough data are available to warn the home owner to refrain from using any of the chlorinated hydrocarbons such as aldrin, chlordane, and dieldrin for sod webworm control. He should be sure that if he is buying premixed lawn care products containing insecticides, he should select one that does not contain any of the chlorinated hydrocarbon insecticides. The ingredients are listed on the label of the product and it should be read before purchase.

Literature Cited

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