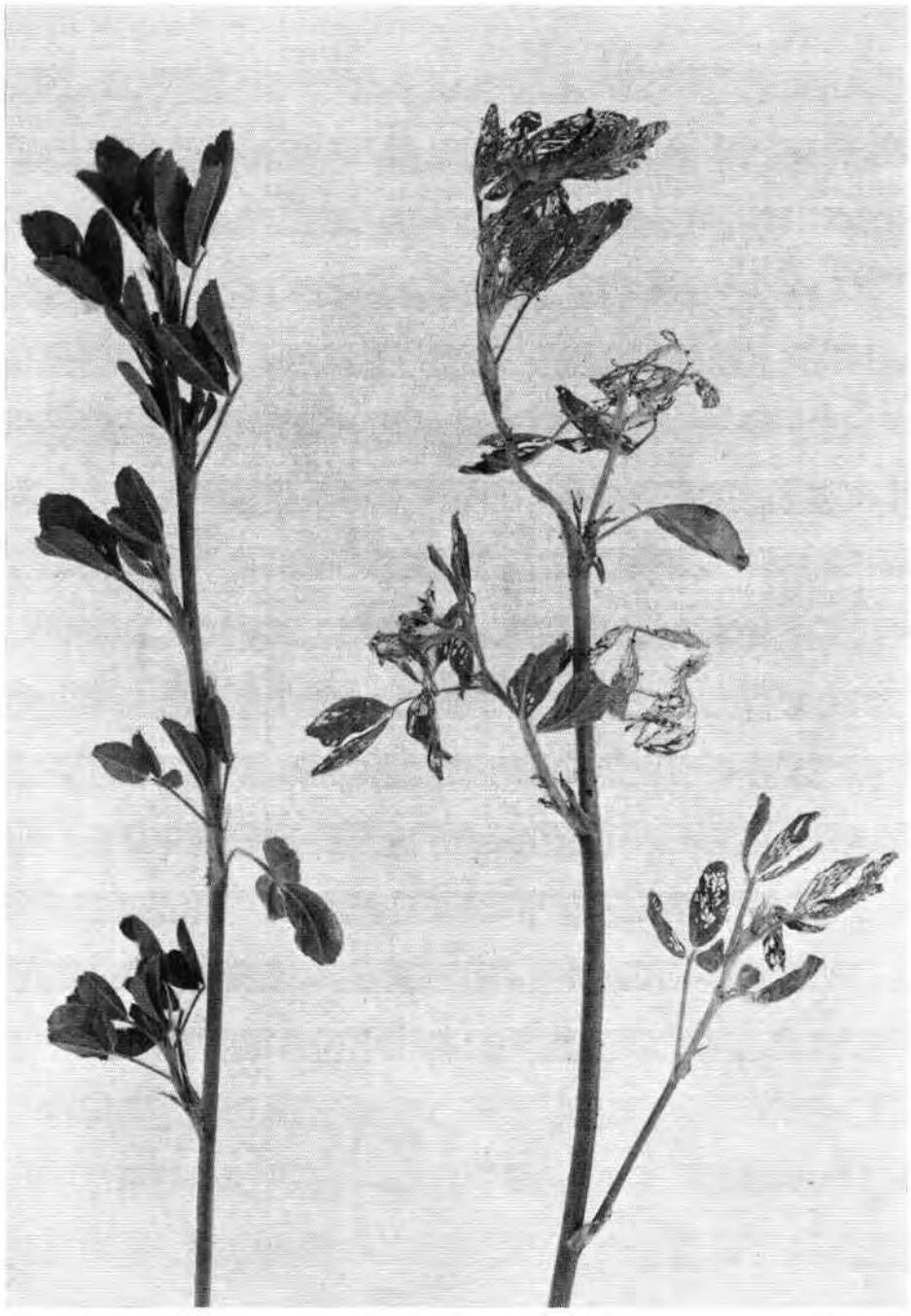
A progress report . . .

ALFALFA WEEVIL CONTROL INVESTIGATIONS



Stem of alfalfa growth badly damaged by larval feeding (right) as compared to a normal stem (left).

TABLE 1. EVALUATION OF GRANULATED INSECTICIDES, APPLIED IN THE DORMANT SEASON, FOR CONTROL OF THE ALFALFA WEEVIL LASSEN COUNTY, 1964

Material (Applied 1 lb actual per acre, March 18)	Reduction of larvae as compared with untreated check*
	%
Niagara 10242	60
Temik	52
Union Carbide 8305	6
Shell Development 7438	39
American Cyanamid 47470	19
American Cyanamid 47031	5
American Cyanamid 47772	0
Bayer 38156	13
Bayer 37289	0
Bayer 25141	0
Stauffer N-2790	12

* Larvae sampled by net sweeps taken immediately prior to first cutting, on June 15, 1964. Untreated check averaged 67 larvae per sweep.

TABLE 2. EVALUATION OF SPRAYS FOR CONTROL OF LARVAE OF THE ALFALFA WEEVIL SISKIYOU COUNTY, 1964

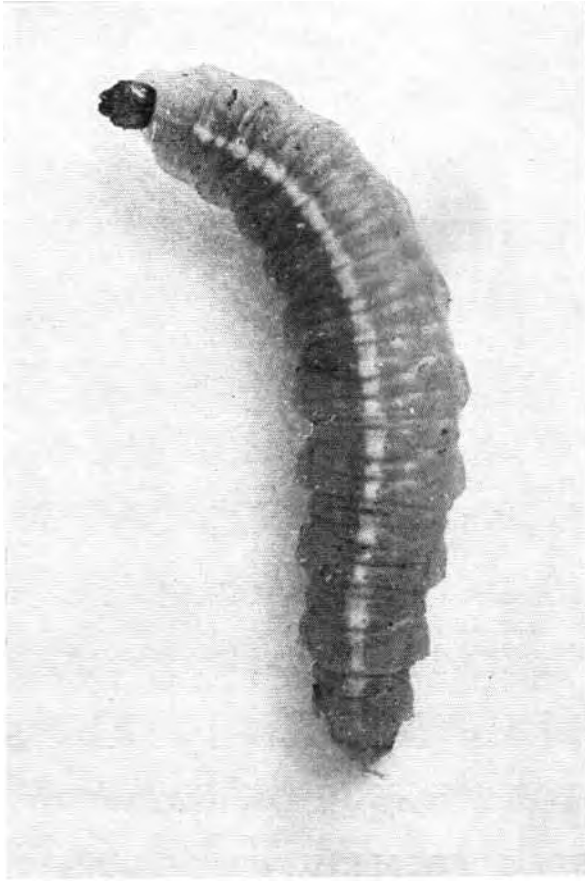
Material (applied May 26)	Application rate of active toxicant	Reduction of larvae, as compared with untreated check, after:*		
		7 days	15 days	21 days
	lbs per acre	%	%	%
Methoxychlor	1.0	85	81	75
Diazinon†	1.0	86	94	90
Methoxychlor + diazinon	0.8 + 0.4	93	93	91
Sevin†	0.8	82	83	81
Phosphamidon†	0.5	76	48	44
Sevin + phosphamidon‡	0.5 + 0.5	87	69	69

* Untreated check averaged 9, 30, and 52 larvae per sweep at 7, 15, and 21 days, respectively, after application.

† Resulted in foliage injury rated "medium" 7 days after application.

‡ Resulted in foliage injury rated "severe" 7 days after application.

Field experiments for alfalfa weevil control conducted in Siskiyou and Lassen counties during 1964–65 indicate little likelihood of replacing the no longer recommended cyclodiene insecticides (such as heptachlor or dieldrin) with other materials for dormant season application. However, several new insecticides, applied as sprays for larval control on the growing crop, were found superior to spray materials now in use. This is a progress report of research; only a few of the materials mentioned in the text and tables are registered or recommended by the University of California. See U.C. Pest and Disease Control Guide For Alfalfa Hay, Leaflet 85, for recommendations.



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Larva of mature alfalfa weevil in photo is ½ inch long, green, with a broad white stripe along the back, and with a dark head capsule.

CONTROL OF THE ALFALFA WEEVIL, *Hypera postica* (Gyllenhal), remains an essential part of profitable alfalfa hay production in much of mountainous northern California. Following the deletion from the USDA "Summary of Registered Agricultural Chemical Uses" of several of the cyclodiene insecticides previously recommended for adult weevil control during the dormant season, growers were confronted with the necessity of dependence on spray applications of certain insecticides to the growing crop for control of the larvae. Sprays for larval control require more critical timing, are more costly, and in general do not provide as effective control as the dormant season application of cyclodienes. However, there is good evidence that resistance of the insect to some of the cyclodienes soon would have precluded their use even in the absence of any federal action. To provide hay growers with alfalfa weevil control recommendations competitive in effectiveness with those which can no longer be used, trials were conducted in northern California during 1964 and 1965.

Methods

Field plot dimensions varied from 10 × 20 ft for granulated insecticides to 20 × 80 ft for spray applications. Granulated materials were distributed by means of a shaker container. Sprays were applied with a truck-mounted boom sprayer having a boom 20 ft wide. This equipment was calibrated to deliver 15 gals of liquid per acre at a pressure of 40 p.s.i. All treatments were replicated four times in randomized blocks. Sampling was conducted by use of a standard 15-inch diameter beating net. Ten sweeps were taken in each plot at the intervals after application indicated in the tables.

Granulated insecticides

In the Lassen County trial (table 1) the use of Niagara 10242 and Temik resulted in slightly more than a 50% reduction of larvae at the time of first cutting. However, effectiveness was not improved in a further trial conducted in Siskiyou County the following year by either increasing the dosage or applying these materials in the fall instead of the late winter. In the latter trial, the following granulated treatments were also evaluated and considered unsatisfactory for control of the weevil: phorate at 1.0 and 2.0 lbs of active material per acre, applied either in the fall or in the winter, disulfoton at 1.0 and 2.0 lbs applied in the winter, methyl parathion at 1.0 and 2.0 lbs applied in the fall or winter, Ortho 5353 at 1.0 and 2.0 lbs applied in the fall or winter, Bomyl at 1.0 lb applied in the winter, and General Chemical 6506 and 9160 at 1.0 lb applied in the winter.

Sprays

The field selected for the Siskiyou County trial in 1964 (table 2) was not as heavily infested with weevil larvae as is considered desirable for subjecting insecticides to a severe test of their effectiveness. Nevertheless, diazinon and the combination of methoxychlor and diazinon gave better larval control than any of the other materials evaluated. Of the compounds listed, methoxychlor and the mixture of methoxychlor plus diazinon were the only treatments which did not result in some degree of foliage injury. This was characterized by a scorching of the leaves and may be attributable in part to the lengthy period of rainy weather which persisted during the early part of the experiment—and which resulted in very succulent plant growth.

In the experiments reported in tables 3 and 4, populations of larvae in the untreated check approached or exceeded 100 per sweep during the time the work was in progress. Under those severe conditions, Union Carbide 10854 (table 3)

TABLE 3. EVALUATION OF SPRAYS FOR CONTROL OF LARVAE OF THE ALFALFA WEEVIL LASSEN COUNTY, 1964

Material (applied June 3)	Application rate of active toxicant	Reduction of larvae as compared with untreated check, after:*	
		12 days	21 days
	lbs per acre	%	%
Bidrin	0.75	91	76
Imidan	0.75	91	76
Union Carbide 10854	0.75	89	91
Union Carbide 20047A	0.75	77	65
Ortho 5353†	0.75	87	85
Bomyl	0.5	87	73
Stauffer B 10046	0.75	85	86
Stauffer B 10119	0.75	82	83
Azodrin	0.75	84	76
Shell Dev. 4072†	0.5	22	23
Malathion	1.0	84	70
Banol	2.0	75	76
Banol	1.0	61	60

* Untreated check averaged 52 and 92 larvae per sweep at 12 and 21 days, respectively, after application.

† Resulted in foliage injury rated "light" 7 days after application.

TABLE 4. EVALUATION OF SPRAYS FOR CONTROL OF LARVAE OF THE ALFALFA WEEVIL SISKIYOU COUNTY, 1965

Material (applied May 17)	Application rate of active toxicant	Reduction of larvae, as compared with untreated check, after:*		
		15 days	22 days	29 days
	lbs per acre	%	%	%
Niagara 10242	0.25	98	96	77
Niagara 10242	0.5	99	98	85
Niagara 10242	1.0	99	99	94
Geigy 13005	0.25	91	89	51
Geigy 13005	0.5	95	93	77
Geigy 13005	1.0	96	98	69
Ortho 5353	0.56	67	79	47
Ortho 5353†	0.75	89	89	70
Ortho 5353‡	1.13	96	92	81
Ortho 5353 + Phosphamidon§	0.56 + 0.125	86	83	53
Ortho 5353 + Phosphamidon§	0.56 + 0.25	91	91	57
Shell Dev. 7438	0.5	88	94	82
Shell Dev. 7438	1.0	92	96	81
Bomyl	0.75	81	84	50
Parathion	0.375	72	78	50

* Untreated check averaged 52, 108, and 118 larvae per sweep at 15, 22, and 29 days, respectively, after application.

† Resulted in foliage injury rated "light" 8 days after application.

‡ Resulted in foliage injury rated "medium" 8 days after application.

§ Resulted in foliage injury rated "severe" 8 days after application.

gave outstanding results 21 days after application, as did Niagara 10242, Geigy 13005, certain dosages of Ortho 5353 and Shell Development 7438 at 22 days after application (table 4). Twenty-nine days after treatment, Niagara 10242 at a dosage of 1.0 lb continued to provide a very high level of control. In these experiments the use of Ortho 5353 (at dosages of 0.75 lb or higher), Ortho 5353 plus phosphamidon, and Shell Development 4072 all caused some foliage injury.

Discussion

The failure with all granulated treatments applied during the dormant season demonstrates the extent of the problem in attempting to replace the formerly used cyclodiene insecticides (such as heptachlor and dieldrin) with other insecticides which do not belong to that chemical group. The lack of sufficient residual activity is basic to this problem but with the distinct trend away from commercial development, as well as usage, of pesticides having lengthy persistence, it is questionable whether replacement of the cyclodienes for weevil control by application during the dormant season can ever be achieved.

Sprays applied to the growing crop for larval control offer the only effective alternative to dormant-season control of the adult weevil. As already stated, a major objection to sprays for larval control is the difficulty in applying the insecticide at precisely the proper time, particularly when larval populations are heavy. Applications made too early do not protect the crop during the entire period when larval numbers exceed economic levels. A loss in hay yield results from treatments applied even a few days after the optimum date for spraying.

Promising materials

Spray materials showing particular promise as replacements for the insecticides presently recommended for use in mountainous northern California include: Niagara 10242, Geigy 13005, and Shell Development 7438. Union Carbide 10854, which also provided excellent larval control, is no longer being developed, according to the manufacturer. While none of these compounds was initially more effective than those now recommended, the residual activity was somewhat superior. Therefore, their use may negate the need for critical timing and the user may be permitted to make application in the very early stages of larval activity and expect protection of the crop during the entire period that larval populations are present in destructive numbers.

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INJURY TO EASTER SYSTEMIC

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GROWERS OF EASTER LILIES have recently been troubled by yellowing of plant foliage. These experiments were conducted to determine whether pesticides used for aphid control might be the cause of this injury. The tests were conducted in commercial greenhouses on

Severe leaf tip injury from systemic insecticides is evident in photo below of Japanese Georgia variety Easter lily. Yellow leaf tips are especially visible about the middle of the plant.