Alfalfa Butterfly Tests

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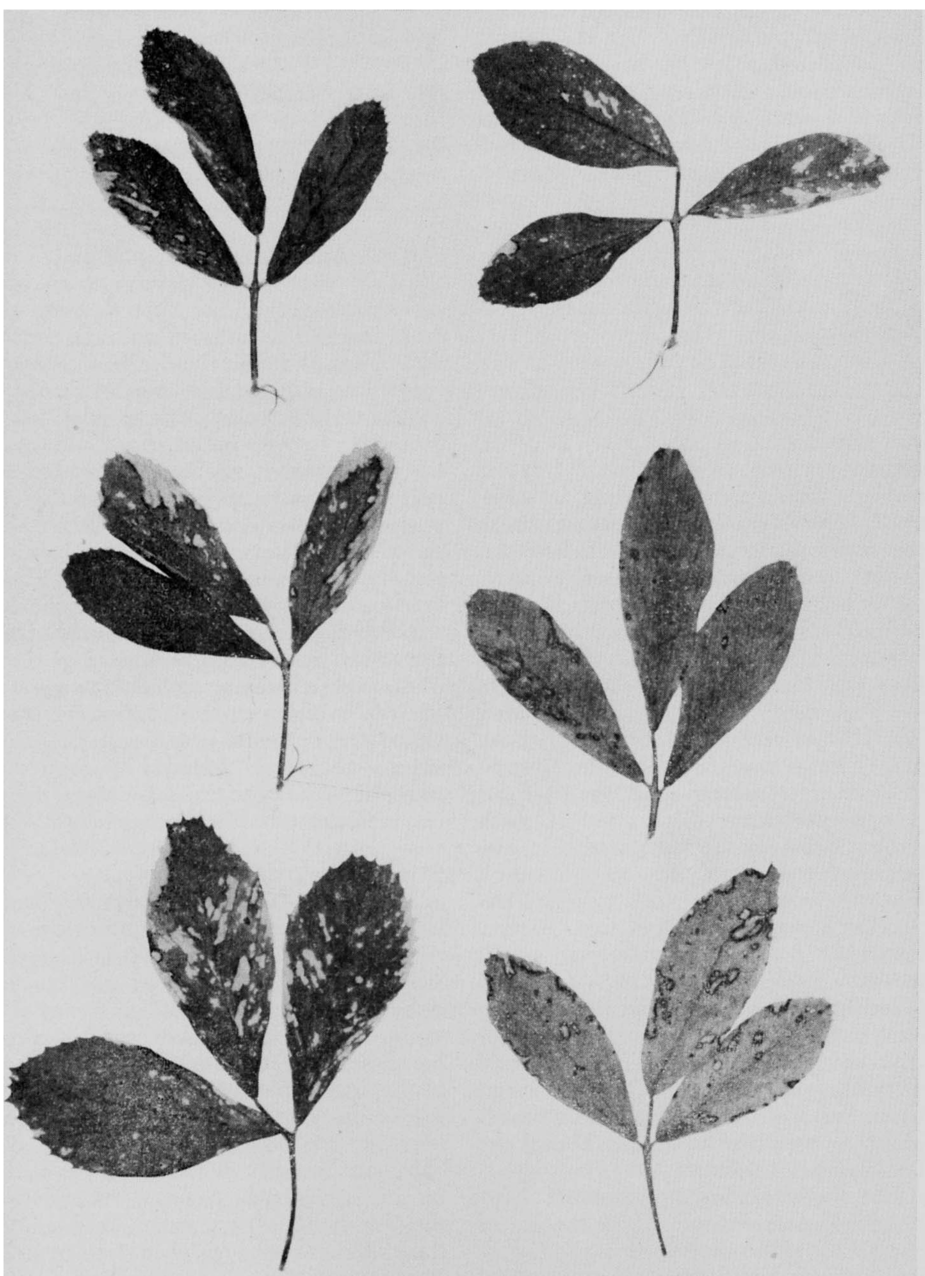
THE ALFALFA BUTTERFLY, *Colias philodice eurytheme* (Boisduval), is a serious defoliator of alfalfa in the warm interior valleys of California. Serious outbreaks of caterpillars may occur from June through October, but the major damage is done during the latter part of July and in August. Infestations vary markedly from field to field due to the habits of the pest and its parasite, *Apanteles medicaginis* Muesebeck. Because of these uneven infestations and since the parasite may be seriously harmed by chemicals, control of the pest should be applied only on the basis of careful and adequate caterpillar population counts.

In connection with a series of tests on the chemical control, HETP (50%) was compared to DDT in an infested alfalfa field northeast of Westley. Four treatments were applied by airplane-sprayer to large blocks averaging about ten acres in size. These treatments were as follows:

1. Wettable DDT. A wettable powder containing 50% DDT applied at the rate of 0.21 pound of actual DDT in approximately 5 gallons of water per acre.
2. DDT in oil. One part Vapona 1D (2.4% by weight of DDT in Vapona No. 1 Base Oil)—a kerosene containing 10% of summer oil conforming to California grade light—to 3.8 parts of Vapona No. 1 Base Oil at the rate of 0.15 pound of actual DDT in approximately four gallons of oil per acre.
3. One quart of 50% HETP per acre in Vapona No. 1 Base Oil, at approximately five gallons of oil per acre.
4. Same as 3, except used at the rate of one pint of 50% HETP mixture in approximately four gallons of oil per acre.

Alfalfa leaves showing injury following treatment with HETP in oil.



The materials were applied by a boom-type airplane-sprayer. An extra pump maintained adequate agitation in the spray tank. The applications were made between 7:30 and 9:00 a.m. on July 25. The plants were covered with dew and a slight breeze (estimated at 5 m.p.h.) occurred intermittently from the east. Coverage was considered good.

Population counts made in this alfalfa field before and after treatment are summarized in table 1. Prior to treatment, the population of alfalfa butterfly caterpillars ranged from 34 to 45.6 per sweep in these plots. Such an infestation will usually completely defoliate an alfalfa field. All treatments gave economic control and a normal yield of hay was harvested from all plots.

The caterpillars reacted to both materials in a similar fashion. Many showed effects within 15 minutes after treatment and a large number dropped to the ground after all treatments. Some of the smaller larvae spun down on silken threads. Counts made eleven hours after treatment showed the population in the wettable DDT plot reduced to 3.7 larvae per sweep; in the DDT in oil plot to 2.2 per sweep; in the one quart HETP mixture to 6.2; and the one pint HETP mixture to 4.4. By the third day following treatment, the caterpillar population had been practically eradicated in the DDT plots. In the HETP treatments, the control was much less satisfactory. In the one-quart treatment, the count was 3.9 per sweep on the third day while in the one-pint treatment, it was 7.3, which is greater than it was 11 hours after treatment. Observations of the caterpillars indicated that many of them had been knocked from the plants and then recovered. This was confirmed by the presence of mud on many of the caterpillars in this plot.

Definite foliage injury was observed in both HETP plots and not in any other portion of the field. Since oil was applied to other parts of the field, the injury must be due to the HETP. The injury usually consisted of a variable amount of general

TABLE 1

Mean Number of Larvae per Sweep of an Insect Net in an Alfalfa Field Treated with DDT and HETP

Date surveyed	Time since treatment	Treatment											
		Wettable DDT			DDT in oil			HETP, 50%					
								One quart per acre			One pint per acre		
		Large larvae	Small larvae	Total larvae	Large larvae	Small larvae	Total larvae	Large larvae	Small larvae	Total larvae	Large larvae	Small larvae	Total larvae
July 23	Before	13.0	21.0	34.0	16.6	20.3	36.9	18.7	26.9	45.6	18.7	26.9	45.6
July 25	11 hours	2.1	1.6	3.7	1.6	0.6	2.2	3.9	2.3	6.2	2.2	2.2	4.4
July 28	3 days	0.0	0.0	0.0	0.2	0.2	0.4	2.8	1.1	3.9	5.0	2.3	7.3
July 30	5 days	0.0	0.0	0.0	0.2	0.1	0.3	2.6	1.0	3.6	4.0	1.8	5.8
Aug. 1	7 days	0.0	0.0	0.0	0.4	0.1	0.5	2.1	0.8	2.9	3.4	3.2	6.6
Aug. 7	13 days	0.0	0.0	0.0	0.1	0.1	0.2	0.9	1.1	2.0	1.7	3.9	5.6

chlorosis and small light necrotic areas (usually circular) surrounded by darker rings. Sometimes much of the peripheral area of the leaf was necrotic. Three days after treatment this injury was general but not serious where the one-quart dosage was applied, and hardly noticeable in the one-pint dosage. A week after treatment, it was much less apparent and by cutting time, thirteen days after treatment, no injury could be detected. Undoubtedly, the dropping of the seriously injured leaves accounts for the absence of apparent injury at harvest time. Although very evident, the injury was at no time serious.

The results of this very preliminary test offer some promise for the use of HETP as a control for the alfalfa butterfly. Further work is needed on dosages, methods of application and their probable effect upon the plants. Although injury was slight in this case, caution must be used wherever HETP in oil is applied to alfalfa. The results of other studies on the control of the alfalfa butterfly will be published elsewhere. This report is not to be construed as a recommendation for the use of these materials on alfalfa but as a recording of experimental results.

Tests on Bees

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THE PRODUCTION OF A MAJORITY of our food crops is influenced not only by the control of the injurious pests but also by the presence of sufficient pollinators to effect maximum yields. Many of our orchard and field crops either are dependent on or are greatly benefited by pollinating insects. Any pest control program which materially reduces the number of pollinating insects is quite likely to adversely affect the production of those crops that are benefited by the visits of pollinators.

In recent years, the increased use of chemicals in insect and weed control has caused the loss of thousands of colonies of honeybees. Poisons which are injurious to honeybees must necessarily kill the solitary bees as well. The beekeeping industry performs the important function of providing honeybee colonies for the use of agriculture and a substantial loss of colonies of bees is not only a monetary loss for their owners but may mean a greater loss to the growers of those crops serviced by the honeybees. The honeybee is the only insect that can be propagated and moved from place to place as needed for pollination services. As the solitary bees are reduced in numbers by the application of chemicals, the honeybee becomes still more important as the remaining source of essential pollinating services. Since the beekeeping industry must depend largely on the income from the sale of the byproducts of the hive, the honey, beeswax, queens and swarms, rather than on the rentals received for the pollination services, conditions must be favorable for honey production in the areas in which bees are needed to enable the beekeeper to maintain his colonies. While hives of bees can be moved from one place to another, at certain times of the year, it is physically impossible for a beekeeper to move his hives on short notice. When an operator owns from one thousand to several thousand colonies, the movement of his hives to new locations is a major operation that involves the use of considerable manpower as well as heavy trucks. The hives must be loaded in late afternoon and moved at night. The movement of a large number of colonies from any given area results in the removal of millions of pollinators, and the result from the viewpoint of pollinization is about as positive for that area as if the bees had been killed.

For these reasons, it is important for those using or recommending the use of chemicals in the control of crop pests to know how the application of any chemical will effect the balance of pollinators in the region in which the poisons are applied. Honeybees may fly a distance of from two to five miles in quest of nectar and pollen although the average distance probably, is not more than two miles. Poisonous dusts may drift in substantial quantities for two miles or more beyond the fields treated, so the danger area of poisoning also must be considered. When poisons are confined to the fields treated, the chemical hazards to pollinating insects are materially reduced. The ideal pest control program would be one in which the poisons could be confined to the fields treated and applied at a time or in such a manner as to cause no appreciable injury to pollinating insects. One of the factors to consider in devising a pest control program, is to know the probable toxicity to the pollinators of the chemicals employed. Another factor is to use chemicals that are least toxic to beneficial insects.

The production in recent years of many new chemical compounds for use as insecticides and herbacides has made it necessary for a large amount of work to be done in determining the toxicity of the various chemicals to bees and to other beneficial insects. The phosphates are probably the newest addition to a long list of useful chemicals. They have not been on the market long enough or in sufficient quantity for tests to be made on a large acreage basis. Consequently, their probable injury under field conditions will have to be deduced from various laboratory tests.