CHEMICAL CONTROL STUDIES OF THE WALNUT CATERPILLAR[1]

by M.E. Farris and J.E. Appleby

Abstract. Foliar sprays of malathion 50EC, diazinon 25EC, acephate (Orthene) 75SP, and *Bacillus thuringiensis* Berliner (Dipel) were tested on 2nd and 4th instars of *Datana integerrima* Grote and Robinson on black walnut trees. Excellent control resulted with foliar spray applications of all the mentioned insecticides.

Black walnut, *Juglans nigra* L., is an important timber and nut tree species. Many monocultural plantings of the tree have been made in the Midwest during recent years to replace or supplement a decreasing natural supply of the species for timber. Of the defoliating insect species that feed on back walnut, the walnut caterpillar, *Datana integerrima* Grote and Robinson, is the most serious (Farris and Appleby 1978). The walnut caterpillar is generally controlled by its natural enemies. Periodically the insect's natural controls are ineffective, and populations of the walnut caterpillar become epidemic with widespread defoliation of black walnut and other plants (Fig.

Fig. 1. The terminal branches of a small black walnut tree severely defoliated by the walnut caterpillar.

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1). Because of this factor, other control measures may become necessary to prevent extensive damage and loss of black walnut trees. Spray applications of *Bacillus thuringiensis* Berliner (Polles 1974), carbaryl (Polles 1974), basic copper arsenate (Felt and Bromley 1940) and lead arsenate (Haseman 1940, Hixon 1941) when applied to actively feeding larvae have given control. Because some of the chemicals formerly used caused damage to the environment, experiments were conducted to find less hazardous insecticides. Reported here are results of tests using 4 different insecticide sprays on 2nd and 4th instars of the walnut caterpillar.

Materials and Methods

Experiments 1 and 2 were conducted at the Dixon Springs Agricultural Center, Simpson, Ill. Experiment 1 consisted of selecting 3 lower branches on each of 5 black walnut trees ca. 40 ft tall. The selected branches were shaken vigorously to remove any insect predators. Foliage infested with a specific number of 2nd instars was placed on each branch. The distal ca. 6 ft of each branch containing the larvae was then enclosed in a fiberglass bag. The open end of each bag was closed and tied to the branch with string. The larvae were allowed to feed for 2 days. On Aug. 10, 1976 each bag was removed prior to treatment. Using a 1-gal knapsack sprayer, foliar sprays were applied onto the selected branches and larvae using the following insecticides with formulation rate indicated for 100 gal water: acephate (Orthene) 75SP 1.0 lb, *Bacillus thuringiensis* Berliner (Dipel) WP 0.5 lb, diazinon 25EC 1.0 qt, malathion 50EC 1.0 qt. Each treatment, including a check, was applied to 3 branches. The bags were then retied. On Aug. 12 each bag was removed and the number of live and dead larvae was counted on the branches, foliage, and in each bag.

Experiment 2 was the same as Experiment 1 except that different branches were selected and 4th instars were used. The larvae were placed on the branches on Aug. 13. Treatments were applied on Aug. 20. On Aug. 24 the number of live and dead larvae were counted in each bag.

Results and Discussion

In Experiment 1, larvae treated with acephate, malathion, and diazinon sprays immediately became very active inside the bags and many dropped from the foliage. Some larvae which dropped were able to exit the bags through the screen mesh. *B. thuringiensis* (Dipel) treated larvae ceased feeding and did not show increased activity. Two days after treatments were applied, all larvae sprayed with insecticides were dead (Table 1). Unaccounted larvae probably escaped through the screen mesh.

Table 1. Results of insecticide sprays applied to black walnut foliage infested with walnut caterpillar larvae. Each treatment was applied on 3 branches at Simpson, Ill., on Aug. 10, 1976.

Treatment & rate/100 gal.	*No. of live larvae before treatment Aug. 10*	*No. of larvae found after treatment Aug. 12*	
		Live	*Dead*
Malathion, 50EC, 1.0 qt.	130	0	91
	83	0	79
	19	0	11
Diazinon, 25EC, 1.0 qt.	58	0	36
	24	0	12
	123	0	22
Acephate, 75SP, 1.0 lb.	41	0	15
(Orthene)	59	0	17
	43	0	21
B. thuringiensis, WP,	33	0	17
0.5 lb. (Dipel)	73	0	52
	62	0	23
Check	19	18	0
	17	17	0
	60	24	0
	844	59	396

In Experiment 2, larvae reacted as in Experiment 1. All larvae were dead 1 day after being treated with acephate (Orthene), malathion, and diazinon (Table 2). Some larvae were observed to be alive in the *B. thuringiensis* (Dipel) treatments 3 days after being sprayed, but all were dead on the 4th day. Wheel bugs, *Arilus cristatus* (L.) were often observed resting and occasionally seen extending their mouthparts through the bags feeding on the larvae. The dead larvae in the check treatments were probably attacked by these bugs.

None of the insecticide treatments produced

evidence of phytotoxicity on black walnut. Presently, of the 4 foliar sprays used, only acephate (Orthene) is approved by USEPA for use on black walnut for walnut caterpillar control.

Table 2. Results of insecticide sprays applied to black walnut foliage infested with 4th instar walnut caterpillars. Each treatment was applied on 3 branches at Simpson, Ill., on Aug. 18, 1976.

Treatment & rate/100 gal.	*No. of live larvae before treatment Aug. 18*	*No. of larvae found after treatment Aug. 24 Live*	*Dead*
Malathion, 50EC, 1.0 qt.	25	0	25
	25	0	25
	25	0	25
Diazinon, 25EC, 1.0 qt.	25	0	25
	25	0	25
	25	0	25
Acephate, 75SP, 1.0 lb.	25	0	25
(Orthene)	25	0	25
	25	0	25
B. thuringiensis, WP,	25	0	25
0.5 lb. (Dipel)	25	0	25
	25	0	25
Check	25	21	4
	25	22	3
	25	20	5
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	375	63	312

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ABSTRACT

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Landscape problems may be difficult to resolve unless one has a complete history of the situation and is able to confer with all parties involved. The disciplines that relate to plant health — botany, entomology, horticulture, plant pathology, plant physiology, and soil science — become important. An understanding of how a plant grows and the necessary requirements for a healthy plant should be discussed with the client. Environmental stresses can affect many plants and need to be considered when examining a client's problem. Problems in older areas with mature plant material may be caused by physiological aging, triggered by the environment. Problems in a new area may involve young, immature plants that failed to become established or are subjected to soil conditions associated with development sites. After the client explains the problem, an on-site examination should be conducted. If the problem appears to be beyond the scope of your expertise, you should tell your client so and consult another person.