A Systemic Insecticide on Ornamental Plants

G. A. BIEBERDORF AND KENNETH HUNTER, Oklahoma State University, Stillwater

Insecticides that are absorbed systemically by plants and translocated and then persist sufficiently long within the plant, would make possible new approaches of insect control. On plants grown for ornamental purposes this approach would seem ideal because such plants are seldom, if ever, used as feed or food.

Little information is available on the use of such material as a control for insect pests attacking ornamental plantings. There is likewise little information available on the toxic effect of systemic material to the plants themselves when applied in large doses. With this in mind, the junior author selected the systemic insecticide Systox, as the test insecticide to be used on such plants.

The common American elm, *Ulmus americana*, was selected as the test plant because it is frequently used in plantings, was readily available, and was heavily infested with several species of leaf hoppers of which the most common was *Erythroneura dumosa* (Bmr.) At the time during which these tests were made, most of the leafhoppers had reached the adult stage. Several hundred could be disturbed by walking underneath the tree.

Three methods of applying the chemical were used. The first method consisted of boring two-inch holes in the soil to a depth of 1½ feet in two half circles on one side of an elm tree having a trunk diameter of about twelve inches. The outer circle of holes was drilled first and on a line along the outer perimeter of the tree's branches. The holes were separated at intervals of three feet in this arc.

A scecond series of holes was drilled two weeks after the first and was located in an arc midway between the outer set of holes and trunk of the tree. At the time that the second set of holes was made, the first or original holes were cleaned in preparation for a second treatment.

The second method of treatment was made by forming a basin around the tree trunk and making a pool that would hold upwards of three hundred gallons of liquid and in this manner flood the area over the feeder roots.

The third method of introducing the Systox into the elm trees was by the use of a side or trunk injector.

CONCENTRATIONS AND OBSERVATIONS

The first series of holes around the outer perimeter of the tree were filled with 10 gallons of water to which had been added 20 ml. of 25% (2 lbs. per gallon) emulsifiable Systox concentrate. This procedure, it was reasoned, would put the material near the feeder roots of the tree where it would be picked up and translocated to the leaves where the leafhoppers were feeding. Observations on the effectiveness of this treatment were made over a two-week period at two-day intervals. The leafhoppers resting or feeding on the under surface of seventy-five leaves were counted on both the treated and untreated portions of the tree. These observations were recorded and are shown in Table I.

Two weeks after the first application, the second set of holes was made. Both sets of holes were filled with the Systox solution as on the previous occasion except that the amount was doubled and 40 ml. of Systox were used in each 10 gallons of water. The observations in regard to the leafhopper populations were again made and these observations are also recorded in Table I.

The next method of introducing the Systox was by flooding elm trees having a trunk diameter of between 3 and 4 inches. The dilutions again were 20 and 40 ml. to each 10 gallons of water. Two hundred gallons of

this solution were used on each of the test trees. The observations on the leafhopper populations were again made, but no difference was indicated in the treated and check trees.

The primary purpose of the side injector method of introducing the Systox was to determine what concentration could be taken up by the tree without causing injury or killing the elm trees. The trees selected for this test were 3 to 6 inches in diameter. Five different trees were used. Three concentrations were used in these side injections, two of which were the same as those applied in the drilled holes and the flooding tests. The third concentration, however, was the 25% (2 lbs. per gallon.) Systox emulsifiable concentrate. Each injector has a capacity of 50 ml. and over a period of four weeks the injectors were filled five times. A toal of 250 ml. apparently was taken up by each of the trees. In no instance was there any observable indication that the trees had suffered ill effects from having absorbed the above mentioned concentrations and quantities of Systox.

In addition to the observations mentioned above, leaves were also collected from the treated trees and taken to the laboratory where leafhoppers were permitted to feed on the leaves of the various treatments. These tests were, however, limited due to the arrival of lower temperatures that killed or forced the leafhoppers into hibernation. The results of these observations are shown in Table II.

CONCLUSIONS

Preliminary tests were made to determine if a systemic insecticide (Systox) could be employed successfully to control insect pests affecting ornamental plantings. Three concentrations were tried in order to determine if injury would be caused by the higher coucentrations. Three methods of application were used and three concentrations were tested. All tests failed to materially reduce the leafhoper (*Eruthroneura dumas*) populations on elm trees. There was no observable injury to the trees that could be attributed to the treatment under question. The 25% (2 lb. per gal.) Systox emulsifiable concentrate applied by the injector method showed no signs of injury to the American elms under test.

TABLE I

Date	No. of leaves counted on each ⅛ of tree	Total No. of insects		Ml. of concentrate used	Gallons of Systox solution used
		Treated side	Untreated side		
Sept. 30-56	75	224	289	20	10
Oct. 2-56	75	208	238	20	10
Oct. 4-56	75	185	177	20	10
Oct. 6-56	75	182	270	20	10
Oct. 8-56	75	251	280	20	10
Oct. 10-56	75	241	146	20	10
Oct. 12-56	75	187	222	20	10
Oct. 14-56	75	206	193	20	10
Total:		1644	1815		
Oct. 16-56	75	177	109	40	20
Oct. 18-56	75	139	162	40	20
Oct. 20-56	75	157	145	40	20
Oct. 22-56	75	102	117	40	20
Oct. 24-56	75	127	92	40	20
Oct. 26-56	75	91	112	40	20
Oct. 28-56	75				
Total:		793	737		

TABLE II

Sample Number	Number of Tubes per sample	Number of Insects per sample	Number dead in three days	
			Max.	Min.
1*	5	10	10	7
2**	5	10	10	6
3***	5	10	6	4
4*√	5	10	9	4

* Samples from tree with holes drilled around tree
** Samples from tree with side injector
*** Samples from tree where flooded
*√ Check