CHEMICAL CONTROL OF *LYGUS* SPP. (HEMIPTERA:MIRIDAE) IN BRITISH COLUMBIA PEACH ORCHARDS*

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Before 1949, the quantity of marketable fruit from many peach orchards in the interior of British Columbia was appreciably reduced because of malformed peaches. Most of this malformation was due to the feeding of *Lygus* bugs, which are particularly abundant where alfalfa cover crops are grown. The only feasible means of controlling these insects was by disking under the cover crop in the fall, and frequently this practice was not very successful.

From 1947 to 1952, experiments were conducted in peach orchards throughout the Okanagan Valley of British Columbia on the control of *Lygus* bugs with DDT and other organic insecticides.

Materials and Methods

In the early experiments, the insecticides were applied as dusts to the orchard cover crops only, but as the work progressed the peach trees were sprayed, generally with a mist-blower sprayer. The area of each treated block was usually about one acre; treatments were not replicated. Control of *Lygus* bugs was estimated from the percentage of malformed fruits at thinning time and at harvest. The insecticides, their amounts and the stages of tree development at which they were applied are given in Tables I to VII.

Results and Discussion

In three orchards where the cover crop alone was dusted (Table I), it was only in the first orchard, treated with DDT at the balloon-bud stage of peach, that the percentage of malformed fruit at harvest in the treated block was appreciably lower than in the check block. In the other orchards, the insecticides were probably applied too early (early balloon-bud stage of peach) for the most effective control of *Lygus* bugs.

TABLE I.—Malformed Fruit at Thinning Time and at Harvest After Dusting the Cover Crop in Three Peach Orchards with DDT or BHC, 1947.

Orchard	Material	Approximate Amount per Acre	Stage of Peaches when Cover Crop Dusted	Fruit Malformed %[1]	
				Thinning Time	Harvest
1	DDT, 3% dust[2]	80 lb.	Balloon-bud	—	7.4
	Check	No treatment		—	19.7
2	DDT, 3% dust	150 lb.	Early balloon-bud	—	9.7
	Check	No treatment		—	9.1
3	BHC, dust[3] 2% gamma isomer	2.3 lb. gamma isomer	Early balloon-bud	8.3	6.4
	Check	No treatment		10.1	7.2

[1]Each figure is determined from 1500 fruits examined at random.
[2]Ansell Laboratories Limited, Vernon, B.C.
[3]Shanahan's Limited, Vancouver, B.C.

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On the basis of the percentages of malformed fruit at harvest, the population of *Lygus* bugs was evidently reduced where peach trees were sprayed twice with a mixture of BHC, stove oil, and Velsicol AR-50 (Tables II and III). Strict comparisons cannot be made since two orchards were involved and the dosages of the chemicals were slightly different in the two orchards. However, where the BHC spray was applied at 95 per cent petal-fall and again at 95 per cent shuck-fall (Table II), the percentage reduction in malformed fruit at harvest was similar to that obtained when it was applied at the late balloon-bud stage and again at 95 per cent shuck-fall (Table III). On the basis of the percentages of malformed fruit at harvest, the BHC spray in the latter orchard appeared to give only slightly better control of *Lygus* bugs than a mixture of DDT, stove oil, and Velsicol AR-50. According to the grower, however, in previous years damage from *Lygus* bugs had always been more severe in the area in which the BHC and check blocks were situated, because of a dense alfalfa cover crop, than in the DDT block, where there was virtually no alfalfa. The superiority of BHC over DDT was, therefore, probably greater than indicated by the percentages of malformed fruit. The poorer results with DDT were, no doubt, largely due to the low dosage (one pound of DDT per acre) used in the experiment.

TABLE II.—Malformed Fruit at Thinning Time and at Harvest after Spraying Peach Trees with a Mixture of BHC, Stove Oil, and Vilsicol AR-50 at about 95 per cent Petal-fall and again at about 95 per cent Shuck-fall, 1948.

Material	Approximate Amount per Acre per Application	Fruit Malformed, %[1]	
		Thinning Time	Harvest
BHC wettable powder[2] 6% gamma isomer Stove oil[3] Velsicol AR-50[4] Duponol WA flakes[5]	0.75 lb. gamma isomer 9.0 pints 9.0 pints 2.0 oz.	5.3	8.6
Check	No treatment	11.2	13.7

[1]Each figure is determined from approximately 2000 fruits examined at random.
[2]Canadian Industries Limited, Montreal, Que.
[3]Approximately 32 S.S.U. Vis. 100°F., over 75 per cent U.R.; Shell Oil Company, Penticton, B.C.
[4]A methylated naphthalene; Velsicol Corporation, Chicago, Ill.
[5]Forty to forty-two per cent sodium lauryl sulphate; Canadian Industries Limited, New Westminster, B.C.

Good control of *Lygus* bugs was obtained in two orchards where a mixture of DDT, stove oil, and Velsicol AR-50 was applied at about 90 per cent petal-fall and again at about 90 per cent shuck-fall (Tables IV and V). Control was slightly less where trees were sprayed at 90 per cent petal-fall only, but the percentage increase in malformed fruit was not sufficiently great to justify the additional expense of the second application (Table V).

TABLE III.—Malformed Fruit at Thinning Time and at Harvest after Spraying Peach Trees at the late Balloon-bud Stage and again at about 95 per cent Shuck-fall with a Mixture of Stove Oil and Velsicol AR-50 containing DDT or BHC, 1948.

Material	Approximate Amount per Acre		Fruit Malformed, %[1]	
	Balloon-bud	Shuck-fall	Thinning Time	Harvest
DDT[2] Stove oil Velsicol AR-50 Nacconol NR[3]	1.0 lb. 1.0 pint 0.5 pint 1.0 oz.	0.75 lb. — — —	15.5	12.5
BHC wettable powder 6% gamma isomer Stove oil Velsicol AR-50 Duponol WA flakes	1.0 lb. gamma isomer 2.0 gal. 0.5 gal. 8.0 oz.	1.0 lb. gamma isomer 1.0 gal. — 6.0 oz.	—	10.2
Check	No treatment	No treatment	14.9	19.2

[1]Each figure is determined from approximately 1700 fruits examined at random.
[2]Technical, Monsanto Chemical Company, St. Louis, Mo., at the balloon-bud stage; 5 per cent powder, Ansel Laboratories Limited, Vernon, B.C., at the shuck-fall stage.
[3]An alkyl aryl sulphonate; National Aniline Division, Allied Chemical and Dye Corporation, New York, N.Y.

TABLE IV.—Malformed Fruit at Thinning Time and at Harvest after Spraying Peach Trees with a Mixture of DDT, Stove Oil, and Velsicol AR-50 at about 90 per cent Petal-fall and again at about 90 per cent Shuck-fall, 1948.

Material	Approximate Amount per Acre		Fruit Malformed, %[1]	
	Petal-fall	Shuck-fall	Thinning Time	Harvest
DDT, technical[2] Stove oil Velsicol AR-50 Duponol WA flakes	9.0 lb. 1.5 gal. 1.5 gal. 3.0 oz.	6.0 lb. 1.0 gal. 1.0 gal. 3.0 oz.	2.5	2.8
Check	No treatment	No treatment	27.4	14.3

[1]Each figure is determined from approximately 3300 fruits examined at random.
[2]Pennsylvania Salt Manufacturing Company, Tacoma, Wash.

A petal-fall spray of DDT gave slightly better control of *Lygus* bugs than a balloon-bud spray (Table VI). The percentage differences in malformed fruit from sprayed and unsprayed trees were not great, suggesting that control was not particularly good. However, this was probably not so, for the initial population of *Lygus* bugs was much greater in the sprayed blocks, where there was an abundance of alfalfa, the preferred host of *Lygus* bugs, than in the check block, where there was virtually no alfalfa.

TABLE V.—Malformed Fruit at Thinning Time and at Harvest after Spraying Peach Trees with a Mixture of DDT, Stove Oil, and Velsicol AR-50 at about 90 per cent Petal-fall and again at about 90 per cent Shuck-fall, or at about 90 per cent Petal-fall only, 1948.

Block	Material	Approximate Amount per Acre		Fruit Malformed, %[1]	
		Petal-fall	Shuck-fall	Thinning Time	Harvest
1	DDT, technical[2] Stove oil Velsicol AR-50 Duponol WA flakes	4.9 lb. 7.3 pints 7.3 pints 1.6 oz.	6.0 lb. 8.0 pints 8.0 pints 2.0 oz.	1.3	2.2
2	Same as Block 1	Same as Block 1	No treatment	3.2	3.1
3	Check	No treatment	No treatment	16.7	14.8

[1]Determined from approximately 2500 fruits examined at random in each block.
[2]Monsanto Chemical Company, St. Louis, Mo.

As a result of these and other experiments not reported here, a petal-fall application of DDT is recommended for the control of *Lygus* bugs in British Columbia peach orchards. The petal-fall spray of DDT was considerably more important than the shuck-fall spray, and slightly more effective than the balloon-bud spray (Tables V and VI). Chandler (1950) found that, in Illinois, a DDT spray applied when 50 per cent of the peach blooms were open gave even better control of *Lygus* bugs than a petal-fall spray. However, as Snapp (1947) has pointed out, the petal-fall application is preferable, in order to avoid poisoning insect pollinators, even though insects do not play an important role in the pollination of peaches. In British Columbia, cherry trees are often interplanted with peaches. As cherries bloom at approximately the same time as peaches, and as insects are essential for the pollination of many varieties of cherry, every precaution should be exercised to safeguard insect pollinators.

A petal-fall spray of parathion gave slightly better control of *Lygus* bugs than a DDT spray applied at the same stage (Table VII). However, work with parathion was discontinued because of its extreme toxicity to man.

TABLE VI.—Malformed Fruit at Thinning Time and at Harvest after Spraying Peach Trees with 50 per cent DDT[1] Wettable Powder at 16 lb. per acre at about 90 per cent Petal-fall, or at the Balloon-bud Stage, 1952.

Stage of Spraying	Fruit Malformed, %[2]	
	Thinning Time	Harvest
Petal-fall	2.0	1.2
Balloon-bud	4.0	1.4
No treatment	7.8	3.4

[1]General Chemical Company, New York, N.Y.
[2]Each figure is determined from approximately 1500 fruits examined at random.

TABLE VII.—Malformed Fruit at Thinning Time and at Harvest after Spraying Peach Trees at about 75 per cent Petal-fall with DDT, or Parathion, 1949.

Material	Approximate Amount per Acre	Fruit Malformed, %[1]	
		Thinning Time	Harvest
Parathion, 15% wettable powder[2]	7 lb.	3.2	2.5
DDT, 50% wettable powder[3]	15 lb.	6.1	6.7
Check	No treatment	22.0	26.0

[1]Each figure is determined from approximately 1200 fruits examined at random.
[2]Naugatuck Chemicals, Division of Dominion Rubber Company, Limited, Elmira, Ont.
[3]Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.

It was feared that the use of DDT for the control of *Lygus* bugs in British Columbia peach orchards might result in an increase of phytophagous mites. To date, there has been no evidence that this has occurred, either in experimental or in grower-sprayed orchards.

Summary

Experiments conducted in British Columbia peach orchards from 1947 to 1952 indicated that the number of peach fruits injured by *Lygus* bugs was appreciably reduced by spraying the trees with DDT. Best results were obtained with a mixture of DDT, stove oil, and Velsicol AR-50 applied at 90 per cent petal-fall and again at 90 per cent shuck-fall. A single spray at petal-fall was almost as effective, and, on the basis of cost, the second application was not justified. Injury to fruit was also reduced by spraying with a mixture of BHC, stove oil, and Velsicol AR-50 at 95 per cent petal-fall and again at 95 per cent shuck-fall. Parathion at the petal-fall stage was slightly more effective than DDT at the same stage; work with parathion was discontinued, however, because of its extreme toxicity to man.

References

Chandler, S. C. Peach insects of Illinois and their control. Illinois Nat. Hist. Surv. Circ. 43. 1950.

Snapp, O. I. Experiments in 1946 on the control of bugs that cause deformed peaches. J. Econ. Ent. 40:135-136. 1947.

Mallis, Arnold. 1954. *Handbook of Pest Control* (2nd Ed.) **MacNair-Dorland Co., New York. Illus., pp. 1068**

This is a valuable reference book, handsome, well-bound and printed on good paper. Frankly aimed at pest control operators, it will nonetheless prove useful to anyone likely to be consulted about household or industrial pests. Its worth is attested by the fact that it is in a second edition after nine years.

Obviously it is not possible to pass judgment on the hundreds of control methods culled from papers, so that discussion must centre on the arrangement and presentation. Here the book is open to criticism. More condensation, and judicious pruning of long quotations would help to avoid redundancies such as this: of poisoned rats, Mallis quotes: "Of course, the odor can be quickly abated if the dead animal is found and removed" (p. 94).

A useful addition, whether or not the reader were familiar with insects, would be master keys after the style of Metcalf and Flint, so that a completely unfamiliar pest could be tracked down quickly. The breakdown might be according to habitat, food, size, shape or Order. Already there are several very good, short keys in the text, giving distinctions within groups. The arrangement of sub-heads within chapters is not uniform, but an adequate index partly compensates for this lack. Each chapter ends with a good bibliography. The style is breezy and even colloquial.—*H. R. MacCarthy.*