

RECENT EXPERIMENTAL WORK ON THE CONTROL OF THE APPLE SAWFLY, HOPLOCAMPA TESTUDINEA (Hymenoptera: Tenthredinidae)¹

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In a previous article on the apple sawfly published in the Proceedings of this society (Downes and Andison 1942) reference was made to a preliminary trial of summer oil combined with nicotine sulphate for control of this insect. The results obtained in 1941 were encouraging and it was decided to give this method as thorough a test the following season as local conditions would permit.

The chief difficulty in carrying out experimental trials was the fact that the area infested by the sawfly was almost entirely composed of city and suburban lots and not commercial orchards. The apple sawfly shows strong preferences for certain varieties, the chief of which, among those which have been observed in our work at Victoria, in order of choice are Hyslop crab, Wealthy, Duchess, Gravenstein and King. In the presence of favoured hosts less attractive varieties may be almost entirely neglected by the sawflies and, as few backyard gardens contain more than one or two apple trees of the same variety, it was difficult to find a series of trees of any preferred variety for a critical test.

In 1942 three small suburban orchards were selected for spray trials. Two of these were adjoining properties and the third was close by, so for practical purposes they could be regarded as one. Spraying was carried out immediately after the bloom had dropped. The following formula was used:

- Summer oil emulsion..... 2 gallons
(Union Mineral Seal, Visc. 55, S.S.U.
100° F. U.R. 80%)
- Nicotine sulphate 1½ pint
- Water 100 gallons
- Lead arsenate 4½ pounds
(Oil concentration 1.21% actual oil)
- Powdered skim milk as emulsifier.

Lead arsenate has little effect, if any, on the apple sawfly, but was included in the spray for the purpose of controlling

various kinds of caterpillars. Several trees were left unsprayed as checks.

The trees were examined for results about one month after spraying when the apples were about one inch in diameter. At that stage the larvae are beginning to leave the fruit and the exit holes, which are quite large, are readily seen. In its early stages a sawfly larva frequently damages several apples in a cluster before finally entering one in which it completes its growth. Fruit scarred by external feeding is included in the injured fruits. Only susceptible varieties are included in the tabulation.

TABLE I
Results of Spraying Experiment in 1942

Variety	Sprayed Trees	
	Total Apples	Per Cent Injury
Gravenstein	2421	3.3
Gravenstein	2106	7.8
Wealthy	1274	1.6
Wealthy	1262	2.6
King	865	6.0
King	400	2.2
Jano	262	11.4
Red Astrakhan	471	1.3
Red Astrakhan	149	9.4
Average Injury		5.06
	Check Trees	
Duchess	2172	39.1
Wealthy	3165	58.7
Hyslop crab	5378	70.0
Hyslop crab	2002	22.4
Average Injury		47.5

In 1943 it was decided to increase slightly the concentration of both oil and nicotine sulphate to determine whether a higher and more uniform degree of control could be obtained than in the previous year's test. In addition to Union Mineral Seal Oil two other types of low viscosity oils were used—Imperial "Mentor 29" (Vis. 45 to 55 S.S.U. 100° F., U.R. 90%) and Shell "Helix" (Vis. 62 S.S.U. 100° F., U.R. 77%). For the trial a block of 34 trees was selected situated on adjoining lots which in former days had been part of a commercial orchard. It consisted of 8 King, 6 Duchess, 8 Alexander, 2 Gravenstein, 1 Cox's Orange, 2 Wealthy,

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1 Winter Banana and 6 unidentified trees. Alexander and five of the unidentified trees proved to be non-susceptible varieties or only slightly so. Several trees did not bear fruit. Oil emulsion was increased to 2½ gallons (1.50% actual oil) and nicotine sulphate to 1½ pint per 100 gallons. Arsenate of lead 4½ pounds per 100 gallons was added as before. The time of application was immediately after blossom fall. Non-susceptible varieties and trees which produced too small a crop are not included in Table II.

TABLE II
Results of Spraying Experiment in 1943

Variety	Sprayed Trees	
	Total Apples	Per Cent Injury
2 Gravenstein	1269	0.17
4 Duchess	3420	0.43
6 King	1318	0.41
1 Wealthy	524	1.15
2 Unidentified	1112	0.90
Average Injury		0.61
	Check Trees	
1 Duchess	1358	35.03
2 King	1537	41.48
1 Wealthy	704	72.57
Average Injury		49.69

TRIAL OF QUASSIA-SOAP SPRAY.—In Europe the most common method for controlling apple sawfly and plum sawfly is to use a quassia spray with or without soap. An attempt made at Victoria in 1942 failed owing to the solution being made too weak. In 1943 a formula mentioned by Thiem (1937) which was used successfully against the plum sawfly, was tried with good results against the apple sawfly on a few trees in a city garden. The quassia solution is prepared as follows: Soak 3 pound of quassia chips in 3 gallons of water for 24 hours and boil for 1 hour; then add ¼ pound of soap and dilute to 10 gallons. The spray was applied on May 18 to seven trees of different varieties consisting of one each of Yellow Transparent, Gravenstein, King, Greening and three unidentified varieties. Examined one month later, the most susceptible variety,

Gravenstein, showed 2.69 per cent sawfly attack; the remainder were not attacked or only slightly.

The degree of control obtained with quassia-soap compares favourably with that obtained with oil-nicotine sulphate and the slightly lower percentage of clean fruit obtained (97 per cent compared with 99 per cent) is probably not significant. One disadvantage of the quassia spray is that it is more troublesome to prepare than an oil-nicotine spray. It is also twice as expensive. The comparative costs of the two sprays per 100 gallons for materials at 1942 prices are: oil-nicotine \$2.66, quassia-soap \$5.78.

CONCLUSION.—The results of experimental work conducted by the Victoria laboratory have shown that a spray of summer oil emulsion combined with nicotine sulphate gives very satisfactory control of the apple sawfly. The best results were obtained with light petroleum oil 55 to 65 S.S.U. viscosity emulsified with powdered skim milk at the rate of 2½ gallons of emulsion to 100 gallons of water (1.50% actual oil) and 1½ pint nicotine sulphate. No apparent difference in results could be observed among the three different brands of light petroleum oil used. On sprayed trees rather more than 99 per cent of all apples set were free from sawfly attack, whereas unsprayed trees showed more than 49 per cent loss and in one case 72 per cent. Only one spray is necessary; this should be applied within a week after petal fall. High pressure is not required in order to get results with this spray; in our trials a bucket pump was used and good results are being obtained by residents with pint-size hand pumps. The principal requirement is to see that the nozzle is held close to the calyces and that none are missed. The addition of lead arsenate makes an excellent combination spray which will rid the trees of caterpillars and other biting insects.

LITERATURE CITED

- Downes, W. and H. Andison. 1942. The Apple sawfly *Hoplocampa testudinea* Klug. on Vancouver Island, British Columbia. *Proc. Ent. Soc. British Columbia* 39: 13-16.
- Thiem, H. 1937. The successful control of plum sawflies with quassia (trans. title) *Kranke Pflanze* 14 (4): 59-65. (Abstract in *Rev. App. Ent. (A)* 25 (8): 465. 1937).