

**THE PEAR PSYLLA IN BRITISH COLUMBIA \***

JAMES MARSHALL

Dominion Entomological Laboratory, Summerland, B.C.

and

H. F. OLDS

Dominion Plant Inspection Office, Vancouver, B.C.

**DISCOVERY OF INFESTATIONS.** — The first British Columbia record of the pear psylla *Psylla pyricola* Foerst., was that of Treherne<sup>1</sup> who reported it from Nelson in 1918. Despite extensive scouting and trapping, however, the insect has not been taken in the Kootenay Valley since that time. Possibly this early record was a case of misidentification.

In 1939 discovery of the pear psylla in the Spokane Valley of Washington raised fears for the pear industries of the western states. Shortly after, operations were incepted by the United States Bureau of Entomology and Plant Quarantine with the object of eradicating the infestation. Concurrently, extensive scouting operations were undertaken which, with the sanction and assistance of the Dominion and Provincial Departments of Agriculture, soon carried into the fruit-growing districts of British Columbia.

Within a few years the pear psylla was found in localities far from the Spokane Valley and in 1942 captures were made in an orchard near Oliver in the Okanagan Valley of British Columbia. Re-checking indicated that in all likelihood the insect was generally distributed from Vaseaux Lake to the International Boundary in the Okanagan Valley and in the Keremeos-Cawston district of the Similkameen Valley twenty miles to the west. At that time the area known to be infested included some 500 acres of pear orchard containing approximately 50,000 trees. In order to protect their eradication operations in the neighboring state of Washington, the United States authorities under-

took to bring spray equipment across the border, and the spring of 1943 thus saw a considerable number of United States Government spray crews operating in Canadian orchards.

By the fall of 1943 it was evident that three applications of nicotine sulphate—soap or nicotine sulphate—summer oil-soap had given excellent control of the psylla, but, as was anticipated, had not eradicated it. The same year, captures were made as far north as Penticton, so control operations were extended. Once again, however, the spray treatments served merely to reduce psylla populations with the result that in the fall of 1944, in addition to new records from Summerland, recurring infestations were detected in the sprayed areas. These new records, augmented later by others near Peachland and Westbank, brought about such further extension of control activities that in 1945 a fleet of United States power sprayers was operating up to the Westbank district some 75 miles north of the International Boundary. By this time, extensive scouting had included virtually all pear orchards in the Province and at the end of the season had provided evidence of the existence of the pear psylla north to Vernon, east to Midway, and west to Hedley. For practical purposes, therefore, the insect may now be considered generally distributed wherever pears are grown over an area of about 4,500 square miles in the province of British Columbia.

The methods of spread of the pear psylla are not entirely clear. Doubtless its dispersal is aided by air currents since it is a small insect given to flight when adult. It is not uncommonly observed on the clothing of individuals who have passed through infested orchards, so that the

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<sup>1</sup> Treherne, R. C. (1918). Annual Report to the Dominion Entomologist (typewritten) Page 2.

great amount of travel between pear orchards incident to their inspection may possibly have accelerated spread of the insect. Unquestionably, however, if the pear psylla is capable of persisting in British Columbia it will merely be a matter of time until it is present in all pear orchards regardless of scouting or inspection operations.

**EXPERIMENTS IN CHEMICAL CONTROL**<sup>2</sup>.—Upon discovery of the first widespread infestation at Oliver, it seemed obvious that with known control measures, eradication of the insect in British Columbia was out of the question. This view was expressed at the outset by W. A. Ross, Chief of the Fruit Insects Unit, Dominion Division of Entomology, who has had long acquaintance with the habits of the pear psylla and whose investigations on its control had led to utilization of heavy dormant oil as standard control practice in Ontario. (The effectiveness of this procedure depends primarily on the fact that heavy oil inhibits oviposition.) Three considerations justified the conclusion that the pear psylla probably would not prove a serious menace to the British Columbia orchardist; first, even in Ontario where environmental conditions are generally favourable for its multiplication, control of pear psylla is not difficult if spraying is timely and thorough; second, there were grounds for hoping that since the psylla thrives best in conditions of poor air drainage and fairly high humidity, it might not prove to be generally prolific under the arid or semi-arid conditions of the British Columbia interior fruit belt. In the third place, although no investigations on control had been carried out in Western North America, there was little doubt that in addition to the known effectiveness of heavy dormant oil, which incidentally is also highly effective against San Jose scale, a summer spray schedule could be developed for simultaneous control of pear psylla and codling moth.

<sup>2</sup> Investigation of control methods was done jointly with Messrs. Ben Hoy and R. P. Murray of the British Columbia Department of Agriculture.

In 1942 an orchard near Oliver, considered at that time to be the most heavily infested in the West, was selected for experiments in chemical control of pear psylla under arid conditions. As the Oliver district, with an average annual precipitation of only nine inches, frequently experiences temperatures in excess of 100° F., the check plot that did not receive any pear psylla spray treatment was of particular interest. Results of the work were: (1) Nicotine sulphate 40% 1 pint—summer oil (79 S.S.U. Vis. 100° F., 73% U.R.) 1 gal.—soap (laundry type) 1 lb., gave effective control. (2) Nicotine alkaloid 40% 1 pint—summer oil 1 gal.—VAT-SOL K (dioctyl sodium sulphosuccinate 33%) 1 lb., appeared approximately as effective as the nicotine sulphate mixture. (3) Derris concentrate (VISKO D-40 containing rotenone 1%, petroleum 43 S.S.U. Vis. 92% U.R., 33% pine oil, concentration unknown and a mutual solvent, composition and quantity unknown) 1 pint—summer oil 1 gal.—VATSOL K 1 lb., was comparable in toxicity to the nicotine-oil mixtures but less offensive to handle and lower in cost. (4) Pear psylla infestation on unsprayed check trees decreased markedly following a week with maximum temperatures ranging from 95° to 105° F. (5) Unsprayed trees did not show any measurable loss of crop, although some foliage injury was evident.

The investigation was continued in the same orchard in 1943. With the object of developing a grower's spray schedule, only two treatments were applied, each to an area of about two acres. By the end of the season few psyllids were present even on the check trees that neither in 1942 nor in 1943 had received a psylla spray. Evidently by substituting nicotine sulphate-summer oil for the regular first and second codling moth cover sprays of lead arsenate or cryolite, or by adding derris-oil mixture to lead arsenate or cryolite, control of pear psylla could, if necessary, be accomplished at no great extra cost and without additional labour. With this information on hand, investigation of summer control of pear psylla was discontinued

until the advent of DDT, when psylla was included in the list of test insects for that compound. Experiments in Kaleden in 1945 indicated fairly clearly that in stove oil solution DDT, per unit weight of toxicant, is less effective against pear psylla than nicotine sulphate applied with summer oil and soap.

In order to utilize the Ontario recommendation of dormant oil, investigations on the effects of various petroleum fractions on orchard trees were begun in 1942. Since the time when dormant oil first became generally used in British Columbia, it had been felt that light oil of 100-110 S.S.U. viscosity at 100° F. was less likely to cause tree injury than a heavier oil of, for example, 200-220 S.S.U. viscosity as used in Ontario against pear psylla. There appears to have been little experimental evidence to support such a view. On the contrary, four years' experiments have indicated that under British Columbia conditions the heavy "psylla" oil is less likely to cause injury to pear or apple trees than its lighter counterpart.

WHAT OF THE FUTURE?—There is every indication the pear psylla is in British Columbia to stay. It is very unlikely

that high temperature with low humidity will prove sufficient to eradicate it, since in many irrigated orchards there are pot-holes or close plantings with poor air drainage and consequently fairly high humidity. Furthermore, it is improbable that growers will take special steps to control it unless so forced by its activities. That would not be efficient orcharding; nor would it be human nature. Rather, from the standpoint of difficulty of control, the pear psylla in all likelihood will be classed with the aphids and treated accordingly. Should the insect flourish in this Province, adequate commercial control may be attained by addition of derris concentrate, for example, to one or two codling moth sprays. This would require a total outlay of five to ten dollars per acre of pear trees but no extra labour. If control of scale insects becomes necessary, simultaneous control of psylla can be effected by applying a heavy dormant oil scale spray somewhat earlier than usual. In that case there would be neither extra outlay nor extra labour. The pear psylla is certainly an unwelcome immigrant, but British Columbia fruit growers will doubtless learn to live with it at no great financial loss or inconvenience.

## FEEDING PERIODS PREREQUISITE TO THE MATING OF *DERMACENTOR ANDERSONI* (Acarina)<sup>1</sup>

J. D. GREGSON

Livestock Insect Laboratory, Kamloops, B.C.

In a previous paper (Gregson<sup>2</sup>) the author mentioned that the feeding rates of female *D. andersoni* Stiles were substantially increased by the presence of male ticks. The experiments described in the present article were planned to demonstrate whether or not copulation is necessary to promote this stimulated feeding, and, since this species of tick only mates while feed-

ing, to determine if any initial engorging period is necessary before this act will take place.

### EXPERIMENT A

On April 4, 1945, five capsules, each containing about half a dozen male and female *D. andersoni* were attached to a sheep in the manner described by the author<sup>3</sup>. The males were moved successively from these capsules as indicated in the following table. Another capsule containing females only, served as the control.

<sup>1</sup> Contribution No. 2409, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada.

<sup>2</sup> Gregson, J. D., 1944. The influence of fertility on the feeding rate of the female of the wood tick, *Dermacentor andersoni* Stiles. Ent. Soc. Ont., 74th Ann. Rept. (1943). 74:46-47; figs. 1-4.

<sup>3</sup> Gregson, J. D., 1942. Notes on the laboratory rearing of some Canadian ticks (Acarina). Ent. Soc. Brit. Columbia, Proc. 39:32-35.