

ENDEMIC ALEYRODIDAE (HOMOPTERA) AND THEIR PARASITES (HYMENOPTERA) ON SOUTHERN VANCOUVER ISLAND, BRITISH COLUMBIA

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ABSTRACT

Four species of whitefly (*Trialeurodes vaporariorum* (Westwood), *T. merlini* (Bemis), *Aleyrodes spiraeoides* Quaint., and *Aleyrodes* sp. A) were collected on native plants on southern Vancouver Island. Three species of parasite (*Encarsia* sp. (?*formosa* Gah.), *Euderomophale* sp. and *Amitus arcturus* Whitt.) were reared from these species. The possibility of using these parasites for biological control of *T. vaporariorum* in greenhouses is briefly discussed.

INTRODUCTION

Biological control of the greenhouse whitefly, *Trialeurodes vaporariorum* (Westwood) (Homoptera: Aleyrodidae) by *Encarsia formosa* (Hymenoptera: Aphelinidae) is routinely used by many greenhouse tomato growers in different parts of the world. The use of this control practice is threatened by the introduction of cold-hardy tomato varieties (Vet, van Lenteren and Woets 1980). These varieties should produce marketable crops at 18°C day and 7°C night temperatures (van Lenteren and Van der Schaal 1981) and provide considerable savings of energy costs to growers. As *E. formosa* does not control *T. vaporariorum* below 18°C (Burnett 1949), growers may have to return to a heavy reliance on traditional control measures.

A solution to the problem may be the use of alternative parasites of *T. vaporariorum* which have more moderate temperature requirements (van Lenteren and van der Schaal 1981). A source of such parasites is populations of aleyrodid species endemic from northern latitudes. This paper presents the results of a survey of whitefly species and their parasites on selected host plants in the southern Vancouver Island region of British Columbia, Canada.

MATERIALS AND METHODS

Species of whitefly and their parasites were collected from *Arbutus menziesii* Pursh. (arbutus), *Lonicera hispidula* (Lindl.) Dougl. (purple honeysuckle), *Rubus ursinus* Cham. & Schl. (trailing blackberry), *Rubus spectabilis* Pursh. (salmonberry) and various cultivated varieties of *Fragaria* sp. (strawberry) at selected sites on the Saanich Peninsula, B.C. at bi-weekly intervals from 6 May to 12 Sept., 1983. Sites and host plants were selected on the basis of preliminary surveys that determined on which host plants and at which locations whitefly immatures could be found relatively

easily. Except for the strawberry site which was a small test plot located at the Saanichton Research and Plant Quarantine Station, the sites were occupied mostly by natural vegetation.

Twenty-five leaves of each host were collected and leaves bearing whitefly puparia or parasitized scale were held for emergence in plastic 1 L containers covered with fine screen. Moist paper towelling was placed in the bottom as a humidity source. Whitefly and parasite emergence was recorded daily. Estimates of percent parasitism were obtained by counting puparia from which either hosts or parasites had emerged in the field, on dates when emergence of the generation of whitefly had been completed. All sites were examined for overwintering stages of whitefly in the winters of 1982/83 and 1983/84.

RESULTS

Whitefly species

Four species of whitefly were collected on the five plant hosts. *Trialeurodes vaporariorum* was found on *A. menziesii* (arbutus), *L. hispidula* (purple honeysuckle) and *R. ursinus* (salmonberry). Puparia were present from 6 May to 20 June and adults began emerging on 10 May. Nymphs and puparia occurred on the foliage from the previous year. Adults were observed on new foliage of all three hosts from 10 May to 18 Aug., but no eggs were found and no subsequent generations occurred. Eggs of *T. vaporariorum* were found on leaves of trailing blackberry and purple honeysuckle in December and January of 1982-83, suggesting either that *T. vaporariorum* adults have an aestivation period on these hosts, or that they use alternative hosts during the summer months. No stages of *T. vaporariorum* were found in extensive searches of other plants in the vicinity of the collection sites. On arbutus, puparial densities ranged from 0.70 to 3.18 puparia per leaf; on purple

honeysuckle, from 0.04 to 1.31; and on *R. ursinus* (trailing blackberry) from 0.10 to 8.50 puparia per leaf.

Trialeurodes merlini (Bemis) was rare on arbutus. Twenty-three puparia were collected on May 13 and these emerged from 18-20 May. Otherwise, *T. merlini* was not collected.

Aleyrodes spiraeoides Quaint. was collected from strawberry and was also observed on a number of hosts: potato, iris, rose and a weed, *Lactuca muralis*. Adults were observed continuously on strawberry from Dec. 1982 to Dec. 1983. Eggs were present from 10 May to 15 Aug., and puparia from 20 June to 12 Sept. Adults overwintered on lower leaves of strawberry as well as on those of native broad-leaved evergreens, e.g. arbutus and *Gaultheria shallon* Pursh (salal). On strawberry, puparial densities ranged from 0.04 to 1.24 puparia per trifoliate leaf.

An apparently undescribed species of *Aleyrodes* (*Aleyrodes* sp. A) was collected from *R. spectabilis* (salmonberry) and was also observed on *Osmaronia cerasiformis* (T. & G.) Greene (Indian plum). Adults were present throughout the year. Eggs were present from 6 May to 29 Aug. and puparia from 20 June to 12 Sept. Adults overwintered on lower leaves of arbutus and salal. Densities of puparia on salmonberry ranged from 1.01 to 17.20 puparia per leaf. Puparia of *Aleyrodes* sp. A and *A. spiraeoides* are indistinguishable (J. Martin¹ pers comm.). Adults of the former species are light cream-colored throughout, whereas adults of the latter species are black on the head and abdomen. Also, *Aleyrodes* sp. A would not accept strawberry as a host and adults of *A. spiraeoides* did not accept either salmonberry or indian plum.

Parasite species

Three species of parasite were reared from outdoor collections of whitefly puparia: *Encarsia* sp. (?*formosa* Gah.), (Hymenoptera: Aphelinidae), *Euderomophale* sp. (Hymenoptera: Eulophidae) and *Amitus arcturus* Whitt. (Hymenoptera: Platygasteridae).

Overall, *Encarsia* sp. was the most abundant species (57% of total), *A. arcturus* was next (36% of

total) and *Euderomophale* sp. was least abundant (7% of total). On *T. vaporariorum*, *A. arcturus* was the most abundant parasite (50% of total), *Encarsia* sp. was next (40% of total) and *Euderomophale* sp. was the least abundant (10% of total). *Euderomophale* sp. was not represented in collections of *Aleyrodes* sp. A although adults were observed on Indian plum leaves bearing scale of *Aleyrodes* sp. A.

Percent parasitism of *T. vaporariorum* ranged from 6% to 29% on arbutus and from 14% to 20% on trailing blackberry. Percent parasitism of *A. spiraeoides* on strawberry was 52% and that of *Aleyrodes* sp. A. on salmonberry ranged from 18% to 50%.

Encarsia sp. was the only parasite reared from *A. spiraeoides*. On *Aleyrodes* sp. A, *Encarsia* sp. was the most abundant parasite (97% of total) and *A. arcturus* made up the remainder.

DISCUSSION

As all three parasite species were reared from *T. vaporariorum* collected outdoors in the late spring, when ambient temperatures ranged around 10°C., it may be assumed that they have some degree of cold-tolerance. Mound and Halsey (1978) record six species each of *Amitus* and *Euderomophale* as parasitic on Aleyrodidae in various parts of the world, but none parasitic on *T. vaporariorum*. Dowell (1979) credited *A. hesperidum* Silvestri with contributing to decline of populations of the whitefly, *Aleurocanthus woglumi* Ashby, in southern Florida. Further study will be required to determine which of the parasite species would be useful in green houses for control of *T. vaporariorum*. *Encarsia* sp. would be the most desirable candidate because present rearing, handling, storage and shipping techniques could be used with little modification.

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