

This study also confirmed that quantitative data on population trends were not greatly improved by taking the additional random samples included in the normal sampling program.

In any case, serious problems will still be detected by means of annual aerial observa-

tion surveys. In these, aerial observers locate and map tree damage from the air, but do not land. These missions, which are in addition to the previously discussed sampling surveys, provide an opportunity to observe and record problems and to schedule detailed ground surveys where needed.

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## **BRACHYCOLUS ASPARAGI MORDVILKO, A NEW APHID PEST DAMAGING ASPARAGUS IN BRITISH COLUMBIA**

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#### ABSTRACT

The aphid *Brachycolus asparagi* Mordvilko was identified from asparagus at Summerland, B.C. in 1979. In 1980 and 1981, this aphid damaged asparagus throughout the asparagus-growing areas of the Okanagan as far north as Armstrong. Feeding by the aphid causes a severe rosetting of the ferns and weakens the plant.

In September 1979, Dr. R. D. McMullen of the Summerland Research Station sent me a vial of aphids collected from asparagus at Summerland, B.C. He stated that a witches'-broom type of growth was very common on asparagus and was closely associated with the occurrence of the aphid. I identified the aphids as *Brachycolus asparagi* Mordvilko. This was the first time this aphid had been identified from asparagus in Canada. Subsequent examination of alate aphids caught in Moericke yellow pan water traps maintained at Penticton and Summerland in 1975 and 1976 revealed that *B. asparagi* had been trapped as follows: 1 from Penticton in 1975, 2 from Penticton in 1976 and 5 from Summerland in 1976. The aphid was therefore present at both Penticton and Summerland for several years before its presence on asparagus became apparent. In 1980 and 1981 *B. asparagi* was present in damaging numbers throughout the asparagus-growing areas of the Okanagan as far north as Armstrong.

*B. asparagi* is native to Europe and the Mediterranean region (Plant Pest Control Division, U.S.D.A., 1970) and was first found in

North America in New York in 1969 (Leonard, 1971). It was later found in New Jersey, Pennsylvania, Virginia, Delaware, Maryland, Massachusetts and North Carolina (Angalet and Stevens, 1977). The asparagus aphid was first observed throughout most of the asparagus-growing areas of the state of Washington on the west coast during the fall of 1979 (W. W. Cone, personal communication).

*B. asparagi* (Fig. 1) is a long, narrow, green aphid, covered with a grey mealy wax. Its antennae are very short and its cauda is moderately long and almost parallel-sided. Its cornicles are small and mammiform. This aphid can be easily separated from other aphids occurring on asparagus by its color, waxy covering, body shape and small cornicles.

*B. asparagi* is reported to be specific to asparagus. We reared it on common garden asparagus (*Asparagus officinalis*) and on ornamental Sprenger asparagus (*A. densiflorus* 'Sprengerii'). It would not colonize such hosts as celery, Chinese cabbage, potato, or broad-bean which we placed in cages with our laboratory colonies.

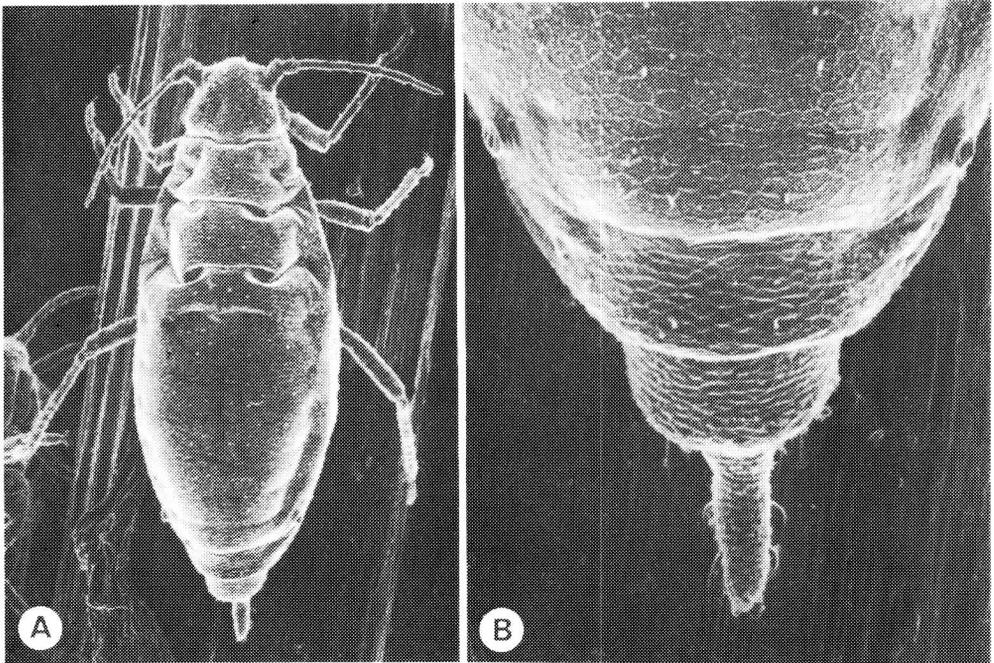


Fig. 1. Scanning electron micrographs of *Brachycolus asparagi* Mordvilko. A. Adult apterous aphid. B. Tip of abdomen showing cornicles and cauda.

The feeding of this aphid causes growth abnormalities in the asparagus (Fig. 2). The ferns grow into what have been described as witches'-brooms but close examination shows that the bushy appearance is the result of rosetting in which the internodes are severely shortened and the cladophylls (modified leaves) are short and turn a characteristic blue-green color. Only the branches of the ferns actually fed upon by the aphids are affected. The aphids' feeding and resulting abnormal growth weakens the plant and the crowns produce numerous small spears. Morse (1916) has suggested that damage to the top of an asparagus plant interferes with synthesis of sugar and translocation to the roots. Data of Capinera (1974) in Massachusetts indicate that a single aphid and its progeny can severely affect the growth of asparagus seedlings both in the field and in the greenhouse.

We conducted several tests to determine the nature of the rosetting of asparagus ferns. All experiments were done with *A. officinalis*, variety Mary Washington or Viking. The *B. asparagi* were from a laboratory colony started in 1980 with aphids from Summerland, B.C. Cladophylls and stem sections were cut from rosetted areas of ferns and leaf exudates both with and without glutaraldehyde in 2% phosphotungstic acid were examined

in the transmission electron microscope. No virus particles were found. Similar tissues were embedded by standard techniques, sectioned, stained, and examined in the TEM. No virus particles or other pathogens were found.

Rosetted asparagus plants on which laboratory colonies had been reared were fumigated in a methyl bromide chamber and then returned to the greenhouse to resume growth. All growth made after the aphids were removed was normal. Furthermore, in our laboratory colonies on any given plant only the ferns that were colonized by *B. asparagi* became rosetted; those not colonized grew normally.

Mature apterous females were confined in a petri plate and their newly born nymphs were taken and used to colonize 6 asparagus seedlings. All 6 seedlings developed severe rosetting. Barring the very remote possibility of a transovarially-transmitted virus, these nymphs were virus-free so the abnormal growth of the asparagus seedlings cannot be attributed to virus infection.

Green peach aphids, *Myzus persicae* (Sulzer), and potato aphids, *Macrosiphum euphorbiae* (Thomas), were also reared on asparagus seedlings. These aphids did not produce growth abnormalities in their hosts.

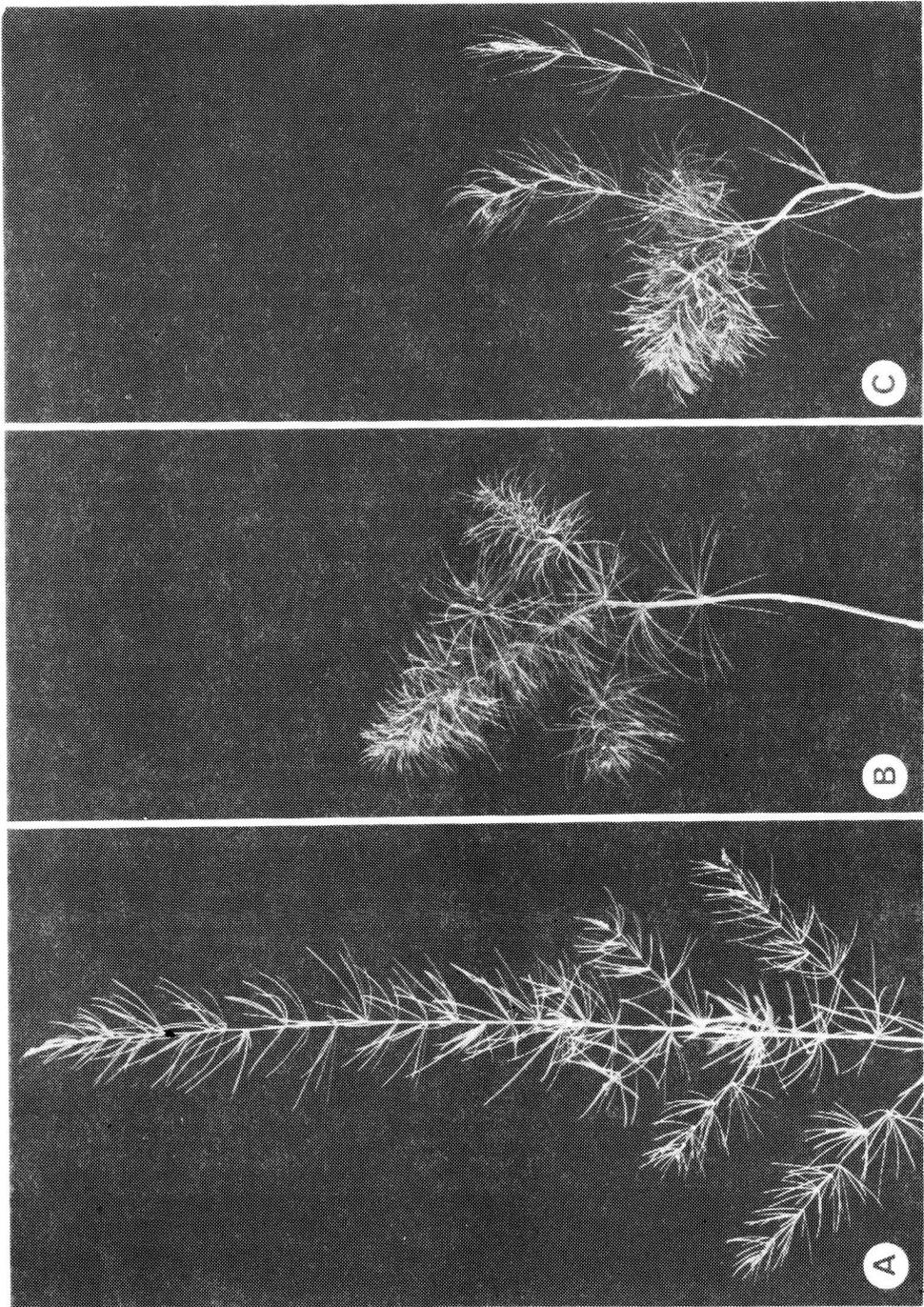


Fig. 2. Asparagus ferns. A. Normal growth. B. Rosetted growth, the result of aphid feeding. C. One branch colonized by aphids showing rosette symptoms (left) and 2 branches not colonized by aphids and growing normally (right).

The results of the experiments show that the rosetting of the asparagus fed upon by *B. asparagi* is a result of the feeding of this aphid and not because of infection by a patho-

gen. We assume that the feeding aphids inject some substance into the plant that induces the plant to grow abnormally.

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