SUMMARY

Title: A survey of aphids and their natural enemies on economic and other plants

Research Institution: Department of Zoology, Faculty of Science, University of Peradeniya.

Period of contract: December 1992 - 1995

Scientific background and scope of project:

Aphids (Hemiptera:Aphididae) live and feed exclusively on plants. They also act as vectors that transmit viral diseases in plants. Thus, aphids are of considerable economic importance.

Previous published work on aphids of Sri Lanka dates back to Westwood (1890), Schouteden (1905), van der Goot (1918), Judenko and Eastop (1963), Caver (1965), Edirisinghe (1994), Wijerathna and Edirisinghe (1995), where 72 species have been recorded. No host records of the aphids were made in the early publications. Reference to aphids that are viral vectors has been made only in a few studies and hardly any work has been done on natural enemies of aphids.

The main objectives and the scope of this study was to identify our aphid fauna and the plants they infest, together with their natural enemies, and construct a Key for the identification of the collected aphids.

Experimental Methods:

The study was carried out in 26 areas spread over 6 agroclimatic regions of the country. In each area, at several sites the natural vegetation, cultivated plants and the weeds were carefully examined and aphids present were collected.

The aphid colonies were examined for predatory insects that feed on aphids and insects that parasitize aphids, forming aphid mummies. These were collected and reared in the laboratory to obtain adults for identification. Plants infested with aphids were examined for probable signs of viral infection. Herbaria specimens of aphid-infested plants were made and the aphid hosts were identified.

Results:

Over 1,000 plant species were examined for aphids during the study. Only 300 plant species in 72 families were infested with aphids. A total of 48 aphid species in 28 genera were collected and identified from these plants.

Keys were constructed for the identification of these aphids (see Annexure).

Among the collected aphids were (a) 12 species of aphids (in 9 genera) and 4 aphid genera that were not previously recorded from Sri Lanka. (b) three rare species of aphids (c) three species of aphids not present in neighboring India (d) 30 aphid species that are potential viral vectors (e) four species of host-specific aphids (f) one endemic species of aphids.

Aphid-infested plants were grouped into several categories based on their taxonomic and economic status and usage and included (1) Vegetables, pulses and cereals. (2) Weeds, both grasses and non-graminaceous (3) Fruit trees (4) Ornamental plants (5) Medicinal plants (6) Forest trees and plantation crops and (7) Endemic plants (drawn largely from forest trees and medicinal plants).

Aphid diversity was highest in vegetables from which 16 species of aphids in 7 genera were collected. These aphids were present on 45 of the 55 vegetable species examined. The natural enemies of these aphids included 3 specie of parasitoids and 12 species of predators. Of the 45 vegetables infested with aphids, 25 vegetables showed probable signs of viral infection.

The second largest collection of aphids was from non-graminaceous weeds, and the highest number of natural enemies were collected from weeds.

Majority of the collected aphids are potential viral vectors and hence of much economic significance. Furthermore, aphids that occur on food crops like rice and vegetables were found on both graminaceous and non- graminaceous weeds, growing near rice fields and vegetable plots.

A total of 25 species of natural enemies consisting of 21 species of predators (in 5 families) and 4 species of parasitoids (F. Braconidae) were collected from aphid colonies. The collected predators were largely (12 species) Coccinellid beetles. The parasitoids being more host specific were collected from 15 species of aphids. Aphids on the remaining flora and the rich Coccinellid fauna predatory on aphids are worth studying on account of their role in aphid- IPM programms.

Conclusions:

The survey covered about 1/4 of the flora of Sri Lanka of which only 300 plant species were infested with aphids. It is very likely that a survey including the rest of the flora, done by making several visits to the study sites would yield more

aphid species and host records.

Although of the 48 species of aphids recorded 30 species are potential viral vectors, viral symptoms on plants infested by such aphid species were very low. It is likely that some of the viruses transmitted by the potential vectors are not present in Sri Lanka. However, if and when such viruses occur Sri Lanka, the information of potential viral vectors with their host plants would be of importance.

The 3 rare species of aphids collected during the study shed light on our biogeography. Thus, Uroleucon minutus on the weed Vernonia cinera has been recorded only from India. Microsiphonella euphorbiae on lettuce, has not been recorded from the Indian subcontinent except from Sri Lanka. Sitobion wickstromiea on a common weed around Kandy; Wickstromia indica (introduced to Sri Lanka from Mauritius as an ornamental plant) is found only in Southern Africa and Mauritius.

The highest diversity of aphids was found on vegetables and non graminaceous weeds. It is likely that aphids are abundant on such plants due to them being herbaceous, and grown as a monoculture. In a mixed forest stand the opposite trend was observed.

More natural enemies were found on vegetables and graminaceous weeds. The Coccinellid predators in particular known to be polyphagous on aphids appear to be species that need to be encouraged. More information need to be gathered about the natural enemies.

The presence of only a few host specific aphid species and

endemic species appears to be a salient feature of our fauna.

Paper published:

Wijerathna, M.A.P. & Edirisinghe, J.P. (1993). New records of aphids from Sri Lanka. (Abstract) Proceedings of the 49 th Annual Sessions of the Sri Lanka Association for the Advancement of Science. Part 1 : 169-170.

Wijerathna, M.A.P. & Edirisinghe, J.P. (1994). Aphids on vegetables. (Abstract) Proceedings of the 50 th Annual Sessions of the Sri Lanka Association for the Advancement of Science. Part 1 : 169-170.

Wijerathna, M.A.P. & Edirisinghe, J.P. (1995). Preliminary Observations on graminaceous aphids (Homoptera:Aphididae) in the Peradeniya University Park. Cey. J. Sci. (Bio. Sci.) 24 (1) : 34-41.