

BIONOMICS AND POPULATION DYNAMICS OF LACE BUG,
DICONOCORIS DISTANTI DRAKE (HEMIPTERA : TINGIDAE)
DAMAGING BLACK PEPPER (PIPER NIGRUM L.) IN SRI LANKA

By

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Thesis

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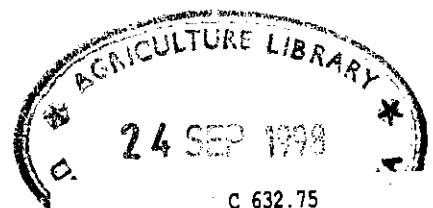
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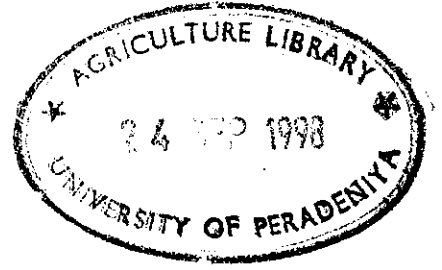
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ABSTRACT

Black pepper (*Piper nigrum* L.) is extensively cultivated in Kandy, Matale and Kegalle districts of Sri Lanka. The yield of black pepper is comparatively very low in Sri Lanka and it is 1/10 of the Malaysian average. This decline in yield is due to several factors of which insects play a vital role. Until recently only a shoot borer and thrips were documented as pests of black pepper in Sri Lanka.

A new pest was identified as *Diconocoris distanti* Drake, which is of great concern to the pepper growers. Even though existence of this insect on black pepper in Sri Lanka was recorded in 1903 this was not reported as a pest of any agricultural crop. Hence, a detailed study on its biology, seasonal distribution and extent of damage to the crop was carried out.

Laboratory rearing of adult of *D. distanti* was done at the Department of Agricultural Biology, Faculty of Agriculture of University of Peradeniya. The life cycle, fecundity, longevity and host plant resistance of this pest was studied.

Sex ratio of the *D. distanti* was 1:1. Pre-ovipositional and ovipositional periods were 24 ± 3 hours and 25 ± 1 days respectively. Fecundity was 34 ± 1 eggs per female at $28 \pm 3^\circ\text{C}$. Eggs were laid singly closer to the veins on the underside of leaves and rarely on flower spikes. Eggs were inserted into the plant tissues and operculum of the egg was covered by a brownish secretion. Mean length of the egg was 0.87mm, mean diameter at operculum was 0.141mm and at widest point was 0.291mm. Incubation

period was 13 ± 1 days at $28 \pm 3^\circ\text{C}$.

D. distanti has five nymphal instars. The morphometric characters used to determine the nymphal instars were head capsule width across the compound eyes, just below the compound eyes and the length of antennae. All three characters were indicated the presence of five nymphal instars.

The nymphal periods of first, second, third, fourth and fifth instars were 3.17 ± 0.09 , 4.13 ± 0.09 , 5.24 ± 0.14 , 5.23 ± 0.1 and 5.32 ± 0.11 days respectively. Morphology of the nymphs of *D. distanti* differed from adults. Body of the nymphs was flattened and peripheral hairs in the abdomen curved upwards. Eyes at early stage were red and later turned to dark brown. Development of the wing pads was clear at latter stages. The overall life cycle was about 48 days at $28 \pm 3^\circ\text{C}$ and $82 \pm 2\% \text{RH}$. Longevity of male insect was 25 ± 2 days whereas females lived for 48 ± 17 days.

Nymphs and adults of *D. distanti* damage by sucking sap from almost all the aerial parts of the pepper plant and the damage on the flower spike was acute. On the underside of the leaves black excretal fluid could be observed as an indication of feeding. Severe feeding led to the drying of the emerging bud and tender shoots which eventually withered-off. An association of leaf gall thrips with *D. distanti* was also observed in the pepper plants and the adults fed on the leaf galls formed by the thrips.

November 1996 to January 1997 (Maha) flowering was seriously damaged than flowering in May to July 1997 (Yala). The percentage of damage on flower spikes was equally high in Kandy, Kegalle and Matale districts. Out of the three districts, highest mean percentage of damage on spikes was recorded as 27% at Matale district.

The population of *D. distanti* fluctuated through out the year. All the life stages were found in large numbers during the period of October 1996 - February 1997 in which heavy flowering was observed which was influenced by the unusual distribution of rainfall during the year 1996/97.

Eggs, nymphs and adults of *D. distanti* were found in high numbers at the middle and bottom regions of the pepper vine whereas the highest damage on flower spike was found in the middle region. Among the varieties widely grown in Sri Lanka, Local and Panniyur-I varieties were found to be vulnerable to this pest than the variety Kuching.

