



UNIVERSITI PUTRA MALAYSIA

**LIFE HISTORY, DEVELOPMENTAL BIOLOGY AND
SEASONAL ABUNDANCE OF
IDIOSCOPUS NITIDULUS (WALKER)
(HOMOPTERA : CICADELLIDAE) .**

ABDUL RAZAK B. HJ MOHD. NORDIN

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LIFE HISTORY, DEVELOPMENTAL BIOLOGY AND
SEASONAL ABUNDANCE OF
Idioscopus nitidulus (WALKER)
(HOMOPTERA: CICADELLIDAE).

By

ABDUL RAZAK B. HJ MOHD. NORDIN

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Abstract of thesis submitted to the Senate of Universiti Pertanian Malaysia in fulfilment of the requirements for the degree of Master of Agricultural Science

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ABDUL RAZAK B. HJ. MOHD. NORDIN

May 1994

Chairman : Associate Professor Dr. Hj. Abd. Ghani Ibrahim

Faculty : Agriculture

Harumanis mango in Perlis suffered from the outbreak of leafhoppers, Idioscopus nitidulus Walk. in 1986 and 1987. The laboratory and field experiments were conducted to investigate some aspects of the biology of mango leafhoppers, I. nitidulus Walk. an important pest of mango flowers and shoots in South East Asia. The synchrony of insect population with the phenology of the plant was also studied.

The adults were found to survive on mature leaves in the absence of flowers and shoots. However, reproduction occurred during the onset of flowering and young shoot development.



The fluctuating patterns in the abundance of hoppers coincided with the availability of flower panicles and developing shoots. The number of hoppers appeared unaffected by the heights and positions of flower panicles in the tree.

The developmental period of male and female hopper on flower panicle were found to be 13.77 ± 0.25 days and 13.50 ± 0.60 days, respectively. The developmental periods of male and female hopper reared on shoot of Harumanis were 15.07 ± 0.81 days and 17.10 ± 0.77 days, respectively. The mean incubation periods on flower panicles and shoots were 3.85 ± 2.00 days and 3.76 ± 2.00 days, respectively.

The hoppers were able to survive on all mango varieties but had varying developmental periods. The shortest developmental time was found with the hoppers reared on Nam Dork Mai; 12.10 ± 0.42 days and 12.71 ± 0.75 days for male and female, respectively. There were four instars when reared on Harumanis and Nam Dork Mai, whereas five instars were found with those reared on Sala and Apple mango.

Hoppers reared on the flower panicles of Harumanis mangoes produced an average of 277.1 ± 109.6 eggs with



percentage hatchability of $90.2 \pm 8.4\%$, while those on vegetative shoots had an average of 149.5 ± 56.6 eggs and percentage hatchability of $54.8 \pm 21.8\%$.

Studies on the hopper's mating behaviour showed that single mated females produced an average of 175.9 ± 71.7 eggs whereas multiple mated produced only 149.3 ± 56.6 eggs. However, single mated female seemed to live longer (67.1 ± 26.3 days) than multiple mated female (59.6 ± 21.8 days). Virgin female hoppers lived a little longer than male hoppers. The longevity of male and female hoppers were 60.5 ± 29.9 days and 69.8 ± 36.0 days, respectively.

Four parasitoids were observed parasitising the hopper's eggs. They were Gonatocerus sp. (Mymaridae), Mirufens sp. and Oligosita (Zorontogramma) sp. (Trichogrammatidae) and Centrodora idioceri (Aphelinidae). Only one predator, Campyloma lividicornis (Miridae), was found feeding on the first nymphal instar of the hoppers.



Abstrak tesis yang dikemukakan kepada Senat
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**KITARAN HIDUP, PERKEMBANGAN BIOLOGI DAN
LIMPAHAN BERMUSIM IDIOSCOPUS NITIDULUS (WALKER)
(HOMOPTERA : CICADELLIDAE)**

Oleh

ABDUL RAZAK B. HJ. MOHD. NORDIN

Mei 1994

Pengerusi : Profesor Madya Dr. Hj. Abdul Ghani
Ibrahim

Fakulti : Pertanian

Tanaman mempelam Harumanis di Perlis mengalami letusan perosak lelompat daun, Idioscopus nitidulus Walk. dalam tahun 1986 dan 1987. Kajian di ladang dan makmal telah dijalankan untuk mengetahui aspek-aspek biologi lelompat daun mempelam, I. nitidulus Walk. perosak penting bunga dan daun mempelam di Asia Tenggara. Kajian ke atas penyelarasan populasi serangga dengan fenologi pokok juga dilakukan.

Dewasanya didapati hidup pada daun-daun matang bila ketiadaan bunga dan pucuk. Walau bagaimanapun, pembiakan berlaku semasa kemunculan bunga dan semasa pembentukan pucuk muda.



Corak peningkatan dan penurunan populasi lelompat daun berlaku bersamaan dengan kepadatan tangkai-tangkai bunga dan pembentukan pucuk-pucuk muda. Ketinggian dan posisi tangkai panikel bunga pada sesuatu pokok tidak mempengaruhi bilangan lelompat daun.

Jangka masa perkembangan jantan dan betina lelompat daun pada tangkai bunga masing-masing ialah selama 13.77 ± 0.25 hari dan 13.50 ± 0.60 hari. Jangka masa perkembangan jantan dan betina yang dibiak pada pucuk Harumanis masing-masing ialah 15.07 ± 0.81 hari dan 17.10 ± 0.77 hari. Purata eraman telur adalah 3.85 ± 2.00 hari di atas tangkai bunga dan 3.76 ± 2.00 hari di atas pucuk.

Lelompat daun dapat hidup pada kesemua varieti mempelam tetapi mempunyai perbezaan jangka masa perkembangan. Jangka masa perkembangan yang paling singkat didapati pada lelompat daun jantan yang dibiak di atas varieti Nam Dork Mai; 12.10 ± 0.42 hari dan yang betina 12.71 ± 0.75 hari. Lelompat daun yang dibiak pada Harumanis dan Nam Dork Mai mengalami empat instar manakala lelompat daun yang dibiak pada mempelam Sala dan Epal mengalami lima instar.

Lelompat daun yang dibiak di atas tangkai-tangkai bunga Harumanis menghasilkan purata 277.1 ± 109.6 biji



telur dengan peratus penetasan setinggi $90.2 \pm 8.4\%$, manakala lelompat daun yang dibiak pada pucuk-pucuk muda menghasilkan purata 149.5 ± 56.6 biji telur dan peratus penetasan sebanyak $54.8 \pm 21.8\%$.

Kajian terhadap tatalaku mengawan lelompat daun menunjukkan bahawa betina yang mengawan hanya sekali menghasilkan purata 175.9 ± 71.7 biji telur manakala betina yang mengawan berulang kali menghasilkan 149.3 ± 56.6 biji telur. Walau bagaimanapun, betina yang mengawan hanya sekali hidup lebih lama (67.1 ± 26.3 hari) daripada betina yang mengawan berulang kali (59.6 ± 21.8 hari). Betina lelompat daun tanpa mengawan hidup lebih lama sedikit daripada lelompat daun jantan. Jangka hayat lelompat daun jantan dan betina masing-masing ialah 60.5 ± 29.9 hari dan 69.8 ± 26.0 hari.

Didapati empat spesies parasitoid memparasit telur lelompat daun. Parasitoid-parasitoid tersebut ialah Gonatocerus sp. (Mymaridae), Mirufens sp. dan Oligosita (Zorontogramma) sp. (Trichogrammatidae) dan Centrodora idioceri (Aphelinidae). Hanya satu sahaja pemangsa, Campyloma lividicornis (Miridae), didapati memakan nimfa instar pertama.



CHAPTER 1

INTRODUCTION

The mango (Mangifera indica L , Anacardiaceae) or locally known as 'mangga' or 'mempelam' is a commercially important fruit grown in the tropics. The Department of Agriculture (1990) registered sixty three varieties of mango found in Malaysia. However, only a few varieties are commercially viable. One of these varieties is Harumanis.

In Malaysia, Harumanis (MA 128) in particular is grown extensively in Perlis. The long dry spell of about three months is conducive for the production of mangoes. A total of 1,064 hectares of land has been planted with Harumanis (White, 1990).

There are several species of insect pests that are associated with mangoes in Malaysia (Yunus and Ho, 1980 ; Sivapragasam and Singh, 1980). These pests are normally controlled by insecticides or by mechanical means. The mango leaf-hoppers, Idioscopus sp. was reported to be the major pest of mango in South East Asia (Tandon and Varghese, 1985). They attacked the flowers and shoots and could cause yield loss of about 75% in the Philippines (Palo, 1932) and 25 - 60% in India (Wadhi, 1964).



In 1986 and 1987, there occurred serious outbreaks of this leafhopper in Perlis causing major loss in mango production (Nazri, Personal Communication). As Perlis is set to become a major producer of Harumanis mangoes with a projected acreage of 5,000 hectares by the year 2000 (IADP, 1990), these leafhoppers have become a major threat to the mango industry.

The leafhoppers become obvious in large numbers during the production of flowers and new flushes. Chemical control has so far been the most widely adopted practice by growers. As such outbreaks could develop due to indiscriminate use of insecticides to control the hoppers. Other than I. clypealis, information on mango leafhoppers particularly on I. nitidulus is scarce.

Therefore, in view of the limited knowledge on the bionomics of the mango leafhopper, a study on the biology of Idioscopus nitidulus Walk. (Homoptera : Cicadellidae) was undertaken. The study was conducted in the state of Perlis mainly on the variety Harumanis (MA 128) with the objective of

1. studying the biology of the hopper.
2. investigating the host preference of the hopper.
3. relating the population fluctuation of the hopper in in the field to plant phenology

Nazri Abas, Department of Agriculture, Perlis.



It is hoped that these studies would provide some basic information on factors affecting the hopper's populations in the field which in turn will serve as the initial step for the establishment of a good Integrated Pest Management (IPM) Programme against the mango hoppers.



CHAPTER II

LITERATURE REVIEW

Taxonomy and Distribution of Hopper

Idioscopus nitidulus Walk. (Homoptera, Cicadellidae) is usually referred to as jassid or mango hopper. Some information on the species nitidulus was obtained by Capriles (1973) who studied the male genitalia of the hopper in Java for identification of the genus.

Reddy (1975) classified I. nitidulus as the major pest disrupting the economic status of mango industry in Malaysia and Indonesia. Tan (Personal Communication, 1988) stated that the hoppers caused serious damage on mangoes in Malaysia.

Species of Idioscopus can be distinguished from each other by the shape of the head, forewing venation and aedeagus. The insect has been described as a major limiting factor to the production of mangoes in South East Asia (Tandon and Varghese, 1985).

Incidence of Idioscopus species attacking mangoes had been reported in India (Ballard, 1915), the Philippines (Wester, 1911), Taiwan (Wen and Lee, 1978), and

Tan Chai Lin, MARDI, Serdang.

