

BIOLOGY AND PARASITIDS OF LEAFMINERS, LIRIOMYZA SPECIES
(FAMILY : AGROMYZIDAE) IN BATTICALOA DISTRICT OF SRI LANKA

By

NIRANJANA VIVEKANANTHANATHAN

Thesis

Submitted in partial fulfillment of the requirements

for the degree of

MASTER OF PHILOSOPHY

in the

POSTGRADUATE INSTITUTE OF AGRICULTURE

of the

UNIVERSITY OF PERADENIYA

PERADENIYA

JUNE 2005

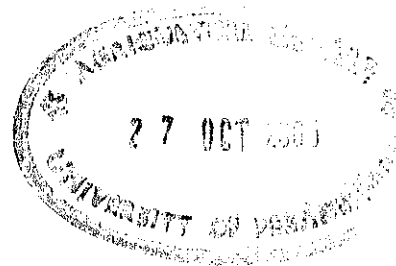
C 632.9

V38



557369

AGRICULTURE LIBRARY
UNIVERSITY OF PERADENIYA



557369 /

ABSTRACT

At present leafminers in the genus *Liriomyza* are one of the serious insect pests in Batticaloa district of Sri Lanka, which attack a numerous vegetables crops and ornamental plants. However, no studies were conducted in the Batticaloa district on *Liriomyza* species. As these insects developed resistance to several groups of insecticides, the elimination of their natural enemies by abuse and misuse of insecticides and their wide host range have made it difficult to control this insect pest.

Four hundred and fifty farmer fields were randomly selected from 17 Agricultural Instructor divisions in the Batticaloa district for this survey. Sticky traps, destructive sampling and suction pump were used to collect the insect samples. The insects belonging to genus *Liriomyza* were identified and separated from the collected samples. Morphological and morphometric characterization were carried out to identify species of genus *Liriomyza* leafminers. Finally, *Liriomyza* species in the Batticaloa district were confirmed by using reference collections, catalogues and identification keys on *Liriomyza* species. In addition, the population dynamics of leaf miners in the Batticaloa district was assessed by counting and monitoring studies.

While keeping the destructive sampling, dead larval stages inside the leaf mines in the destructive samples were also observed for emergence of any parasitoids. After the emergence of adult parasites, characteristics of each adult were categorized and they were identified with the help of reference collections and taxonomic catalogues.

Morphological, morphometric characters and life cycle of the identified species were carried out in the laboratory. Comparison of the features observed in the *Liriomyza* specimens collected from the Batticaloa district with the features described by Spencer (1973) confirms that *Liriomyza sativae* is the only leafminer species existing in this district.

There are four larval instars in the life cycle of *Liriomyza sativae*. Fourth instar is a non-feeding stage. Third larval instar takes major part in the formation of width of leafmine than the other first and second larval instars. Statistical analysis showed that there are no significant differences in the formation of length of leafmines formed by the three larval instars. All the three larval instars take similar part in the formation of length of mine.

Four Hymenopteran parasitoids of *Liriomyza sativae*, namely, *Pnigalio katanosis*, *Opius* sp., *Neochrysochalis okazaki* kamijo and *Diglyphus iscae* were found to parasitise on leafminers in Batticaloa district. Among them, *Diglyphus iscae* is the most abundant parasitoid species of *Liriomyza sativae* in the district. It had highest parasitization rate of 6.27%. All four species of parasitoids collected were larval parasitoids which they parasitized the larvae of *Liriomyza sativae* inside the leafmines. They had a long ovipositor so as to penetrate the upper epidermal cell of the leaf and exoskeleton of the *Liriomyza* larvae.

Except *Pnigalio katanosis*, other three parasitoids were collected from *Liriomyza sativae* infesting all nineteen-host plants. This clearly shows that, no any specific phytochemical

involved in the selection of host by parasitoids. The characteristics of tomato may have influence in host selection of *Pnigalio katanosis*.

Fifteen vegetable, three wild and one ornamental plant were recorded as host plants of *Liriomyza sativae* in Batticaloa district. Chrysanthemum was the most preferred host of *Liriomyza sativae*. The protein content of host plant does not influence in host selection in *Liriomyza sativae*. Among the vegetable crops, Okra, Brinjal and Sword bean were infested by *Liriomyza sativae* during their seedling stage. No infestation was observed in mature plants. This may be probably attributed to the development and existence of defense mechanism of a crop against the pest.

The number of leafmine per leaf was equal to the number of larvae per leaf. Each leafmine contains only one larva inside the tunnel. Moreover, there were no biotypes of *Liriomyza sativae* in Batticaloa district.