CARIBBEAN FOOD CROPS SOCIETY

# PROCEEDINGS

## ELEVENTH ANNUAL MEETING

# STUDIES ON THE AGROMYZID LEAF-MINERS IN BARBADOS

SPECIES, HOST PLANTS AND PARASITES

*by*

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## INTRODUCTION

The Agromyzid leaf-miners occurring in Barbados have, hitherto, remained relatively unknown. The only account of Agromyzids found in this island is by Tucker (1952), who recorded *Agromyza* sp. from cow-pea, and *Agromyza sorosis* from corn. It was, therefore, considered worthwhile to study the Agromyzid leaf-miners, their hosts plants, relative abundance and natural enemies in Barbados, to establish their economic status, and if found necessary, to explore the possibilities of their biological control.

## MATERIALS AND METHODS

An extensive survey was carried out throughout the island and infested leaves of cultivated as well as of the wild plants were brought into the laboratory to rear the adults of leaf-miners and their parasites. Intensity of attack was determined from the number of puparia obtained from a random sample of 25 infested leaves kept singly. Incidence of parasitism was recorded from the total number of emergents reared from a large number of infested leaves kept in bulk. Identification of the specimens was accomplished through the courtesy of British Museum and United States Department of Agriculture.

The studies were initiated in January, 1972.

## RESULTS AND DISCUSSION

Results obtained so far have indicated the presence of *Liriomyza munda* Frick, *Liriomyza trifolii* (Burgess), and *Calycomyza* sp. in Barbados. Specific determination of some of the species is still awaited.

*Liriomyza munda* Frick, was described by Frick (1957) from some solanaceous plants, such as *Datura meteloides, Lycopersicum esculentum* and *Solanum tuberosum* in California. Subsequent studies by many workers including Oatman (1959) indicated that this species has a wide range of host plants. Stegmaier (1966) has listed 37 plants of 10 families as hosts of *L. munda.* It has been recorded attacking *Moringa* sp. in Jamaica (Spencer, 1965), and has also been found infesting various vegetable crops in Venezuela (Spencer, personal communication).

Because of taxonomic complexities, the pattern of distribution and the range of host plants of *L. munda* are not clear. For instance, *L. guytona* Freeman, which was previously known as a serious pest of tomatoes, beans, crucifers and cucurbits in the southern parts of the USA is now regarded as a synonym of *L. munda* (Steyskal, 1964). *L. pusilla* (Mg.) which is a serious pest of many cultivated crops in the USA, Central and Northern Europe, Italy, Sicily, and Egypt, has often been mistakenly identified with *L. munda* (Frick, 1957). Similarly *L. pictella* (Thompson) and *L. eupatorri* (Kalt.) have also been mixed up with *L. munda* (Stegmaier, 1966).

During the present survey in Barbados, *L. munda* has been found to be well distributed all over the island. On cultivated plants it has been found infesting *Allium cepa, Beta vulgaris, Brassica oleracea, Cajanus cajan, Cucumis melo, Cucumis sativa, Cucurbita moschata, Daucus carota, Gossypium barbadense, Hibiscus esculentus, Lactuca sativa, Lycopersicum esculentum, Phaseolus vulgaris, Raphanus sativus,* and *Solanum melongena.*

Amongst the wild plants it has been reared from *Amaranthus dubius, Centrosema pubescence, Cleome viscosa, Commelina diffusa, Cordia curassavica, Crotolaria retusa, Desmodium* sp., *Eclipta prosterata, Emilia sonchifolia, Herpatica alata, Indigofera suffruticosa, Ipomoea* sp., *Jasminum multiflorum, Kallestroemia* sp., *Melicoccus bijugatus, Phyllanthus fraternus, Physalis angulata, Ricinus communis, Solanum nigrum, Stachytarpheta jamaicensis, Tridax procumbens,* and *Wedelia trilobata.*

Males and females of *L. munda* are very common in the cultivated crops in Barbados. Swarms of adults can be seen in sugar cane fields which are obviously visited for feeding on nectar secreted by the Hemipterous pests of that crop.

Injury to the plants is caused by the maggots which devour the parenchymatous tissue, thus depriving the plants of a considerable amount of photosynthetic area. The growth and movement of the maggot result in a typical serpentine mine. In the case of severe attack the leaves become curled and start drying up. According to Wolfenbarger (1966) the presence of 640 mines on a plant with an average of 40 leaves can reduce the yield of the plant by 50%. The oviposition punctures made by females are also potential source of injury, as pathogenic organisms can make their entry into plant tissue through these holes to cause various diseases.

In Barbados, *L. munda* breeds continuously throughout the year with several over-lapping generations. The most obvious reasons for its uninterrupted multivoltine annual cycles seem to be its polyphagous nature and equitable climate of Barbados.

The populations of *L. munda* remain more or less stable throughout the year in Barbados. Among the abiotic mortality factors affecting its populations, heavy rains during the wet season is the most important factor which causes catastrophic destruction of adults. Biotic mortality factors include parasites; some birds which prey upon maggots

in the mines; spiders which feed on adults; soil inhabiting anthropods and pathogenic organisms which destroy puparia in soil.

Parasites rank as the most important of all the mortality factors. Harding (1965) has recorded about 20 species of parasites attacking *L. munda* in Texas. Stegmaier (1966) reared 5 species of hymenoptera as parasites of *L munda* in Florida.

In Barbados, about 7 species of parasites of *L munda* have been recorded so far. These are *Halticoptera* sp. nr. *patellana* (Dalm.) (Pteromalidae); *Diglyphus* sp., *Achrysocharella* sp., *Chrysocharis* spp. (probably three species) (Eulophidae); and an unidentified species of Eucoilidae. Incidence of parasitism was as high as 52.3%.

The intensity of attack (maximum number of puparia obtained from a single leaf) on different plants, and incidence of parasitism are presented in Table I.

Table I

**Intensity of attack of *L. munda* on different plant species, and incidence of combined parasitism in Barbados.**

| Host plant | Maximum number of puparia developed from a single infested leaf | Parasitism (% age) |
|---|---|---|
| *Allium cepa* | 3 | 2.0– 3.9 |
| *Brassica oleracea* | 11 | 20.0–32.0 |
| *Cucumis sativa* | 41 | 4.3–50.4 |
| *Cucurbita moschata* | 12 | 18.3 |
| *Daucus carota* | 19 | 15.6–20.0 |
| *Gossypium barbadense* | 11 | 5.0– 9.0 |
| *Hibiscus esculentus* | 8 | 2.0 |
| *Lactuca sativa* | 9 | 18.6 |
| *Lycopersicum esculentum* | 37 | 16.0–52.3 |
| *Phaseolus vulgaris* | 28 | 7.4–47.0 |
| *Solanum nigrum* | 3 | 20.0 |

Although the population *L. munda* is relatively stable throughout the year in Barbados this pest does pose a potential threat to the cultivated crops especially tomatoes, cucumbers and beans, particularly under present circumstances where indiscriminate insecticidal spray may eliminate an important mortality factor by destroying the natural enemies. In many parts of the world the leaf-miner problem has become significantly worse since the widespread introduction of modern insecticides. Such a situation has been observed in Venezuela where *L. munda* has started causing considerable concern (Spencer, personal communication). Therefore much care should be exercised in the use of insecticides. Moreover leaf-miners of common cultivated plants are likely to become established in new areas through transportation with their hosts, especially in the egg stage which is undetectable. To avoid this danger, strict quarantine measures are very important.

To complement the effect of native parasites, some exotic parasites, e.g. *Chrysocharis* sp., *Diglyphus* sp. and *Opius* sp. from Pakistan have been introduced into Barbados recently.

*Liriomyza trifolii* (Burgess)

*Liriomyza trifolii* was described by Burgess from specimens reared from *Trifolium repens* in the District of Columbia (Spencer, 1965). There has been much controversy regarding the exact taxonomic status of this species also. Frick (1953) considered *L. congesta* (Beck) which attacks leguminous crops in Europe, as a synonym of *L. trifolii,* but Spencer (1965) regarded this proposal as "inaccurate both nomenclatorily and taxonomically". Spencer placed *L. alliovora* Frick, and *L. archboldi* Frost as synonym of *L. trifolii.*

In Barbados, *L. trifolii* has been recorded from *Cucumis sativa* and *Peperomia pellucida,* and is generally extremely insignificant as compared to *L. munda.*

*Calycomyza* sp.

This Agromyzid attacks *Peperomia pellucida,* a common weed of cultivated fields in Barbados. Eggs are deposited singly in the tissue near

the tip of the leaf at the side of the midrib. On hatching, the maggot moves towards the midrib and makes a straight mine along the midrib downwards the base of the leaf. A blotch is caused by feeding activity of the maggot. Pupation also takes place within the blotch at the base.

*Calycomyza* sp. is also very rare and does not attack any cultivated plants in Barbados.

## SUMMARY

Agromyzid leaf-miners occurring in Barbados were hitherto almost completely unknown. Present studies on leaf-miners in Barbados have so far indicated the presence of *Liriomyza munda* Frick, *Liriomyza trifolii* (Burgess) and *Calycomysa* sp., of these, *L. munda* is the most important pest. It is a polyphagous species and remains active throughout the year with several overlapping generations.

About seven species of parasites, some birds and disease are keeping the populations of *L. munda* in check in Barbados. But even a slight change in the natural balance by the elimination of any of the mortality factors might result in the outbreak of this species. Several exotic parasites are being introduced to complement the effect of native parasites.

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