Prodiplosis longifila

Introduction

The citrus gall midge *Prodiplosis longifila* (Gagné) was first collected on limes in Florida by Rainwater in 1934. Gagné (1986) revised the genus *Prodiplosis* and described the adult of *P. longifila*. Since 1997, hot peppers exported from Jamaica to the United States of America have been found to contain gall midges, one of which was described as *Prodiplosis longifila* (Chung, 2000). The insect is therefore of economic and quarantine significance to the Caribbean as an emerging pest issue, since hot pepper is an important export crop from the region.

Identity

Authority : Gagné
Classification
- Kingdom : Animalia
- Phylum : Arthropoda
- Class : Insecta
- Order : Diptera
- Family : Cecidomyiidae
- Genus : *Prodiplosis*
- Species : *longifila*
- Common name : Citrus gall midge
- Role : Pest

Signs & Symptoms

Larvae feed on the flowers and stems of their host plants. On lime (*Citrus aurantifolia*) in Florida, the larva feed on the flowers, damaging the epidermal cells of the ovary, pistil and stamens. The mean number of larvae found per flower was 24**.**26. In Jamaica, eggs are often found inside hot pepper stems. Larvae are mainly found in the stem and calyx of mature green and ripe fruits. Larval feeding may lead to secondary fungal infections. Infested pedicels of hot pepper often show brown, necrotic scars with black borders ("Black stem"), usually at or near the calyx (Fig 2). Fungi have been isolated from these scars and were for years thought to be the primary pests involved. Midge-induced scars should not be confused with black scars initiated during picking. Infested fruits may be free from pedicel scars and may ripen or dehisce prematurely. Larvae sometimes burrow into the fruit (Chung, 2000). Flower bud, flowers, and all stages of the fruit may also be affected during high infestations.

Morphology

The morphology of *P. longifila* is described after Peña and Mead, 1998 and Chung, 2000. Eggs are transparent, measuring 0.26 x 0.1 mm. The larva is yellowish to orange during the last instar and about 1.9 mm when fully grown. Pupae are black at the anterior half of the body and about 1.0 mm long; soil particles may adhere to the white cocoon.Adults are about 1.5 mm long (Fig 1).

Biology and Ecology

Eggs hatch in just over one day to produce almost transparent larvae. Larvae develop over 8 - 12 days then drop to the ground to pupate in the soil. The pupal stage lasts 4 - 5 days. Adults emerge and live for about 1 - 2 days. Stages of the life cycle of *P. longifila* are shown in Fig. 1 after Peña and Mead (1998a).

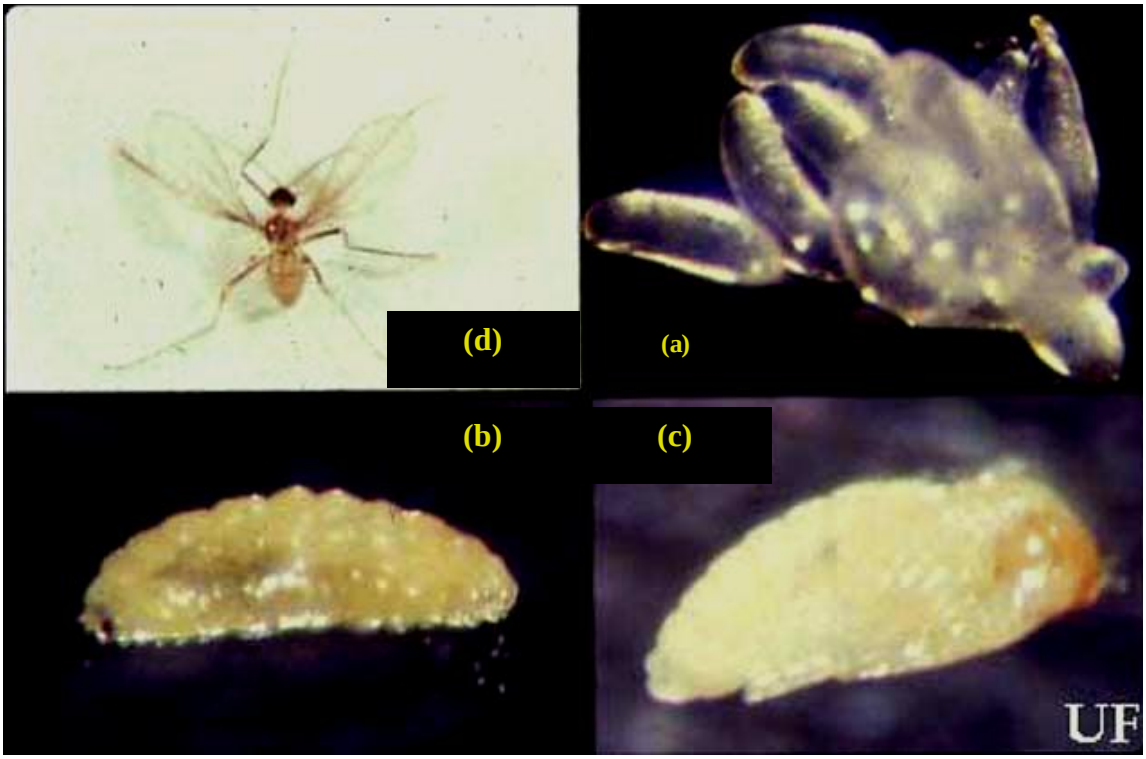

Fig. 1. (a)Eggs (upper right), (b) larva (lower left), (c) pupa (lower right) and (d) adult (upper left) Citrus gall midge *Prodiplosis longifila* Gagné.

Dispersal /vectors

Infested hot pepper fruits may be transported from one place to another through trade. Soil containing pupae may be transported to uninfested areas. Wind currents may disperse adults.

Management

Management recommendations provided below are reproduced from Chung (2000).

- Plant in dry, irrigated areas where possible.
- Irrigate away from the plant drip circle.
- Establish fields in open locations and space plants to allow adequate ventilation.
- Control weeds beneath/around plants.
- Frequently rake upper 1.25 mm of soil beneath plants where soil is damp.
- Remove all fallen fruit from fields, bury (at least 15 cm deep) or burn.
- Remove "Black stem" fruits from field as soon as they appear.
- Apply contact/stomach insecticides when the pests are present.
- Apply pesticide just after flower petals fall and at subsequent recommended intervals. Spraying around 17/30 - 8/30 hrs should enhance kill of ovipositing females. Only approved pesticides may be applied to peppers grown for export.
- Practice field sanitation by destroying the entire field if it is of no further economic use. Destroy completely or remove all reproductive structures at least twice weekly. A combination of cultural practices and approved insecticides can suppress gall midge populations below 5% infestation for at least three weeks (CARDI, 1999).
- Sticky, coloured traps present a potential tactic for monitoring or mating disruption. They should form the basis of an IPM programme along with biological control and other tactics listed.
- Fumigation of hot pepper fruits (for export) with aluminium phosphide in the form of pellets that release phosphine gas can kill more than 80% of larvae within fruits without significantly affecting fruit quality and shelf life(CARDI, 1999).

Pesticides approved for use on peppers for export

The list of pesticides in Table 1 was taken from a document provided by the Small Business Export Development Project of the Jamaica Exporters' Association. Only compounds that are registered for use and are applicable to peppers in Jamaica, have been included here. It should be noted that USEPA stipulates that these listings be used in conjunction with pesticide labels. Legal use applies only to those recommendations listed on the label.

Insecticides	Fungicides	Herbicides
Orthene/Acephate carbaryl/Sevin carbofuran/Furadan cyromazine/Trigard diazinon imidacloprid/Admire malathion methomyl/Lannate	Benomyl/Benlate maneb metalaxyl/Ridomil	metolachlor/Dual fluazifop-butyl/Fusillade glyphosate/Roundup paraquat/Gramoxone sethoxydim/Nabu-S trifluralin/Treflan

Table 1. Approved pesticides for control of the Citrus Gall Midge, *Prodiplosis longifila* on hot pepper in Jamaica

All safe pesticide usage practices must be followed particularly, application rates and pre-harvest intervals.

Natural Enemies

Platygasterid Hymenopteran parasitoids attack this species. *Synopeas spp*. has been mentioned from Florida and Ecuador.

Host Notes

Host plants include Lime (*Citrus aurantifolia*), tomato (*Lycopersicon esculentum*), potato (*Solanum tuberosum*), hot pepper (*Capsicum chinense)* and wild cotton (*Gossypium* sp.) (Peña and Mead, 1998b). In Peru, *P. longifila* attacks beans, tomato, white potato and alfalfa (Chung, 2000).

Distribution

The citrus gall midge is known to occur in Florida, Jamaica, Colombia, Ecuador and Peru.

Pest Significance and Phytosanitary Risk

The citrus gall midge, *P. longifila* is a significant quarantine and economic pest of hot pepper in Jamaica. Hot pepper export from Jamaica increased from 1,700 tonnes in 1996 to 9,000 in 1998 (CARDI, 1999). The value of hot pepper exported to the United States is US$ 5**.**8 million and annual production is worth US$ 2000 million (Edwards, 1999). Larvae infestation levels ranged from 0.5 – 27 % but little is known about the extent to which this affects production (CARDI).

Bibliography

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Peña, J. E. & Mead, F.W. (1998b) Featured Creatures, Citrus gall midge, *Prodiplosis longifila* (Gagné). University of Florida and Florida Department of Agriculture and Consumer Services.

Web Resources -

http://www.scholar.lib.vt.edu/theses/available/etd-07252001-110440/unrestricted/WilliamsETD.pdf
http://creatures.ifas.ufl.edu/fruit/citrus_gall_midge.htm.
http://www.edis.ifas.ufl.edu/IN162
http://www.radajamaica.com.jm/Technical/gallmidge.htm