

CITRUS LEAFMINER, *PHYLLOCNISTIS CITRELLA*, IN FLORIDA (LEPIDOPTERA: GRACILLARIIDAE: PHYLLOCNISTINAE)

J. B. HEPPNER¹

Florida State Collection of Arthropods,
DPI, FDACS, P. O. Box 147100, Gainesville, Florida 32614-7100, USA

ABSTRACT leafminer, *Phyllocnistis citrella* Stainton, a pest of citrus and related Rutaceae in Asia, is reported as established in southern Florida from a recent introduction. Current distribution in Florida is noted, as well as potential native Rutaceae in Florida that larvae of citrus leafminer may attack. All known hostplants and parasitoids are listed. A bibliography of all citrus leafminer literature is included.

KEY WORDS: Africa, Asia, Australian, biology, Braconidae, Chalcidoidea, Chrysopidae, distribution, Elasmidae, Encyrtidae, endangered species, Ethiopian, Eulophidae, Eurytomidae, hostplants, Hymenoptera, Lauraceae, Leguminosae, Loranthaceae, Nearctic, Neuroptera, North America, Oceania, Oleaceae, Oriental, Papilionidae, parasitoids, pheromones, Pteromalidae, Rutaceae, Tiliaceae.

The citrus leaf miner, *Phyllocnistis citrella* Stainton, is a serious pest of citrus and related species of the plant family Rutaceae. In most parts of southern Asia, Australia, and east Africa, where it is present, it is considered one of the major citrus pests. In late May 1993 the citrus leafminer (or CLM) was discovered in southern Florida, the first record of this pest for Florida, the continental United States, and the New World (Heppner, 1993). CLM has once previously been intercepted in the USA in 1914 (ports not noted) on citrus and *Atalantia* horticulture stock imports (Sasscer, 1915).

Phyllocnistis citrella, originally described from India (Stainton, 1856), was confirmed by Don Davis, a specialist in the Gracillariidae family, at the Smithsonian Institution (USNM).

The taxonomy of the citrus leafminer is as follows:

<i>Phyllocnistis citrella</i> Stainton, 1856	India
<i>citricola</i> (Shiraki, 1913)	Taiwan
<i>saligna</i> .—Kurisaki, 1928 (not Zeller, 1839), misident.	Japan

STATUS IN FLORIDA

Several citrus nurseries in Homestead have become infested with citrus leafminer; the first sample being collected in Homestead on May 20, 1993. Infestation was reported at 90% on about 200 acres of Persian limes. Further samples thereafter came from nursery, grove, and dooryard citrus in the Miami region (Monroe Co. to Palm Beach Co.), and in Collier Co. and Lee Co. on the west coast of Florida. By mid-July CLM was also reported in Charlotte Co., Hendry Co., Hillsborough Co., Indian River Co., Manatee Co., Martin Co., St. Lucie Co., and



Fig. 1. *Phyllocnistis citrella* adults: wings extended (top) and folded (bottom).

1. Contribution No. 788, Section of Entomology, Division of Plant Industry, Florida Department of Agriculture and Consumer Services, Gainesville, FL.

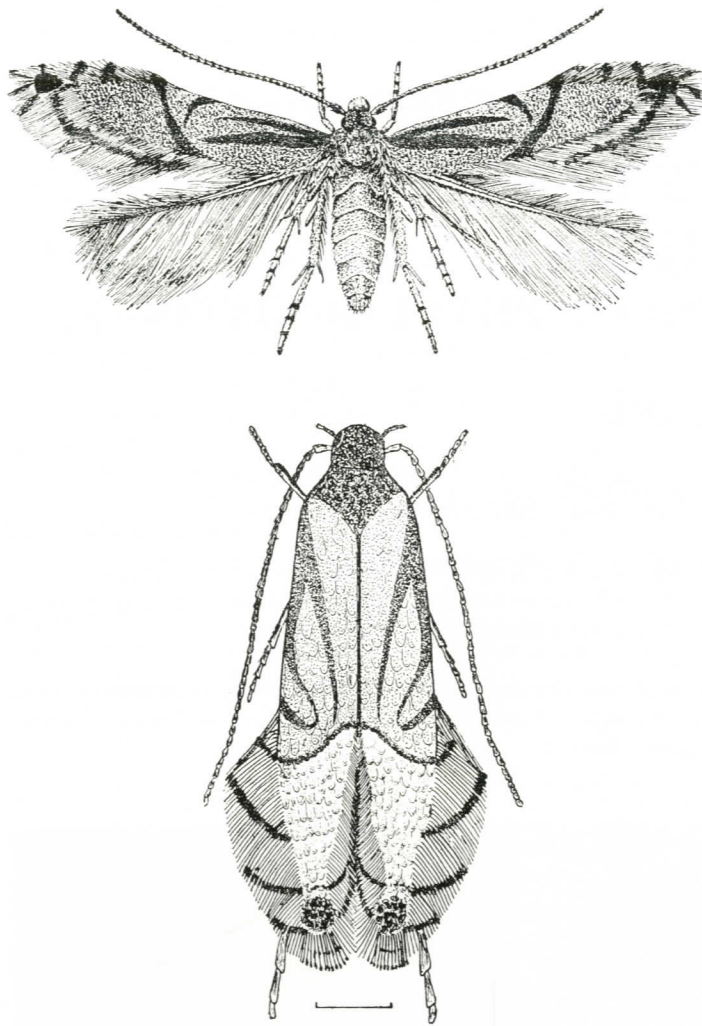


Fig. 2. *Phyllocnistis citrella* adults, wings extended (top) and folded (bottom). (after Clausen, 1931, top; and Badawy, 1967, bottom) (line = 0.3mm)

Orange Co. (see Fig. 3). Affected counties include the following (206 sites):

- Broward Co. (Coconut Creek, Cooper City, Davie, Ft. Lauderdale, Hallandale, Hollywood, Lauderdale Lakes, Miramar, Parkland, Pembroke Park, Pembroke Pines, Pompano Beach, Tamarac) — 38 sites
- Charlotte Co. (Grove City) — 1 site
- Collier Co. (Immokalee, Marco Island, Naples, Sunniland) — 35 sites
- Dade Co. (Florida City, Goulds, Hialeah, Homestead, Medley, Miami, Miami Shores) — 98 sites
- Hendry Co. (Felda and LaBelle) — 2 sites
- Hillsborough Co. (Lithia, Ruskin, Tampa) — 3 sites
- Indian River Co. (Vero Beach) — 1 site
- Lee Co. (Bokeelia, Bonita Springs, Cape Coral, Estero, Ft. Myers, Pineland, St. James City, Sanibel) — 16 sites
- Manatee Co. (Bradenton) — 1 site
- Martin Co. (Hobe Sound) — 1 site
- Monroe Co. (Big Pine, Islamorada, Marathon, Tavernier) — 4 sites
- Orange Co. (Tangerine and Winter Park) — 2 sites
- Palm Beach Co. (Boca Raton, Delray Beach, Wellington) — 4 sites
- St. Lucie Co. (Ft. Pierce) — 1 site

DISTRIBUTION OF CLM

A widespread Asian species (Clausen, 1931, 1933; CIE, 1970, 1986), described from Calcutta, India (Stainton, 1856), CLM now

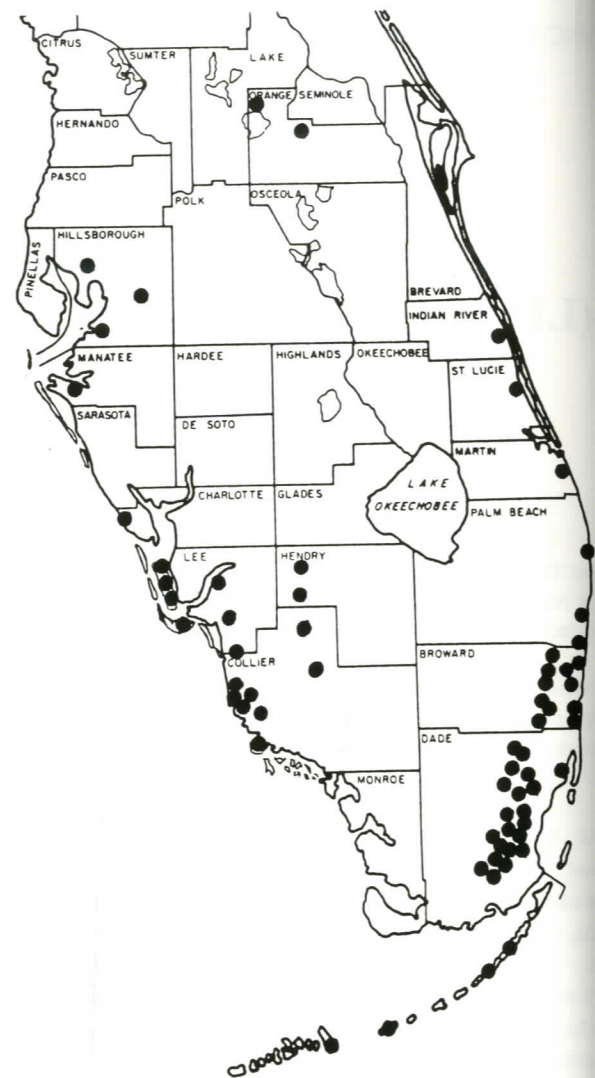


Fig. 3. Distribution in Florida as of mid-July 1993 (DPI range map).

is known from East Africa — Sudan to Yemen (Badawy, 1967), through southern Asia — Saudi Arabia to India (Fletcher, 1920) and Indonesia (Kalshoven, 1981), north to Hong Kong and China, Philippines (Sasscer, 1915), Taiwan (Chiu, 1985; Lo and Chiu, 1988) and southern Japan (Clausen, 1927). It is also found in New Guinea and nearby Pacific Islands (CIE, 1970, 1986), and Australia (Beattie, 1989; Hill, 1918; Wilson, 1991). Reports of CLM in South Africa are based on rearings from 1908 (Meyrick, 1909). The Ivory Coast and Nigeria records are relatively recent (CIE, pers. comm.). The Australian introduction occurred before 1940 (possibly by 1918 according to Hill, 1918), and has since 1969 been reported from northern Queensland. Within 10 years it moved as far south as Sydney, NSW. The total known distribution is noted in Table 1.

DIAGNOSIS

Adults of the citrus leafminer are minute moths (4mm wing spread) with white and silvery iridescent scales on the forewings with several black markings and tan plus a black spot on each wingtip (Fig. 1-2). The hind wings and body are white, with long fringe scales extending from the hindwing margins. In resting pose with wings folded (Fig. 1-2), the moth is much smaller in

TABLE 1. Distribution of Citrus Leafminer (in part after CIE, 1970, 1986).

Nation	Year	References
NEW WORLD		
USA (Florida)	1993	Heppner (1993)
AFRICA		
Ethiopia	1970	CIE (1986)
Ivory Coast	1985?	CIE (pers. comm.)
Nigeria	1988?	CIE (pers. comm.)
South Africa	1908?	Meyrick (1909), Janse (1917), Vari & Kroon (1986)
Sudan	1962	Ba-Angood (1977), Badawy (1968, [1969]), Schmutterer (1969), Siddig (1984)
Tanzania	1972?	Bohlen (1973)
ASIA		
Afghanistan	origin?	Cotterell (1954), Giorbelidze (1979), Millet (1964)
Bangladesh	origin	Alam <i>et al.</i> (1965)
China	origin	Chekiang Univ. (1964), Chen & Wong (1936)
Hong Kong	origin	Hill <i>et al.</i> (1982), Lee & Winney (1981), Mason & So (1969)
India	origin	Fletcher (1914, 1920), Stainton (1856)
Indonesia	origin	Hall (1925), Kalshoven (1950, 1981), Snellen (1903), Voûte (1932, 1934)
Iran	500 BC?	Farahbakhsh (1961), Gentry (1965)
Iraq	500 BC?	Gentry (1965)
Japan	1600s?	Esaki <i>et al.</i> (1932), Shiraki (1913)
Kampuchea (Cambodia)	origin	Hanson (1963b)
Korea	1600s?	Paik (1958)
Laos	origin	Manser <i>et al.</i> (1968)
Malaysia/Sarawak	origin	Dammerman (1929), Wallace (1966)
Myanmar (Burma)	origin	Ghosh (1923, 1940), Hanson (1963a)
Nepal	origin	Rana & Sharma (1965)
Pakistan	origin?	Brooks (1958)
Philippines	1500s?	Baltazar (1968)
Saudi Arabia	100 ?	Ayoub (1960), FAO (1972)
Sri Lanka	origin	Rajapakse & Kulasekera (1982)
Taiwan	1600s?	Lo & Chiu (1988), Shiraki (1913)
Thailand	origin	Thailand Dept. Agric. (1965)
Vietnam	origin	Logvinovskaya (1983), Whittle (1992)
Yemen, North	1960?	Cook (1988)
Yemen, South	1960?	Ba-Angood (1978), Mahfood (1968)
PACIFIC REGION		
Australia	1918?	Beattie (1989), Hill (1918), Turner (1940)
Caroline Is.	1952?	Oakley (1953)
Mariana Is.	1952?	Oakley (1953)
Papua New Guinea	1953?	Dumbleton (1954), Thomas (1962)
Solomon Is.	1985?	CIE (1986)
Western Samoa	1982?	Maddison (1986)

appearance (about 2mm). Many *Phyllocnistis* species are similar, with a smooth-scaled white head and a haustellum lacking basal scales, but CLM is easily detected on citrus by its meandering serpentine larval mine (Fig. 4-9), usually on the ventral side of the leaf. Larvae (Fig. 10) are minute (to 3mm), translucent greenish-yellow, and located inside the leaf mine; the last instar is a specialized prepupal non-feeding stage (Fig. 11). The pupa (Fig. 13-14) characteristically makes a pupal cell at the leaf margin. Adults are too minute to be easily noticed in the daytime, and have some activity at night as well.

BIOLOGY

The biology of CLM has been reported on by a number of researchers, including Badawy (1967), Beattie (1989), Clausen (1927, 1931, 1933), Fletcher (1920), Kalshoven (1981), Latif and

Yunus (1951). Eggs of CLM are laid singly on the underside of host leaves. Egg eclosion occurs within 2-10 days, whereupon larvae immediately enter the leaf and begin feeding. Larvae make serpentine mines on young leaves (sometimes also young shoots), resulting in leaf curling and serious injury. Leaf mines are usually on the ventral leaf surface, except in heavy infestations when both leaf surfaces are used. Usually only one leaf mine is present per leaf but heavy infestations can have 2 or 3 mines per leaf; up to 9 mines on large leaves have been found in Florida and up to 20 mines per leaf are known from elephant lemon in India (Pandey and Pandey, 1964). As with similar leafminers, larvae are protected within the leaf during their feeding cycle. Larvae have 4 instars (or 3 instars and the specialized prepupal stage, Fig. 11). Development time takes from 5-20 days. Pupation is within the mine in a special pupal cell at

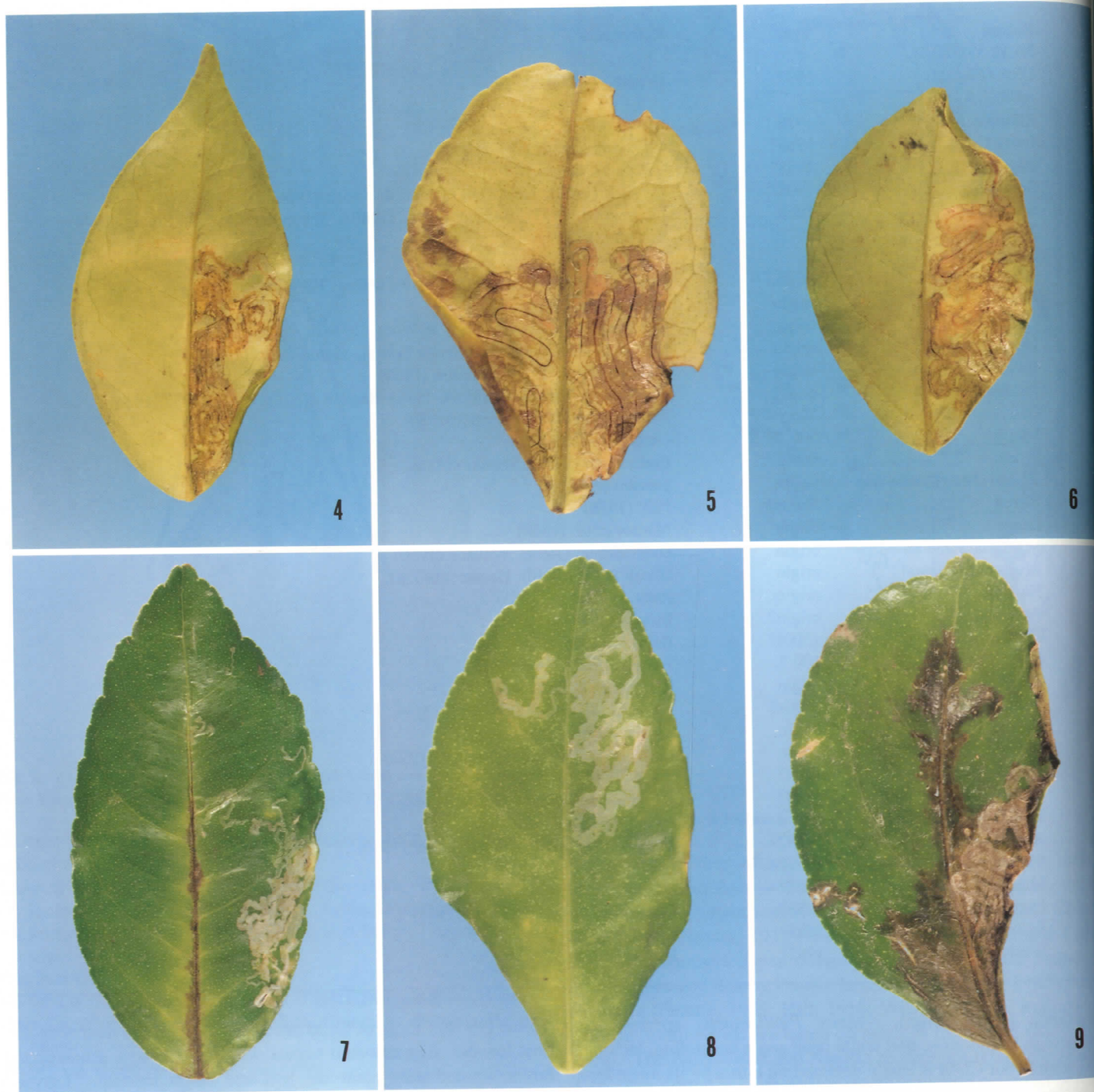


Fig. 4-9. Leaf mines of citrus leafminer (various *Citrus* sp. from southern Florida): 4-6. Normal mines on ventral leaf surfaces; 7-9. Irregular mines on dorsal leaf surfaces. (photo credits: Jeffrey W. Lotz, DPI)

the leaf margin, under a slight curl of the leaf; rarely this can occur in a depression of the leaf surface away from the margin. Adults emerge about dawn and are active in the morning; other activity is at dusk or night. Females lay eggs evenings and at night (Badawy, 1967; Beattie, 1989; Pandey and Pandey, 1964).

Generations per year appear to be nearly continuous: 6-10 in southern Japan (Clausen, 1931), 9-13 in northcentral India (Lal, 1950); 10 in southern India (Pandey and Pandey, 1964). Development time is reported as follows: 2-10 days for egg hatching;

5-20 days for larval development (4 instars are needed, or 3 plus the prepupal stage); and 6-22 days for pupal development, totalling a generation time of about 13-52 days (Pandey and Pandey, 1964; Voûte, 1934, 1935), depending on weather and temperature conditions. Adults live for only a few days, or about 1 week on average.

CLM appears to help spread citrus canker (Hill, 1918; Ando *et al.*, 1985) because of leaf damage from the mine, whereupon the citrus canker can gain easy entrance to internal tissues of the leaf.

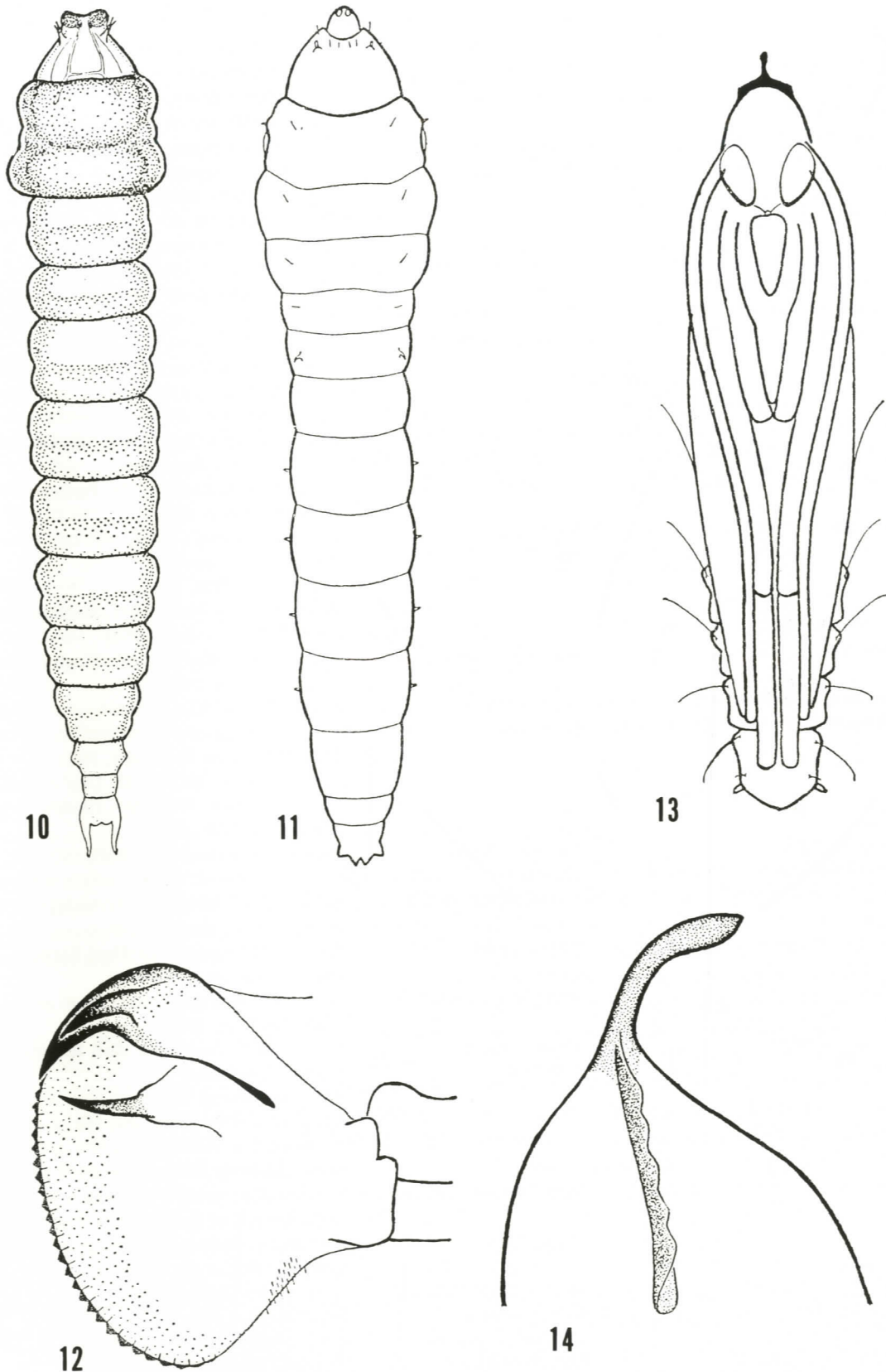


Fig. 10-14. Immature stages of *Phyllocnistis citrella*: 10. Last instar larva; 11. Prepupal stage; 12. Detail of larval mandible; 13. Pupa (front view); 14. Detail of pupal head sculpture (lateral view). (after Clausen, 1931) [all greatly enlarged]

TABLE 2. Recorded hostplants of Citrus Leafminer (* unsuitable hosts (larvae do not complete development); Δ Florida record)

RUTACEAE		
<i>Aegle marmelos</i>	bael tree	China (Huang <i>et al.</i> , 1989a) India (Fletcher, 1920) Philippines (Sasscer, 1915)
<i>Atalantia</i> sp.	limequat	Florida (DPI report) New Host Record
Δ <i>x Citrofortunella</i> sp.	calamondin	Florida (DPI report) New Host Record
Δ <i>x Citrofortunella microcarpa</i>	citrus	Florida (DPI report) India (Stainton, 1856)
Δ <i>Citrus</i> sp.		Florida (DPI report)
Δ <i>Citrus aurantiifolia</i>	lime	India (Latif & Yunus, 1951) Sudan (Badawy, 1967)
Δ <i>Citrus aurantiifolia</i> [= 'Swingle']	Key lime	Florida (DPI report) New Host Record
Δ <i>Citrus aurantiifolia</i> 'Tahiti'	Persian lime	Florida (DPI report)
Δ <i>Citrus aurantium</i>	sour orange/bigarade	Florida (DPI report) India (Latif & Yunus, 1951) Saudi Arabia (Ayoub, 1960) Sudan (Badawy, 1967)
<i>Citrus jambhiri</i>	rough lemon	India (Verma & Sohi, 1968; Singh & Rao, 1978)
<i>Citrus latifolia</i>	seedless lime	India (Singh & Rao, 1978)
<i>Citrus limetta</i>	sweet lime	India (Latif & Yunus, 1951; Pandey & Pandey, 1964) Sudan (Badawy, 1967)
<i>Citrus limettioides</i>	sweet lime	India (Singh <i>et al.</i> , 1989)
Δ <i>Citrus limon</i>	lemon	Florida (DPI report) Australia (Wilson, 1991) India (Pruthi & Mani, 1945; Singh & Rao, 1978) Saudi Arabia (Ayoub, 1960)
<i>Citrus limon</i> [= var. <i>pusilla</i>]		India (Latif & Yunus, 1951; Singh & Rao, 1978; Batra <i>et al.</i> , 1988)
<i>Citrus x limonia</i>	Rangpur lemon	India (Singh & Rao, 1978) Florida (DPI report) Hong Kong (Lee & Winney, 1981) India (Pruthi & Mani, 1945; Latif & Yunus, 1951; Pandey & Pandey, 1964) Vietnam (Whittle, 1992)
<i>Citrus x limonia</i> [?= <i>Citrus nakoora</i>]	Nakoora lemon	Philippines (Reinking & Groff, 1921)
Δ <i>Citrus maxima</i>	pummelo	India (Singh <i>et al.</i> , 1989) India (Latif & Yunus, 1951; Pandey & Pandey, 1964) Saudi Arabia (Ayoub, 1960)
<i>Citrus maxima</i> 'Kao pan'	Siamese pummelo	Florida (DPI report) New Host Record
<i>Citrus maxima</i> [= <i>grandis</i>]	shaddock	Saudi Arabia (Ayoub, 1960)
<i>Citrus medica</i>	citron/elephant lemon	India (Latif & Yunus, 1951; Pandey & Pandey, 1964)
Δ <i>Citrus meyeri</i> [= 'Meyer']	Meyer lemon	Florida (DPI report) New Host Record
<i>Citrus myrtifolia</i>	chinotto	Saudi Arabia (Ayoub, 1960)
<i>Citrus x nobilis</i>	tangor/king mandarin	India (Latif & Yunus, 1951; Singh <i>et al.</i> , 1989) Sudan (Badawy, 1967)
Δ <i>Citrus x nobilis</i> 'Temple'	Temple tangor	Florida (DPI report) New Host Record
Δ <i>Citrus x paradisi</i>	grapefruit	Florida (DPI report) Australia (Wilson, 1991) Hong Kong (Lee & Winney, 1981) India (Latif & Yunus, 1951) Sudan (Badawy, 1967)
Δ <i>Citrus reticulata</i>	tangerine/mandarin	Florida (DPI report) Hong Kong (Lee & Winney, 1981) India (Singh & Rao, 1978; Singh <i>et al.</i> , 1989) Korea (Catling <i>et al.</i> , 1977) Saudi Arabia (Ayoub, 1960)
<i>Citrus reticulata</i> [= <i>deliciosa</i>]	Mediterranean mandarin	India (Singh & Rao, 1978)
<i>Citrus reticulata</i> [= <i>kara</i>]	Kara mandarin	India (Singh & Rao, 1978; Batra <i>et al.</i> , 1988)
<i>Citrus reticulata</i> [= <i>reshni</i>]	Cleopatra mandarin	India (Singh & Rao, 1978; Batra <i>et al.</i> , 1988)
<i>Citrus reticulata</i> [= <i>suhuiensis</i>]	Murcott mandarin	Vietnam (Whittle, 1992)
<i>Citrus rugulosa</i>		India (Singh <i>et al.</i> , 1989)
Δ <i>Citrus sinensis</i>	sweet orange	Florida (DPI report) China (Huang <i>et al.</i> , 1989a) India (Mitra & Khongwir, 1928; Pruthi & Mani, 1944; Latif & Yunus, 1951; Pandey & Pandey, 1964; <i>et al.</i> , 1989)

<i>ΔCitrus sinensis</i> 'Sunburst'	sunburst orange	Sudan (Badawy, 1967)
<i>ΔCitrus sinensis</i> 'Valencia'	Valencia orange	Florida (DPI report)
<i>ΔCitrus x tangelo</i>	tangelo	Florida (DPI report)
<i>ΔCitrus x tangelo</i> 'Minneola'	Minneola tangelo	Florida (DPI report) New Host Record
<i>Citrus reticulata</i> 'Owari Satsuma' [= <i>unshiu</i>]	satsuma	Florida (DPI report) New Host Record
<i>ΔFortunella crassifolia</i>	kumquat	India (Singh & Rao, 1978)
<i>Fortunella margarita</i>	kumquat	Florida (DPI report) New Host Record
<i>Limonia</i> spp.	wood apple	Saudi Arabia (Ayoub, 1960)
<i>Murraya paniculata</i>	orange jasmine	India (Sandhu & Batra, 1978)
* <i>Murraya koenigii</i>	curry leaf	India (Pruthi & Mani, 1945)
		India (Fletcher, 1920; Margabandhu, 1933; Pruthi & Mani, 1945)
<i>Poncirus trifoliata</i>	trifoliolate orange	India (Clausen, 1933; Singh & Rao, 1978; Singh <i>et al.</i> , 1989)
Rutaceae spp.		Indonesia (Voûte, 1934, 1935)
<i>Severinia buxifolia</i>	Chinese box orange	India (Sandhu & Batra, 1978)
OLEACEAE		
* <i>Jasminum</i> sp.	jasmine	India (Margabandhu, 1933)
* <i>Jasminum cinnamomifolium</i>		India (Pruthi & Mani, 1945)
<i>ΔJasminum humile</i>	yellow jasmine	Florida (DPI report) New Host Record
<i>Jasminum sambac</i>	Arabian jasmine/bela	India (Fletcher, 1920)
		Saudi Arabia (Ayoub, 1960)
LORANTHACEAE		
<i>Loranthus</i> sp. [on citrus]	mistletoe	Philippines (Sasscer, 1915; Reinking & Groff, 1921)
		Thailand (Clausen, 1931)
LEGUMINOSAE		
* <i>Dalbergia sissoo</i>	sissoo	India (Latif & Yunus, 1951)
<i>Pongamia pinnata</i>	karum tree	India (Margabandhu, 1933)
LAURACEAE		
<i>Alseodaphne semecarpifolia</i>		India (Latif & Yunus, 1951)
<i>Cinnamomum zeylanicum</i>	cinnamon	Sri Lanka (Rajapakse & Kulasekera, 1982)
TILIACEAE		
* <i>Grewia asiatica</i>		India (Latif & Yunus, 1951)

A sex attractant for males of CLM has been reported by Ando *et al.* (1985): (7Z, 11Z)-7,11-hexadecadienal in Japan. Further studies with this pheromone have been conducted by Ujiye (1990, 1992), and by Narahara and Kai (1991), in Japan.

HOSTPLANTS

CLM is common on species of citrus and related Rutaceae within its range (Kalshoven 1981). CLM is most commonly found on leaves of grapefruit and pummelo (pomelo) (Badawy, 1967). In Florida, CLM has been found most commonly on Persian and Key limes, and on grapefruit, although most all citrus commonly grown in Florida has harbored CLM.

Recorded Rutaceae outside of Florida include *Aegle marmelos* in India (Fletcher, 1920), *Atalantia* sp. in the Philippines (Sasscer, 1915), *Murraya exotica* in India (Pruthi and Mani, 1945), *Poncirus trifoliata* in India (Clausen, 1933), and various native Rutaceae in Indonesia (Kalshoven, 1981). Other reported hosts include *Jasminum sambac* (Oleaceae) in India (Fletcher, 1920), mistletoes on citrus (*Loranthus* sp., Loranthaceae) in the Philippines (Reinking and Groff, 1921), *Pongamia pinnata* (Leguminosae) in India (Margabandhu, 1933), and *Alseodaphne semecarpifolia* (Lauraceae) in India (Latif and Yunus, 1951). Florida records include various *Citrus* sp., kumquat (*Fortunella*

crassifolia), and calamondin (*xCitrofortunella microcarpa*).

Several other hosts have been reported for CLM but larvae do not complete their life cycle on these incompatible hosts: *Murraya koenigii* (Rutaceae) in India (Fletcher, 1920), *Jasminum* sp. and *Jasminum cinnamomifolium* (Oleaceae) in India (Pruthi and Mani, 1945), *Dalbergia sissoo* (Leguminosae) in India (Latif and Yunus, 1951), and *Grewia asiatica* (Tiliaceae) in India (Latif and Yunus, 1951). A *Salix* sp. (Salicaceae) host record for India (Pruthi and Mani, 1945) probably refers to the related *Phyllocnistis saligna* (Zeller), which feeds on willow. Table 2 summarizes known hostplant data for CLM (numerous minor cultivars of *Citrus* spp. have also been reported as hosts for CLM; see Sinha, Batra, and Uppal, 1972).

PARASITES

A number of workers in various countries have discovered parasitoids of CLM over the years. Table 3 lists all known parasitoids recorded thus far for CLM, a total of 39 species in 7 families, mostly Chalcidoidea. Several species of parasitoids have been reared from CLM in Florida but results are not in yet as to whether these are native Florida species or also imported along with CLM. So far no Diptera have been reported parasitizing CLM larvae.

TABLE 3. Parasites Recorded from Citrus Leafminer.

BRACONIDAE	
<i>Bracon</i> sp.	Philippines (Baroga, 1968)
<i>Microbracon phyllocnistidis</i> Muesebeck, 1933	Indonesia (Muesebeck, 1933)
CHALCIDOIDEA	
sp.?	Sri Lanka (Rutherford, 1914)
ELASMIDAE	
<i>Elasmus</i> sp.	Japan (Ujiye, 1988)
<i>Elasmus zehntneri</i> Ferrière, 1929	Indonesia (Ferrière, 1929)
	Philippines (Baroga, 1968)
ENCYRTIDAE	
<i>Ageniaspis</i> sp.	Indonesia (Voûte, 1934, 1935)
<i>Ageniaspis</i> sp.	Saudi Arabia (Ayoub, 1960)
<i>Ageniaspis</i> sp.	Thailand (Ujiye & Morakote, 1992)
<i>Ageniaspis citricola</i> Logvinovskaya, 1983	Taiwan (Lo & Chiu, 1988)
	Vietnam (Logvinovskaya, 1983)
EULOPHIDAE	
<i>Ascotolinx funeralis</i> Girault, 1913a	Australia (Bouček, 1988)
<i>Chrysocharis</i> sp.	Japan (Ujiye, 1988)
<i>Chrysonotomyia</i> sp.	Japan (Ujiye, 1988)
<i>Citrosticus phyllocnistoides</i> (Narayanan, 1960)	India (Rao & Ramamani, 1966; Bouček, 1988)
	Thailand (Ujiye & Morakote, 1992)
<i>Cirrospilus</i> sp.	Japan (Ujiye, 1988)
<i>Cirrospilus ingennus</i> Gahan, 1932	Taiwan (Lo & Chiu, 1988)
<i>Cirrospilus phyllocnistis</i> (Ishii, 1953)	Japan (Ishii, 1953; Ujiye, 1988)
	Taiwan (Wu & Tao, 1977)
<i>Cirrospilus quadristriatus</i> (Rao & Ramamani, 1966)	India (Rao & Ramamani, 1966)
	Thailand (Ujiye & Morakote, 1992)
<i>Closterocerus trifasciatus</i> Westwood, 1833	Japan (Ujiye, 1988)
	Thailand (Ujiye & Morakote, 1992)
<i>Holcopelte</i> sp.	Japan (Ujiye, 1988)
<i>Kratosysma</i> sp.	Thailand (Ujiye & Morakote, 1992)
<i>Kratosysma citri</i> Bouček, 1988	Papua New Guinea (Bouček, 1988)
<i>Pleurotropsis</i> sp.	Japan (Ujiye, 1988 [as <i>Cotterellia</i> sp.]
<i>Pnigalio</i> sp.	Japan (Ujiye, 1988)
<i>Semielaecher</i> sp.	Papua New Guinea (Bouček, 1988)
<i>Semielaecher petiolatus</i> (Girault, 1915)	Australia (D. Smith, pers. comm.; Bouček, 1988)
<i>Stenomesus japonicus</i> (Ashmead, 1904)	Japan (Kamijo, 1976 [= <i>Sympiesomorpha mikan</i> Ishii, 1953])
	Taiwan (Wu & Tao, 1977)
<i>Sympiesis</i> sp.	Australia (D. Smith, pers. comm.)
<i>Sympiesis</i> sp.	Taiwan (Wu & Tao, 1977)
<i>Sympiesis striatipes</i> (Ashmead, 1904)	Japan (Ujiye, 1988)
	Thailand (Ujiye & Morakote, 1992)
<i>Teleopterus</i> sp.	Thailand (Ujiye & Morakote, 1992)
<i>Tetrastichus</i> sp. A	Japan (Ujiye, 1988)
<i>Tetrastichus</i> sp. B	Japan (Ujiye, 1988)
<i>Tetrastichus</i> sp.	Taiwan (Lo & Chiu, 1988)
<i>Tetrastichus</i> sp.	Thailand (Ujiye & Morakote, 1992)
<i>Zaomomentedon brevipetiolatus</i> Kamijo, 1990	Japan (Ujiye, 1988 [as <i>Visnuella</i> sp.]
	Thailand (Ujiye & Morakote, 1992)
EURYTOMIDAE	
<i>Eurytoma</i> sp.	Sri Lanka (Hutson & Pinto, 1934)
<i>Eurytoma</i> sp.	Thailand (Ujiye & Morakote, 1992)
PTEROMALIDAE	
<i>Asaphoideus niger</i> Girault, 1913b	Australia (Bouček, 1988)
sp? (Pirenini)	Philippines (Baroga, 1968)

IMPACT IN FLORIDA

CLM has the potential of rapidly spreading throughout citrus areas of Florida (note spread in Australia from Queensland to Sydney in only a few years). Attacks on young trees can kill plants; older citrus would sustain damage to new leaves during leaf flush. CLM may also attack native mistletoes (Loranthaceae) in Florida as new hosts. Citrus fruit is not damaged by CLM nor directly affected.

CLM potentially could spread throughout the southeast U.S. if native Rutaceae are found to its liking; cold winters would limit its spread north about to Georgia, if the distribution in China is any indication. Other ornamentals and native Rutaceae are potential hosts or occur in Florida in horticultural plantings (e.g., mock orange), including such plants as wild lime, the hostplant of the endangered Schaus swallowtail butterfly in the Florida Keys. Potential native Rutaceae (plus some introduced species) found in Florida are noted in Table 4.

CLM is thought to help spread citrus canker (Hill, 1918; Ando *et al.*, 1985) because of leaf damage from the mine; research in India has shown a 50% increase in citrus canker in groves infested with CLM (Sohi and Sandhu, 1968).

Control of CLM in Florida is anticipated to include a spray regime of various pesticides as is done in other countries (see economic papers in Bibliography). Biological control measures with various parasitoids of CLM also should be effective in reducing populations of CLM. One predator is known from China, *Chrysopa boninensis* Okamoto (Neuroptera: Chrysopidae), one of the green lacewings (Huang *et al.*, 1989a). The pheromone for CLM also has the potential to help monitor adult populations, and possibly even reduce their numbers when used in combination with a sesiid-type sticky trap (Ujiye, 1990).

ACKNOWLEDGMENTS

The staff of the Division of Plant Industry, particularly the many dedicated plant inspectors for Florida, are to be thanked for locating this citrus pest and helping to document its spread. The DPI Library staff are thanked for their efforts in securing many of the more obscure publications noted in the bibliography, although not all could be seen prior to this publication. Jeffrey W. Lotz, DPI photographer, is thanked for the photographs included herein. Wayne Dixon, Biological Administrator, is especially thanked for spearheading the effort to document this pest and its occurrence in Florida. Nancy Coile, DPI staff Botanist, provided considerable help in correcting botanical names, particularly the complex synonymy of the many species and cultivars of *Citrus*. Dan Smith, of Nambour, Queensland, Australia, kindly noted parasitoids being used in Australia against CLM. Jorge Peña, IFAS Subtropical Research and Education Center, University of Florida, Homestead, FL, is thanked for beginning hostplant testing of CLM on native Florida plants.

TABLE 4. Potential Hostplants in Florida.

<i>Amyris balsamifera</i>	balsam torchwood
<i>Amyris elemifera</i>	torchwood
<i>Atalantia ceylanica</i>	
<i>Casimiroa edulis</i>	white sapote
<i>Citroncirus webberi</i>	citrange
<i>Citrofortunella microcarpa</i>	calamondin
<i>Citrus</i> spp.	citrus (all species)
<i>Dictamnus albus</i>	gas plant
<i>Fortunella crassifolia</i>	kumquat
<i>Glycosmis parviflora</i>	Chinese glycosmis
<i>Limonia acidissima</i>	wood apple
<i>Murraya</i> spp.	mock oranges
<i>Poncirus trifoliata</i>	trifoliolate orange
<i>Ptelea trifoliata</i>	stinking ash/hoptree
<i>Ruta graveolens</i>	common rue
<i>Severinia buxifolia</i>	Chinese box orange
<i>Severinia monophylla</i>	
<i>Thamnosma texana</i>	Texas turpentine broom
<i>Triphasia trifolia</i>	limeberry
<i>Zanthoxylum americanum</i>	northern prickly ash
<i>Zanthoxylum clava-herculis</i>	Hercules' club
<i>Zanthoxylum coriaceum</i>	Biscayne prickly ash
* <i>Zanthoxylum fagara</i>	wild lime
<i>Zanthoxylum flavum</i>	satinwood/yellowwood

* oviposition by CLM ♀ recorded in Florida (J. Peña, pers. comm.)

CITRUS LEAFMINER BIBLIOGRAPHY

TAXONOMY

Common, I. F. B.

1990. *Moths of Australia*. Melbourne: Melbourne Univ. Pr. 535pp, 32pl.

Davis, D. R.

1987. Gracillariidae (Tineoidea). In F. W. Stehr (ed.), *Immature insects* [1], 372-378. Dubuque: Kendall/Hunt Publ. Co.

Esaki, T., et al.

1932. *Iconographia insectorum japonicorum*. Tokyo: Hokuryukan. 2500pp, 24pl. [In Japanese]
1957-58. *Icones heterocerorum japonicorum in coloribus naturalibus*. Osaka: Hoikusha. 2 v. [In Japanese]

Heppner, J. B., and H. Inoue (eds.)

1992. *Lepidoptera of Taiwan. Vol. 1, Part 2: Checklist*. Gainesville: Assoc. Trop. Lepid. 276pp.

Inoue, H., et al

- 1953-61. *Check list of the Lepidoptera of Japan*. Tokyo. 6 pts (683pp). [In Japanese]

Inoue, H., T. Okano, T. Shirôzu, S. Sugi, and H. Yamamoto

1959. *Iconographia insectorum japonicorum colore naturali edita*. Tokyo. Vol. 1. 284+67+40pp, 184pl. [In Japanese]

Inoue, H., S. Sugi, H. Kuroko, S. Moriuti, and A. Kawabe

1982. *Moths of Japan*. Tokyo: Kodansha. 2 vol. [In Japanese]

Issiki, S., et al.

1965. *Early stages of Japanese moths in colour*. Osaka: Hoikusha. Vol. 1. 237pp, 60pl. (1979 reprint) [in Japanese]

Janse, A. J. T.

1917. *Check-list of the South African Lepidoptera Heterocera*. Pretoria. 219pp.

Meyrick, E.

1909. New South African Microlepidoptera. *Ann. S. African Mus.* (Pretoria), 5:349-379.

Park, K. T.

1983. Microlepidoptera of Korea. *Insecta Koreana* (Chuncheon), 3:1-195, 2pl.

Seksjeva, S. V.

1981. 25. Fam. Phyllocnistidae. In *Identification keys to the insects of European Russia. Vol. 4. Lepidoptera. Pt. 2*, 311-313. Moscow.

Shiu, Y. H., K. T. Park, and S. H. Nam

1983. *Illustrated Flora & Fauna of Korea. Vol. 27. Insecta (IX). Lepidoptera*. Seoul. 1053pp, 48pl.

Snellen, P. C. T.

1903. 7. *Phyllocnistis minutella* Snellen i l., nov. sp. In W. van Deventer, Over de ontwikkelingstoestanden van eenige Microlepidoptera van Java. *Tijds. Ent.* (Amsterdam), 46:87-89, pl. 10.

Stainton, H. T.

1856. Descriptions of three species of Indian Micro-Lepidoptera. *Trans. Ent. Soc. London*, (n.s.) 3:301-304.

Turner, A. J.

1940. A revision of the Australian Gracillariidae (Lepidoptera). *Trans. Roy. Ent. Soc. S. Austr.* (Adelaide), 64:50-69.

Vari, L., and D. Kroon

1986. *Southern African Lepidoptera: a series of cross-referenced indices*. Pretoria: Transvaal Mus. 198pp.

Wang, P. Y., et al.

1981. *Iconographia heterocerorum sinicorum*. Beijing: Acad. Sinica. 4 v.

BIOLOGY

Anon.

1959. *Illustrated insect larvae of Japan*. Tokyo: Hokuryukan. 714pp.

Ba-Angood, S. A. S.

1977. A contribution to the biology and occurrence of the citrus leafminer, *Phyllocnistis citrella* Staint., in the Sudan. *Z. Angew. Ent.* (Berlin), 83:106-111.
1978. On the biology and food preference of the citrus leafminer *Phyllocnistis citrella* Stainton, in PDR of Yemen. *Zeit. Angew. Ent.* (Berlin), 86:53-57.

Badawy, A.

- [1969]. The morphology and biology of *Phyllocnistis citrella* Stainton, a citrus leaf-miner in the Sudan. *Bull. Soc. Ent. Egypt* (Cairo), 51:95-103 (1967).

Barroga, S. F.

1968. Biological notes and control of citrus leafminer (*Phyllocnistis citrella* Stainton) affecting citrus seedlings. *Philipp. J. Plant Ind.* (Manila), 33:17-29.

Bhumannavar, B. S., and S. P. Singh

1983. Studies on population dynamics of citrus leaf miner *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistidae). *Entomol. Mon.* (Trivandrum), 8:397-400.

Clausen, C. P.

1931. Two citrus leaf miners of the Far East. *USDA, Tech. Bull.* (Washington), 252:1-13.

Deventer, W. van

1903. Over de ontwikkelingstoestanden van eenige Microlepidoptera van Java. *Tijds. Ent.* (Amsterdam), 46:79-89, pl. 9-10.

Fletcher, T. B.

1914. *Some south Indian insects*. Madras: Govt. Pr. 565pp.
1920. Life histories of Indian insects. Microlepidoptera. *Mem. Dept. Agric. India* (New Delhi), 6:1-217, 68pl.

Grandi, G.

1951. *Introduzione allo studio dell'entomologia. Vol. II. Endopterygota*. Bologna: Ediz. Agricola. 1332pp.

Hamamura, T.

1980. Studies on the overwintering of the citrus leaf miner, *Phyllocnistis citrella* Stainton (Lepidoptera: Lyonetiidae) in Hiroshima. *Kaju Shikenjo Hokoku Bull. Fruit Tree Res. Sta.* (Akita) Ser. E., 3:99-112.

Hering, E. M.

1951. *Biology of the leaf miners*. The Hague: W. Junk. 420pp.

Hill, D. S., P. Hore, and I. W. B. Thornton

1982. *Insects of Hong Kong*. Hong Kong: Hong Kong Univ. 503pp.

Huang, M. Z., and M. D. Huang

1989. Study on the spatial pattern of larvae of *Citrus* leaf miner. *Studies on the integrated management of Citrus insect pests* 90-95. Guangzhou: Acad. Bk. & Periodical Pr. [In Chinese]

Hutson, J. C., and M. P. D. Pinto

1934. Two caterpillar pests of citrus. *Trop. Agric.* (Peradeniya) 83:188-193, 2pl.

Ikemoto, T.

1972. Ecological studies on a field population of the citrus leaf miner, *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistidae), with special reference to spatial distribution pattern. *Japan. J. Appl. Ent. Zool.* (Tokyo), 16:127-138.

Kurisaki, M.

1928. On the life-history of citrus leaf miner, *Phyllocnistis saligna*, Zell., and the relation between this miner and citrus canker, *Pseudomonas citri*, Hasse. *Insect World* (Gifu), 24:39-44. [In Japanese] [refers to *P. citrella*]

Liu, S. K., and R. G. Zeng

1981. Larval stages of the citrus leaf miner (*Phyllocnistis citrella* Stainton). *J. S. China Agric. Univ.* (Kuangchou), 2:51-57. [In Chinese]

Lo, K. C., and S. C. Chiu

1988. *The illustrations of citrus insect pests and their natural enemies in Taiwan*. Taichung: Taiwan Agric. Res. Inst. 75pp. [In Chinese]

Needham, J. G., S. W. Frost, and B. H. Tothill

1928. *Leaf-mining insects*. Baltimore: Williams & Wilkins. 351pp.

Pandey, N. D., and Y. D. Pandey

1964. Bionomics of *Phyllocnistis citrella* Stt. (Lepidoptera: Gracillariidae). *Indian J. Ent.* (New Delhi), 26:417-423.

Radke, S. G., and H. G. Kandalkar

1987. Bionomics of citrus leafminer, *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae). *P.K.V. Res. J.* (Akola), 11:91-92.

Siddigi, M. S., and K. P. Mahur

1981. Bionomics of citrus leaf miner, *Phyllocnistis citrella* St. *Prog. Hort.* (Ranikhet), 13:55-64.

Sohi, G. S., and G. C. Verma

1966. Feeding habits of *Phyllocnistis citrella* Stainton in relation to the anatomical structure of the leaf. *Indian J. Ent.* (New Delhi), 27:483-485.

Sontakay, K. R., and R. L. Gupta

1945. Seasonal incidence of *Phyllocnistis citrella* Stt. The citrus leaf miner. *Indian Farming* (New Delhi), 1:106.

Thailand Dept. Agric.

1965. *A host list of the insects of Thailand*. Bangkok. 149pp.

Yamamoto, E.

1968. Studies on the biology and control of the citrus leaf miner, *Phyllocnistis citrella* Stainton. 1. On the biology. *Proc. Assoc. Plant Prot. Kyushu* (Fukuoka), 14:47-50. [In Japanese]
1969. Studies on the biology and control of the citrus leaf miner, *Phyllocnistis citrella* Stainton. 2. On the ecology. *Proc. Assoc. Plant Prot. Kyushu* (Fukuoka), 15:158-160. [In Japanese]
1971. Studies on the biology and control of the citrus leaf miner, *Phyllocnistis citrella* Stainton. 3. On the development. *Proc. Assoc. Plant Prot. Kyushu* (Fukuoka), 17:64-65. [In Japanese]

PHEROMONES**Ando, T., K. Y. Taguchi, M. Uchiyama, T. Ujiye, and H. Kuroko**

1985. (7Z-11Z)-7,11-hexadecadienal: sex attractant of the citrus leafminer moth, *Phyllocnistis citrella* Stainton (Lepidoptera, Phyllocnistidae). *Agric. Biol. Chem. Tokyo*, 49:3633-3653.

Du, T. Y., J. J. Xiong, and Z. H. Wang

1989. (7Z, 11Z)-7, 11-hexadecadienal: sex attractant of *Phyllocnistis wampella* Liu and Zeng [and *Phyllocnistis citrella*]. *Kunchong Zhishi* (Guangdong), 26:147-149. [In Chinese]

Narahara, M., and I. Kai

1991. Seasonal population trends of male citrus leafminer *Phyllocnistis citrella* Stainton, as determined by capture in sex attractant baited traps in Oita Prefecture. *Proc. Assoc. Plant Prot. Kyushu* (Kitakyushu), 37:160-162.

Ujiye, T.

1990. Studies on the utilization of a sex attractant of the citrus

leafminer moth, *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistidae): I. Analysis of seasonal population trends and some behavioral characteristics of the male moths by the use of synthetic sex attractant traps in the field. *Bull. Fruit Tree Res. Sta.* (Tsukuba), 18:19-46. [In Japanese]

1992. Studies on the utilization of a sex attractant of the citrus leafminer moth, *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistidae): II. Feeding of moths trapped on a sticky board by a snail, *Acusta despecta sieboldiana* (Pfeiffer) and ants. *Bull. Fruit Tree Res. Sta.* (Tsukuba), 22:91-97. [In Japanese]

PARASITES**Ashmead, W. H.**

1904. Descriptions of new Hymenoptera from Japan II. *J. New York Ent. Soc.*, 12:146-165.

Bouček, Z.

1988. *Australasian Chalcidoidea (Hymenoptera): a biosystematic revision of genera of fourteen families, with a reclassification of species*. London: CIE. 832pp.

Chen, M. S., and X. N. Luo

1990. The population dynamics and control effectiveness of dominant parasitoids of lepidopterous pests. In *Natural enemies of insects*, 12:78-81.

Ding, Y., M. Li, and M. D. Huang

1989. Studies on the biology of two species of parasitoids, *Tetrastichus phyllocnistoides* and *Cirrospilus quadristriatus*, and their parasitization of the Citrus leaf miner *Phyllocnistis citrella* Stn. In *Studies on the integrated management of citrus insect pests*, 106-113. Guangzhou: Acad. Bk. Periodical Pr.

Ferrière, C.

1929. The Asiatic and African species of the genus *Elasmus*, Westw. (Hym., Chalci.). *Bull. Ent. Res.* (London), 20:411-423.

Gahan, A. B.

1932. Miscellaneous descriptions and notes on parasitic Hymenoptera. *Ann. Ent. Soc. Amer.* (Washington), 25:736-757.

Girault, A. A.

- 1913a. Diagnoses of new chalcidoid Hymenoptera from Queensland, Australia. *Arch. Naturg.* (Berlin), 79A (6):90-107.
- 1913b. Australian Hymenoptera Chalcidoidea — VI. The family Pteromalidae with descriptions of new genera and species. *Mem. Qd. Mus.* (Brisbane), 2:303-334.
1915. Australian Hymenoptera Chalcidoidea — IV. Supplement. *Mem. Qd. Mus.* (Brisbane), 3:180-299.

Ishii, T.

1953. A report of the studies of the parasite wasps of injurious insects. *Bull. Fac. Agric. Tokyo Univ.* (Tokyo), 1(2):1-10.

Kamijo, K.

1976. Notes on Ashmead's and Crawford's types of Eulophidae (Hymenoptera, Chalcidoidea) from Japan. *Kontyu* (Tokyo), 44:482-495.
1987. Notes on Japanese species of *Cirrospilus* (Hymenoptera, Eulophidae), with descriptions of two new species. *Kontyu* (Tokyo), 55:43-50.
1990. Notes on *Pleurotroppopsis* (Hymenoptera, Eulophidae) and its allied genera, with descriptions of four new species from Japan. *Japan. J. Ent.* (Tokyo), 58:816-826.

Logvinovskaya, T. V.

1983. A new species of *Ageniaspis* Dahlbom, 1857 (Hymenoptera, Encyrtidae) from Vietnam. *Ent. Obozr.* (Moscow), 62:610-611. [In Russian] (Engl. transl: *Ent. Rev.* (Washington), 62(3):150-152.)

Muesebeck, C. F. W.

1933. Seven new species of reared Braconidae (Hymenoptera). *Proc. Ent. Soc. Washington*, 35:193-200.

Narayanan, E. S.

1960. Two new species of chalcidoid parasites in India. *Proc. Indian Acad. Sci. (New Delhi)*, (B) 52:119-123.

Rao, B. R. S., and S. Ramamani

1966. Biology of *Cirrospiloideus phyllocnistoides* (Narayanan) and description of a new species, *Scotolinx quadristriata* (Hymenoptera: Eulophidae) as parasites of *Phyllocnistis citrella* Stainton. *Indian J. Ent. (New Delhi)*, 27:408-413.

Ujiye, T.

1988. Parasitoid complex of the citrus leafminer, *Phyllocnistis citrella* (Lepidoptera: Phyllocnistidae) in several citrus-growing districts of Japan. *Proc. Assoc. Plant Prot. Kyushu (Kitakyushu)*, 34:180-183. [In Japanese]

Ujiye, T., and R. Morakote

1992. Parasitoids of the citrus leafminer, *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistidae) in Thailand. *Japan. J. Appl. Ent. Zool. (Tokyo)*, 36:253-255.

Voûte, A. D.

1932. Een nieuw van bestrijding van een insectenplaag met behulp van een inheemschen parasiet (*Ageniaspis* sp., parasiet van *Phyllocnistis citrella* Staint.). *Tijd. Ent. (Amsterdam)*, 75 (suppl.):128-135.
1935. Der Einfluss von *Ageniopsis* sp. auf ihren Wirt *Phyllocnistis citrella* Staint. unter verschiedenen (mikro-) klimatischen Verhältnissen. *Arch. Neerland. Zool. (Leiden)*, 1:354-372.

Westwood, J. O.

1833. Further notice of the British parasitic insects; together with the "Transactions of a fly with a long tail," observed by Mr. E. W. Lewis; and additional observations. *Mag. Nat. Hist. (London)*, 6:414-421.

CONTROL AND ECONOMICS**Ahmad, S. K.**

1988. Chemical control of citrus leaf miner on citrus. *Pakistan J. Agric. Res. (Lahore)*, 9:271-273.

Alam, M. Z., A. Ahmed, S. Alam, and M. A. Islam

1965. *A review of research Division of Entomology (1947-1964)*. Dacca: Agric. Infor. Serv. & E. Pakistan Agric. Res. Inst. 272pp.

Anon.

1963. Pest & Disease Number. *Plant Prot. Bull.*, 11:1-70. (1959)

Atwal, A. S., and G. C. Verma

1970. Studies on the control of citrus leaf miner, *Phyllocnistis citrella* Stainton (Gracillariidae: Lepidoptera). *J. Res. Punjab Agric. Univ. (Ludhiana)*, 7:55-57.

Awate, B. G., L. M. Naik, and U. M. Raut

1976. Control of citrus leaf-miner (*Phyllocnistis citrella* Stainton: Gracillariidae: Lepidoptera) with modern synthetic insecticides. *J. Plant Crops*, 4:35-36.

Ayoub, M. A.

1960. *Phyllocnistis citrella* Stainton, a main Citrus pest in Saudi Arabia (Microlepidoptera: Lyonetiidae). *Bull. Soc. Ent. Egypte (Cairo)*, 44:387-391.

Ayyar, T. V. R.

1923. Some insects noted as pests of fruit trees in south India. *Agric. J. India (Calcutta)*, 1:50-59.

Badawy, A.

1968. The control of *Phyllocnistis citrella* Staint., a Citrus leaf-miner in the Sudan (Lepidoptera: Gracillariidae). *Bull. Ent. Soc. Egypt (Cairo)*, (Econ. ser.) 2:129-130.

Baltazar, C. R.

1968. Supplementary host list and checklist of Philippine plant pests. *Philipp. J. Sci. (Manila)*, 97:177-227.

Batra, R. C.

1990. Citriculture in north-western India. In Gill, K. S., J. S. Kanwar, and R. Singh (eds.), *Proceedings of a citrus show-cum-seminar on prospects and problems of kinnow cultivation, Ludhiana, India, 6-7 January, 1989*, 189-195.

Batra, R. C., and G. S. Sandhu

1980. Soil systemic granular insecticides for chemical control of citrus leaf-miner *Phyllocnistis citrella* on kinnow mandarin. *Pestology (Bombay)*, 4:13-14.
- 1981a. Differential population of citrus leaf miner and its parasites on some commercial citrus cultivars. *J. Res. Punjab Agric. Univ. (Ludhiana)*, 18:170-176.
- 1981b. Screening of citrus germplasm for citrus leaf-miner in the Punjab. *J. Res. Punjab Agric. Univ. (Ludhiana)*, 18:221-223.
- 1981c. Comparison of different insecticides for the control of citrus leaf-miner *Phyllocnistis citrella* in the nursery. *Pesticides (Bombay)*, 15:5-6.
- 1981d. Foliar spraying and soil drench treatments of insecticides for the control of citrus leaf miner *Phyllocnistis citrella*. *Indian J. Ent. (New Delhi)*, 43:83-86.
1983. Mechanism of resistance in Troyer citrange to citrus leaf-miner. *J. Res. Punjab Agric. Univ. (Ludhiana)*, 20:558-559.
- Batra, R. C., G. S. Sandhu, S. C. Sharma, and R. Singh**
1988. Biology of citrus leaf-miner on some citrus rootstocks and its relationship with abiotic factors. *Punjab Hort. J. (Patiala)*, 28:30-35.

Beattie, G. A. C.

1989. Citrus leaf miner. *NSW Agric. Fisheries, Agfact (Sydney)*, H2. AE.4:1-4.

Bindra, O. S.

1957. Insect-pests of citrus and their control. *Indian J. Hort. (Sabour)*, 14:89-98.

Bodenheimer, F. S.

1951. *Citrus entomology in the Middle East with special references to Egypt, Iran, Irak, Palestine, Syria, Turkey*. The Hague: W. Junk. 663pp.

Bohlen, E.

1973. *Crop pests in Tanzania and their control*. Berlin: P. Parey. 142pp.

Bokura, U.

1936. Care in preventing citrus canker. *J. Plant Prot. (Tokyo)*, 23:431-435. [In Japanese]

Brooks, G. T.

1958. Summary of insect conditions in Pakistan. *Coop. Econ. Ins. Rep. (Washington)*, 8:140-142.

Butani, D. K.

1979. Insect pests of citrus and their control. *Pesticides (Bombay)*, 13:15-21.

Caswell, G. H.

1962. *Agricultural Entomology in the Tropics*. London: E. Arnold. 152pp.

Catling, H. D., S. C. Lee, D. K. Moon, and H. Kim

1977. Towards the integrated control of Korean citrus pests. *Entomophaga (Zurich)*, 22:335-343.

Chang, Y. C., and L. M. Hung

1986. A list of forest insect-pests and their host plants in Taiwan. *Taiwan For. Res. Inst. Spec. Bull. (Taichung)*, 25:1-282.

Chekiang University of Agriculture

- 1962-64. *Agricultural entomology*. Shanghai. 2v (777pp). [In Chinese]

- Chen, F. G., and F. P. Wong**
1936. A list of the known fruit insects of China. *Yearbk., Bur. Ent. Hangchow*, 5:82-140. (1935)
- Chen, R. T., Y. H. Chen, and M. N. Huang**
1989. Biology of the green lacewing, *Chrysopa boninensis* and its predation efficiency on the Citrus leaf miner, *Phyllocnistis citrella*. In *Studies on the integrated management of citrus insect pests*, 96-105. Guangzhou: Acad. Bk. Periodical Pr.
- Cherian, M. C.**
1942. Our present position with regard to the control of fruit pests. *Madras Agric. J.* (Madras), 30:14-17.
- Chiu, S. C.**
1985. Biological control of citrus pests in Taiwan. *Taiwan Agric. Res. Inst. Spec. Rep.* (Taichung), 19:1-8.
- Chopra, R. L.**
1928. Annual report of the entomologist to the Government, Punjab, Lyallpur, for the year 1925-26. *Rep. Dept. Agric. Punjab, 1925-26* (Lahore), 1:67-125.
- Clausen, C. P.**
1927. The citrus insects of Japan. *USDA, Tech. Bull.* (Washington), 15:1-15.
1933. The citrus insects of tropical Asia. *USDA, Cir.* (Washington), 266:1-35.
- Commonwealth Institute of Entomology (CIE)**
1970. *Phyllocnistis citrella* Stnt. In *Distribution maps of pests*. Ser. A, Map No. 274. London.
1986. *Phyllocnistis citrella* Stnt. In *Distribution maps of pests*. Ser. A, Map No. 274 (rev.). London.
- Cook, A. A.**
1988. Association of citrus canker pustules with leaf miner tunnels in North Yemen. *Plant Disease* (St. Paul), 72:546.
- Corbett, G. H.**
1928. Division of Entomology. Annual report for 1927. *Malayan Agric. J.* (Kuala Lumpur), 16:136-140.
1935. Division of Entomology. Annual report for the year 1934. *Gen. Ser. Dept. Agric. S. S. & F. M. S.* (Kuala Lumpur), 21:43-56.
- Cotterell, G. S.**
1954. Notes on insect injuries to crops in Afghanistan. *FAO Plant Prot. Bull.* (Rome), 2:53-55.
- Dammerman, K. W.**
1929. *The Agricultural Zoology of the Malay Archipelago: the animals injurious and beneficial to agriculture, horticulture and forestry in the Malay Peninsula, the Dutch East Indies and the Philippines*. Amsterdam: J. H. de Bussy. 473pp.
- Dumbleton, L. J.**
1954. A list of insect pests recorded in South Pacific Territories. *FAO S. Pacific Comm., Tech. Pap.* (Brisbane), 79:1-196.
- Ebeling, W.**
1959. *Subtropical fruit pests*. Berkeley: Univ. Calif. Pr. 436pp.
- Ela, R. M.**
1955. Four insecticide-fungicide combination sprays in the control of some pests affecting citrus in the Philippines. *Philipp. Agric.* (Laguna), 39:354-363.
- Farahbakhsh, G.**
1961. A checklist of economically important insects and other enemies of plants and agricultural products in Iran. *Publ. Dept. Plant Prot., Minis. Agric.* (Tehran), 1:1-153, 2pl.
- Food and Agriculture Organization (FAO)**
1961. Host list of insects recorded in the South East Asia and Pacific Region. Citrus sp. — Citrus. *FAO Plant Prot. Comm. S.E. Asia, Tech. Doc* (Bangkok), 22(2):1-9.
1972. *Report to the government of Saudi Arabia on research in plant protection based on the work of H. E. Martin, FAO entomologist*. 38pp.
- Gentry, J. W.**
1965. Crop insects of northeast Africa-southwest Asia. *USDA, Agric. Hdbk* (Washington), 273:1-210.
- Ghosh, C. C.**
1924. Reports by the entomologist, Mandalay, for years ended 30th June 1922 and 1923. *Rep. Ent.* (Rangoon), 1923:1-14; 1924:1-19.
1940. *Insect pests of Burma*. Rangoon: Govt. Print. 216pp, 87pl.
- Ghuguskar, H. T., S. G. Radke, and M. N. Borle**
1981. Unusual heavy incidence of citrus leaf miner, *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistidae) on nagpuri santra in Amravati and Nagpur District. *P. K. V. Res. J.* (Akola), 5:143-147.
- Giorbelidze, A. A.**
1979. Protection of citrus in Afghanistan. *Zashchita Rastenii* (Moscow), 8:59. [In Russian]
- Gupta, S. R.**
1929. Entomology. In *Rep. Dept. Agric. Assam* (Shillong), 1928-29:44-45.
- Hall, C. J. J. van**
1925. Ziekten en Plagen der Cultuurgewassen in Nederlandsch-Indie in 1924. *Meded. Inst. Plantenziekten Buitenzorg* (Bogor), 67:1-53.
- Hanifa, A. M., and S. Palaniswamy**
1977. Evaluation of certain insecticides against citrus leafminer, *Phyllocnistis citrella*, on acidlime. *Internatl. Symp. Citriculture* (Bangalore), 34.
- Hanson, H. C.**
1963a. *Diseases and pests of economic plants in Burma: a study based on field survey data and on pertinent records, material, and reports*. Washington: Amer. Inst. Crop Ecol. 68pp.
1963b. *Diseases and pests of economic plants of Vietnam, Laos and Cambodia: a study based on field survey data and on pertinent records*. Washington: Amer. Inst. Crop Ecol. 155pp.
- Hector, G. P.**
1921-24. Reports of the economic botanist to the Government of Bengal for the years 1919-1923. *Rep. Dept. Agric. Bengal* (Calcutta), 1919-20:iii; 1920-21:33-36; 1921-22:37-41; 1922-23:i-v.
- Heppner, J. B.**
1993. Citrus leafminer, *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae: Phyllocnistinae). *Fla. Dept. Agric. Consumer Serv., Div. Plant Indus., Ent. Circ.* (Gainesville), 359:1-2.
- Hill, G. F.**
1918. History of citrus canker in the Northern Territory (with notes of its occurrence elsewhere). *N. Terr. Austr. Bull.* (Darwin), 18:1-8.
- Huang, M. D., D. X. Cheng, S. X. Li, X. H. Mai, W. C. Tan, and J. Szetu**
1989a. Studies on population dynamics and control strategy of the citrus leaf miner. *Acta Ent. Sinica* (Beijing), 32:58-67. [In Chinese]
1989b. Studies on annual population dynamics and control strategy of the Citrus leaf miner. In *Studies on the integrated management of Citrus insect pests*, 63-75. Guangzhou: Acad. Bk. & Periodical Pr. [In Chinese]
- Huang, M. D., and S. X. Li**
1989. The damage and economic threshold of Citrus leaf miner, *Phyllocnistis citrella* Stainton to Citrus. In *Studies on the integrated management of Citrus insect pests*, 84-89. Guangzhou: Acad. Bk. & Periodical Pr. [In Chinese]

- Husain, M. A.**
1925. Annual report of the entomologist to Government, Punjab, Lyallpur, for the year 1922-23. *Rep. Dept. Agric. Punjab, 1922-23* (Lahore), 2:177-204.
- Hutson, J. C.**
1933. *Report on the work of the Entomological Division*. Peradeniya: Ceylon Dept. Agric. 23pp.
1934. Report on the work of the Entomological Division. *Admin. Rep. Dir. Agric. Ceylon 1933* (Colombo), D:134-140.
- Ito, I., T. Shibata, K. Shimohara, and K. Kawachi**
1982. Characteristic of fenvalerate in controlling the citrus leaf miner *Phyllocnistis citrella* Stainton (Lepidoptera: Gracilariidae). *Appl. Ent. Zool.* (Tokyo), 17:284-286.
- Johnston,**
1959. [Note]
Bull. Dept. Agric. Malaya (Kuala Lumpur), 110:20.
- Kalshoven, L. G. E.**
1950-51. *De Plagen van de Cultuurgewassen in Indonesië*. The Hague: Bandoeng. 2 v.
1981. *Pests of crops in Indonesia*. Jakarta: Ichtar Baru. 701pp. [Engl. trans.]
- Khanna, S. S., and Y. D. Pande**
1966. Bionomics and control of *Phyllocnistis citrella* Stainton. *Allahabad Farm.* (Allahabad), 40:203-209.
- Khare, J. L.**
1922. Some citrus pests in the Nagpur District. *Dept. Agric. Cent. Prov. Bull.* (Nagpur), 10:1-14, 10pl.
- Kohno, M., and S. Makino**
1969. Studies on the control of citrus leaf miner by insecticidal dusts. *Proc. Kyushu Assoc. Plant Prot.*, 15:160-163.
- Koli, S. Z., and K. G. Choudhari**
1981. Seasonal abundance of citrus pests and their control. *Indian J. Ent.* (New Delhi), 43:183-187.
- Laboratoires d'Entomologie**
1937. [Report]. *C. R. Inst. Rech. Agron. Indochine 1935-36* (Hanoi), 1:71-76, 1pl.
- Lahiri, A. R., and S. Biswas**
[1982]. Observations on the relative intensity of infection on three species of cultivated citrus plants by *Psylla murrayi* Mathur (Homoptera: Psyllidae) at Shillong, Meghalaya. *Bull. Zool. Survey India* (Calcutta), 2:123-127. (1980) [competition from citrus leafminer]
- Lakra, R. K., Z. Singh, and W. S. Kharub**
1984. Population dynamics of citrus leaf-miner *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistidae) in Haryana. *Indian J. Ecol.* (Ludhiana), 11:146-153.
- Lal, K. B.**
1950. Insect-pests of fruit trees grown in the plains [India]. *Agric. Anim. Husb. Uttar Pradesh* (Lucknow), 1:30-45.
- Latif, A., and C. M. Yunus**
1951. Food plants of citrus leaf miner in Punjab. *Bull. Ent. Res.* (London), 42:311-316.
- Lattin, J. D., and P. Oman**
1983. Where are the exotic insect threats? In C. L. Wilson & C. L. Graham (eds.), *Exotic plant pests and North American agriculture*, 93-137. New York: Academic Pr.
- Lee, L. H. Y., and R. Winney**
1981. Check list of agricultural insects of Hong Kong 1981. *Agric. Fish. Dept. Bull.* (Hong Kong), 2:1-164.
- Macabasco, C. B.**
1961. The citrus pests and their control. *Philipp. J. Agric.* (Manila), 26:133.
- Maddison, P.** (ed.)
1986. Symposium on biological control of insects of economic importance. 15th Pacific Science Congress, 1-11 February 1983, Dunedin, New Zealand. *Agric. Ecosyst. Envir., DSIR* (Auckland), 15:85-220.
- Mahfood, S. A.**
1968. *A preliminary list of plant pests and diseases in the People's Republic of Southern Yemen*. Cairo: Near East Plant Prot. Comm. 9pp.
- Manser, P. D., G. H. Plumb, and M. Liengphilavanh**
1968. A preliminary list of insects found on economic crops in Laos. *FAO Plant Prot. Comm. S. E. Asia, Tech. Doc.* (Bangkok), 63:1-4.
- Margabandhu, V.**
1933. Insect pests of oranges in the northern Circars. *Madras Agric. J.* (Coimbatore), 21:60-68.
- Mason, R. R., and P. Y. So**
1969. The control of citrus leaf-miner (*Phyllocnistis citrella* Stainton). *Agric. Sci. Hong Kong*, 1:58-74.
- Millet, E. R.**
1964. Summary of insect conditions in Afghanistan. *Coop. Econ. Ins. Rep.* (Washington), 14:19-21.
- Milne, D.**
1927. Entomology. *Rep. Dept. Agric. Punjab* (Lahore), 1925-26:49-54.
- Mitra, S. K., and P. C. Khongwir**
1928. Orange cultivation in Assam. *Bull. Dept. Agric. Assam* (Shillong), 2:1-19.
- Mo, Y. S., P. J. Lu, and S. R. Huang**
1981. A good result in control of citrus leaf-miner with pyrethroids. *Guangdong Nongye Kexue* (Guangzhou), 6:47-48. [In Chinese]
- Murai, M.**
1974. Studies on the interference among larvae of the citrus leaf-miner, *Phyllocnistis citrella* Stainton. *Res. Pop. Ecol.* (Tokyo), 16:80-111.
- Nagalingam, B., and P. Savithri**
[1983]. Studies on the chemical control of citrus leaf miner *Phyllocnistis citrella* Stainton (Gracilariidae Lepidoptera). *Pestology* (Bombay), 4:21-24. (1980)
- Nitobe, I.**
1916. The citrus insects of Formosa. *Formosa Agric. Exp. Sta. Rep.* (Taipei), 89:1-210.
- Oakley,**
1953. [Note].
Proc. 7th Pacific Sci. Cong., 4:179.
- Oei-Dharma, H. P.**
1969. *Use of pesticides and control of economic pests and diseases in Indonesia*. Leiden: E. J. Brill. 199pp.
- Oozi, Y.**
1938. On *Phyllocnistis citrella* Stainton. *Ent. World* (Tokyo), 6:223-228, 1pl. [In Japanese]
- Paik, W. H.**
1958. Citrus insect problems in Quelpart Island. *Korean J. Appl. Zool.* (Seoul), 1:26-35. [In Japanese]
- Pal, S. K.**
1971. Control of citrus leaf miner *Phyllocnistis citrella* Stainton (Gracilariidae: Lepidoptera) in Himachal Pradesh. *Madras Agric. J.* (Madras), 58:409-410.
- Pant, N. C.** (ed.)
1964. *Entomology in India*. New Delhi: Ent. Soc. India. 529pp.
- Patil, A. V., N. P. Kahare, and B. R. Raut**
1972. Screening the genetic stock of different varieties of citrus rootstocks against citrus leaf-miner and citrus psylla. *Pesticides*, 6:48-50, 52.

- Pierce, W. D.**
1918. *A manual of dangerous insects likely to be introduced in the United States through importations*. Washington: U.S. Dept. Agric. 256pp.
- Pillai, R. M.**
1921. Short notes on the insect pests of crops in Travancore. *Travancore Dept. Agric.* (Trivandrum), 1921:1-53.
- Pruthi, H. S., and H. N. Batra**
1938. A preliminary list of fruit pests of the North West Frontier Provinces. *Misc. Bull. Imp. Council Agric. Res. Sci. Monog.* (New Delhi), 19:10-12.
- Pruthi, H. S., and M. S. Mani**
1945. Our knowledge of the insect and mite pests of the citrus in India and their control. *Imp. Council Agric. Res. Sci. Monog.* (New Delhi), 16:1-42.
- Quayle, H. J.**
1938. *Insects of citrus and other subtropical fruits*. Ithaca: Comstock Publ. Co. 583pp.
- Radke, S. G., and H. G. Kandalkar**
1988. Chemical control of citrus leafminer. *P.K.V. Res. J.* (Akola), 12:123-125.
- Radke, S. G., and A. Y. Thakare**
1989. Chemical control of citrus leaf miner. *P.K.V. Res. J.* (Akola), 13:44-47.
- Rahman, K. A.**
1940. Important insect-pests of fruit trees and their control. *Punjab Fruit J.* (Lahore), 4:1-4.
- Rahman, K. A., and M. Yunus**
1945. The citrus leaf miner. *Indian Farming* (New Delhi), 6:221.
- Rajapakse, R. H. S., and V. K. Kulasekera**
1982. Some observations on the insect pests of cinnamon in Sri Lanka. *Entomon* (Kariavattom, India), 7:221-223.
- Raju, N. B. T., K. R. Reddy, S. V. Rao, K. Lakshminarayana, and B. H. Rao**
1977. Efficiency of different insecticides for the control of citrus leaf miner in A. P. In *Internat. Symp. Citriculture*, 1-34. Bangalore.
- Ramachandrachari, C., V. Padmabhan, and C. Krishnamurthy**
1966. Citrus leafminer and its control in Cuddapah Dist. *Andhra Agric. J.* (Bapatla), 8:234-238.
- Rana, P. N., and K. C. Sharma**
1965. Preliminary list of crop pests in Nepal. *FAO Plant Prot. Comm. S. E. Asia, Tech. Doc.* (Bangkok), 49:1-6.
- Reddy, K. R. S., P. Savitri, and P. K. Rao**
1989. Chemical control of citrus leafminer *Phyllocnistis citrella* St. *Indian J. Ent.* (New Delhi), 50:468-475. (1988)
- Reinking, O. A., and G. W. Groff**
1921. The kao pan seedless Siamese pummelo and its culture. *Philipp. J. Sci.* (Manila), 19:389-437, 16pl.
- Reuther, W., E. C. Calavan, and G. E. Carman** (eds.)
1989. *The citrus industry. Vol. V. Crop protection, postharvest technology, and early history of citrus research in California*. Berkeley: Univ. Calif. 374pp.
- Rutherford, A.**
1914. Leaf miner of citrus (*Phyllocnistis citrella*, Stainton). *Trop. Agric.* (Peradeniya), 43:49-50.
1914. Some insect pests of 1913. *Ceylon Dept. Agric. Bull.* (Peradeniya), 15:1-8.
- Sabine, B. N. E.**
1971. Citrus leafminer. *Qd. Agric. J.* (Brisbane), 97:127-129.
- Sachan, A. S., S. K. Gangwar, and J. N. Sachan**
[1985]. Seasonal incidence of major insect pests of Khasi mandarin (*Citrus reticulata* Blanco.) at high altitudes in Meghalaya. *Indian J. Plant Prot.* (Hyderabad), 10:46-48. (1982)
- Sakai, M., Y. Sato, and M. Kato**
1967. Insecticidal activity of 1,3-bis (carbamoylthio)-2-(N,N-dimethylamino) propane hydrochloride, cartap, with special references to the effectiveness for controlling the rice stem borer. *Jap. J. Appl. Ent. Zool.* (Tokyo), 11:125-134. [In Japanese]
- Sandhu, G. S., and R. C. Batra**
1978a. Incidence of citrus leaf-miner *Phyllocnistis citrella* injury on different cultivars and rootstocks of citrus in the Punjab. *Punjab Hort. J.* (Patiala), 18:92-96.
1978b. Sources of resistance as observed under field infestation against citrus leaf-miner. *Sci. Culture* (Calcutta), 44:122-124.
- Sasscer, E. R.**
1915. Important insect pests collected on imported nursery stock in 1914. *J. Econ. Ent.* (Geneva, NY), 8:268-270.
- Schmutterer, H.**
1969. *Pests of crops in northeast and central Africa, with particular reference to the Sudan*. Stuttgart: G. Fischer. 296pp, 16pl.
- Shewale, B. S., D. S. Ajri, and D. B. Kadam**
1987. Evaluation of various insecticides against citrus leaf miner (*Phyllocnistis citrella* Stn.). *Current Res. Reporter, Mahatma Phule Agric. Univ.* (Maharashtra), 3:30-32.
- Shewale, B. S., P. V. Makar, and V. U. Kharole**
[1983]. Insecticidal control of citrus leaf-miner (*Phyllocnistis citrella*). *Pestology* (Bombay), 5:9-10. (1981)
- Shidharan, S., N. Dhandapani, N. Nagarajan, and S. Thamburaj**
1989. Seasonal incidence and control of *Citrus* leaf miner in mandarin orange. *Pestology* (Bombay), 13:15-16.
- Shiraki, T.**
1913. Investigations upon general insect pests. *Formosa Agric. Exp. Sta. Spec. Rep.* (Taipei), 8:1-670.
1934. Insect pests of citrus-trees in Formosa. *J. Soc. Trop. Agric.* (Taipei), 6:29-36, 187-194.
- Siddig, S. A.**
1984. Shambat Research Station. Entomology Section. In *Annual Report of the Gezira Research Station and Substations, Sudan, 1976-1977*, 248-254. Khartoum: Minist. Agric.
- Singh, B. P.**
1984. Studies on the bionomics and control of citrus leaf miner *Phyllocnistis citrella* Stainton. *Pesticides* (Bombay), 18:46-50.
- Singh, S. P., and N. S. Rao**
[1980]. Relative susceptibilities of different species/varieties of citrus to leaf miner, *Phyllocnistis citrella* Stainton. *Proc. Internat. Soc. Citricult.* (Griffith, Austr.), 1978:174-177.
- Singh, S. P., N. S. Rao, K. K. Kumar, and B. S. Bhumannavar**
1989. Field screening of citrus germplasm against the citrus leaf-miner, *Phyllocnistis citrella* Stainton. *Indian J. Ent.* (New Delhi), 50:69-75. (1988)
- Singh, T. V. K., and K. M. Azam**
1988. Seasonal occurrence, population dynamics and chemical control of citrus leafminer, *Phyllocnistis citrella* Stainton in Andhra Pradesh. *Indian J. Ent.* (New Delhi), 48:38-42.
- Sinha, M. K., R. C. Batra, and D. K. Uppal**
1972. Role of citrus leaf-miner (*Phyllocnistis citrella* Stainton), on the prevalence and severity of citrus canker (*Xanthomonas citri* (Hase) Dowson). *Madras Agric. J.* (Madras), 59:240-245.
- Sohi, G. S., and M. S. Sandhu**
1968. Relationship between *Citrus* leaf-miner (*Phyllocnistis citrella* Stainton) injury and citrus canker (*Xanthomonas citri* (Hase) Dowson) incidence on *Citrus* leaves. *J. Res. Punjab Agric. Univ.* (Ludhiana), 5:66-69.
- Talhouk, A. S.**
1975. Citrus pests throughout the world. In *Citrus. Ciba-Geigy*

- Agrochem., Tech. Monog.* (Basle), 4:21-23, map.
- Tan, W. C., D. X. Chang, and M. D. Huang**
1989. An autoregressive model of the population dynamics of the Citrus leaf miner. In *Studies on the integrated management of citrus insect pests*, 76-83. Guangzhou: Acad. Bk. & Periodical Pr. [In Chinese]
- Tanaka, M.**
1966. Fundamental studies on the utilization of natural enemies in the citrus grove in Japan. I. The bionomics of natural enemies of the most serious pests. *Bull. Hort. Res. Sta.* (Tokyo), (D), 4:
- Tao, C. C., and K. C. Wu**
1968. Report on citrus insect control study by chemicals in Taiwan. *Plant Prot. Bull. Taiwan* (Taipei), 10:57-64. [In Chinese]
1969. Studies on bark treatment against Citrus insects. *Plant Prot. Bull. Taiwan* (Taipei), 11:143-149. [In Chinese]
- Thomas, R. T. S.**
1962. The pests of some cultivated plants in Netherlands New Guinea. *Bull. Dept. Econ. Affairs (Agric. Serv.), Hollandia* (Dutch New Guinea), 1:1-126.
- Tough, D.**
1975. Citrus leaf miner on the advance. *Agric. Gaz. NSW*, 86:15.
- U. S. Dept. Agric. (USDA)**
1958. Citrus leaf miner (*Phyllocnistis citrella* Stainton). In *Insects not known to occur in the United States. Coop. Econ. Insect Rep.* (Washington), 8:35-36.
- Valand, V. M., J. R. Patel, and N. C. Patel**
1992. Bioefficacy of insecticides against citrus leaf miner, *Phyllocnistis citrella* Stainton, on kagzi lime. *Indian J. Plant Prot.* (Hyderabad), 20:212-214.
- Vekateswarlu, C., and S. Ramapandu**
1992. Compatibility of fungicides and bactericide with insecticides in the control of citrus canker and leafminer in acidlime. *Indian J. Plant Prot.* (Hyderabad), 20:27-31.
- Verma, G. C., and G. S. Sohi**
1967. Studies on the chemical control of Citrus leaf miner *Phyllocnistis citrella* Stainton (Gracilariidae: Lepidoptera). *J. Res. Punjab Agric. Univ.* (Ludhiana), 4:227-232.
- Verma, R. R.**
1989. Studies on the tolerance of species and varieties of Citrus to the citrus leaf-miner, *Phyllocnistis citrella* Stainton. *Agric. Sci. Digest* (Karnal), 9:31-33.
- Vivekanandan, P., and T. G. Naganathan**
1983. Efficacy of insecticides in the control of citrus leaf-miner (*Phyllocnistis citrella*). *Pesticides* (Bombay), 17:22-23.
- Voûte, A. D.**
1934. De djerock-mineerrups (*Phyllocnistis citrella* St.). *Inst. Plantenziekt. Buitenzorg* (Bogor), 19:138-175, 2pl.
1935. De plagen van de djerোকcultuur in Nederlandsch-Indie. *Meded. Inst. Plantenziekt. Buitenzorg* (Bogor), 86:1-65, 5pl.
- Wallace, C. R.**
1966. *Check list of Sarawak insects of economic importance. Report on an entomological investigation in Sarawak 1960-62.* London: Minist. Overseas Devel. 92pp.
- Whittle, A. M.**
1992. Diseases and pests of citrus in Viet Nam. *FAO Plant Prot. Bull.* (Rome), 40:75-81.
- Wilson, C. G.**
1991a. Notes on *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistidae) attacking four citrus varieties in Darwin. *J. Austr. Ent. Soc.* (Brisbane), 30:77-78.
1991b. Citrus leaf miner. *Agnote* (Darwin), 443:1-2.
- Woglum, R. S.**
1913. Report of a trip to India and the Orient in search of natural enemies of the citrus whitefly. *USDA, Bur. Ent. Bull.* (Washington), 120:1-58, 12pl.
- Wu, K. C., and C. C. Tao**
1977. Comparative study of spraying and painting insecticides against citrus leaf miner, *Phyllocnistis citrella* (Phyllocnistidae, Lepidoptera). *J. Agric. Res. China* (Taipei), 26:158-168. [In Chinese]
- Yamamoto, E.**
1972. Studies on the biology and control of the citrus leaf miner, *Phyllocnistis citrella* Stainton. 4. Insecticidal control. *Proc. Assoc. Plant Prot. Kyushu* (Fukuoka), 18:61-63. [In Japanese]
1976. Studies on the biology and control of the citrus leaf miner, *Phyllocnistis citrella* Stainton. 5. On the damage caused by the early infestation. *Proc. Assoc. Plant Prot. Kyushu* (Fukuoka), 22:67-69. [In Japanese]
- Yang, H. H., G. R. Deng, and M. X. Jin**
1990. Study on integrated control of citrus pests and diseases. *J. Guangxi Agric. Coll.* (Nanning), 9(4):1-9. [In Chinese]
- Zhang, Z. Z., et al.**
1980. *Forest Insects of China.* Beijing: Acad. Sinica. 1107pp. [In Chinese]