State of Hawaii
DEPARTMENT OF AGRICULTURE

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Figure 1. Adult citrus leafminer moth.

Citrus Leafminer

Phyllocnistis citrella Stainton

(Lepidoptera: Gracillariidae)

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Introduction. In June 2000, several nursery growers in Waimanalo, Oahu, noticed unfamiliar serpentine leaf mines on their citrus plants and provided leaf samples to the Hawaii Department of Agriculture (HDOA). Adult moth specimens which subsequently emerged from the samples were identified as the citrus leafminer (CLM), *Phyllocnistis citrella* Stainton. CLM originated in southeast Asia and is a major citrus pest in the Old World, causing extensive damage to new leaf flush, particularly on nursery citrus stock (Heppner 1995). It also occurs in Australia, Japan, Taiwan, the Middle East to Sudan, South Africa, and parts of coastal West Africa. In the U.S., the citrus leafminer was found in Florida (1993), Alabama, Louisiana & Texas (1994), and California (2000).

Description and Damage. Injury to young citrus foliage is caused by an elongate, pale, translucent leafminer larva tunneling just under the surface of the leaves (Figure 2). Typically, leaf mines are found on young terminal leaves, and infrequently on tender young stems. Leaf mines usually occur on the undersides of leaves, but are sometimes found on the top surfaces. A thin reddish-brown fecal line is present down the middle of the mines, characteristic of the leafminer. Nearing pupation, a mature larva tunnels to the leaf margins and folds over a short section of the leaf edge (Figure 3). The resulting pupal cell protects the elongate brownish pupa (Figure 4). The adult citrus leafminer emerges as a tiny, 2.5 mm long, silvery moth with a distinct black spot at the tip of each wing (Figure 1). The complete life cycle from egg to adult will take about three weeks. According to Heppner (1993), the adults are active during the day and in the evenings.

Figure 2. A silvery, serpentine leaf mine created by a CLM larva.

Distribution. Citrus leafminer damage is found on citrus plants and trees at nurseries, farms, and residences. Infestations are found throughout Oahu. CLM was first detected on Kauai & Maui in 2001 and on Molokai & the Big Island in 2002.

Figure 3. Exposed CLM larva in a special cell before pupation.

Figure 4. Exposed CLM pupa in a special cell at leaf margin.

Hosts. The citrus leafminer is a pest of *Citrus* species and other Rutaceae in many parts of the world (Legaspi and French, 1997). Affected plants in Hawaii include several varieties of orange (Valencia and navel), lemon (Lisbon and Meyer), lime (Bearss), tangerine, calamondin, grapefruit (ruby), pummelo, and kumquat both in pots and in the ground.

Figure 5. Pupal stage of parasitoid, *Ageniaspis citricola*.

Figure 6. Adult *Ageniaspis citricola.*

Natural Enemies. A tiny parasitic wasp was found attacking the citrus leafminer during an HDOA survey at a Waimanalo nursery in 2000. The parasitoid was recognized from the scientific literature as *Ageniaspis citricola* Logvinovskaya (Hymenoptera: Encyrtidae), the same species released by Florida for biological control of CLM. The characteristic parasitoid pupae, which look like a chain of tiny "sausage-links" (Fig. 5), were found in the CLM pupal cells of many infested leaves. This parasitoid was purposely introduced into Florida from Australia in 1994 for control of CLM (Hoy and Nguyen, 1997). It apparently entered Hawaii at the same time as the leafminer and also became established. This tiny, 0.8 mm long, wasp (Figure 6) will not attack plants and is not harmful to humans. Damage by CLM has been minimized by the presence of this parasitic wasp. *Ageniaspis citricola* is now established on all the major islands and has provided good control of CLM.

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