

# Management of Citrus Leafminer on Texas Citrus

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**Abstract.** The citrus leafminer (CLM), *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae), was first identified on Texas citrus in August 1994. Likely introduced from Mexico on infested citrus stock, CLM spread within a 2-month period throughout the three county Lower Rio Grande Valley (LRGV) citrus growing area—currently comprising about 14,170 ha. New flush growth on virtually all grapefruit and orange cultivars grown commercially in the LRGV have sustained serious CLM feeding injury. CLM infestations and foliar mining are most severe on late summer and early fall growth flushes. CLM peel mining injury has caused downgrading of grapefruit harvested from some LRGV orchards and was especially severe during the 1995–96 season. Orchards in eastern LRGV nearer the Gulf of Mexico generally have higher CLM infestations and sustain greater foliar and fruit injury than orchards located inland in central and western LRGV. Management strategies for CLM on Texas citrus include: fertilization and irrigation timing to influence foliar flushing; use of selective pesticides like Agri-Mek EC (avermectin) + oil and Micromite 25W (diflubenzuron) + oil for short-term control; and utilization of indigenous wasp parasites such as *Zagrammosoma multilineatum* Ashmead, *Horismenus*, and *Closterocerus* species for long-term control. Attempts to introduce and establish the exotic wasp parasite, *Ageniaspis citricola* Logvinoskay, to control CLM in LRGV orchards have been unsuccessful.

The citrus leafminer (CLM), first identified in Florida in May 1993, was subsequently reported in the Lower Rio Grande Valley (LRGV) of Texas in Aug. 1994 (French et al., 1994). Surveys conducted immediately following the discovery revealed that CLM was already well established in several orchards and a large citrus nursery. While CLM foliar feeding injury was severe especially on young trees, finding of serpentine CLM mines on fruit caused even greater concern since Texas citrus is grown mainly for the fresh market. An intensive research program was initiated with the following priorities: expanded orchard surveys for early detection of CLM populations; damage (foliar and fruit); and development of effective management strategies (cultural, biological, and chemical) for CLM—with emphasis on identification and utilization of native and exotic natural enemies (insect parasites and predators).

## Materials and Methods

Releases of the exotic parasite, *Ageniaspis citricola* Logvinoskay (Encyrtidae), were made in several LRGV orchard sites during the spring of 1995 and 1996. Twelve to 24 leaf terminals (new growth flushes) were collected from 80 different commercial orchards during both 1995 and 1996. Samples were processed in the laboratory for detection of CLM populations, damage, and identification (and number) of native and exotic *A. citricola* parasites of CLM. A CLM fruit damage survey was also conducted in 36 grapefruit orchards during June and July 1995. Number of damaged fruit and location within the tree canopy (by height and quadrant) was recorded. Orchard spray trials with both labeled and experimental compounds were evaluated for efficacy against CLM.

## Results

In 1995 and 1996, CLM populations and foliar feeding damage were lowest on the spring flush (February–March), increased significantly in early summer (May–July), and reached highest infestation and damage levels on late summer and fall flushes (September–November). Orchards in eastern LRGV nearer the Gulf of Mexico had a significantly

higher percentage of CLM damaged fruit than orchards located more inland. Also, percentage of damaged fruit was significantly higher in the northwest tree quadrant, with slightly more fruit damage occurring in the lower tree canopy (below 2 m). A total of nine native parasite species were identified from three families—Proctotrupidae, Ceraphronidae, and the common Eulophidae. The most abundant native parasite was *Zagrammosoma multilineatum* (Ashmead), which comprised >68% of the parasite complex identified both in 1995 and 1996. Less dominant parasites were the Eulophids—*Closterocerus* sp., *Horismenus* sp., and *Pnigalio*. The exotic parasite, *A. citricola* was collected at only one orchard release site, with 17% parasitism of CLM. Micromite 25W (diflubenzuron), Agri-Mek EC (abamectin), or Provado 1.6F (imidacloprid), each tank mixed with NR 435 oil or Silwet adjuvant and applied as a foliar spray, all provided >80% kill of 1st–4th stage CLM.

## Conclusion

The native parasite complex, and particularly *Z. multilineatum*, appears to have real potential for long-term management of CLM on Texas citrus. *Zygrammosoma multilineatum* had apparently moved from another leafminer host insect (species identification yet to be determined), that infests Anaqua (Manzanita) trees native to South Texas. Current project emphasis is on the collection of native parasites or parasitized CLM and redistribution into other orchards infested with CLM.

## Literature Cited

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