

Biological Control Update on...

- ...Giant whitefly
- ...Citrus Leafminer
- ...Olive fruit fly

Perennial Crops

- Provide consistent plant structure for long periods
- Stabilized soils & microclimates allow for greater species diversity
- Pest populations tend to get buffered
 - Interspecific competition
 - Generalist natural enemies

Giant Whitefly

Photo Courtesy of Mark S. Hoddle, UC Riverside

Giant Whitefly



- Exploration in Mexico 1997



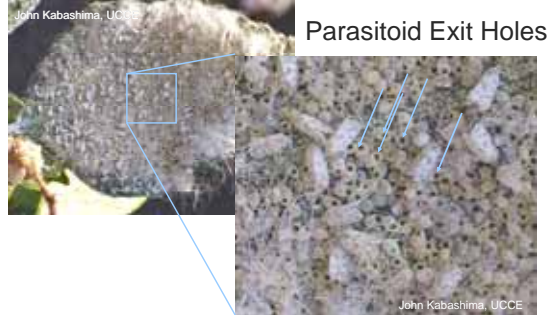
Release



Releases



Establishment



Results



Relocation of natural enemies

- Small numbers of parasitoids from O.C. released in SLO in 2003, 2004 – no recoveries
- A large release in 2006, subsequent recoveries in 2007 (even after hard freeze)

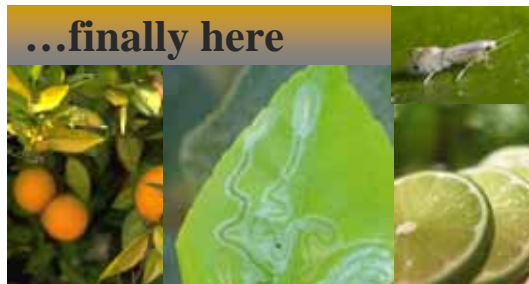
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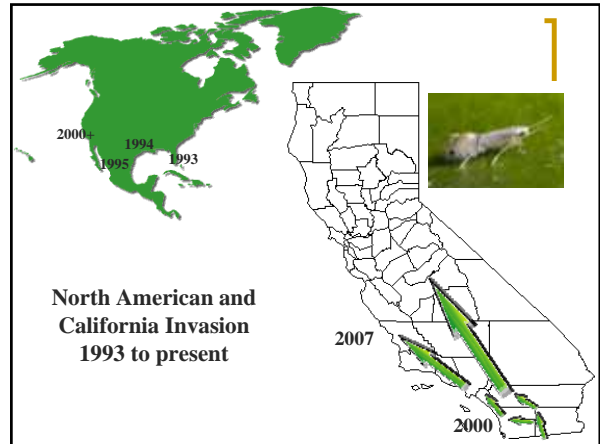
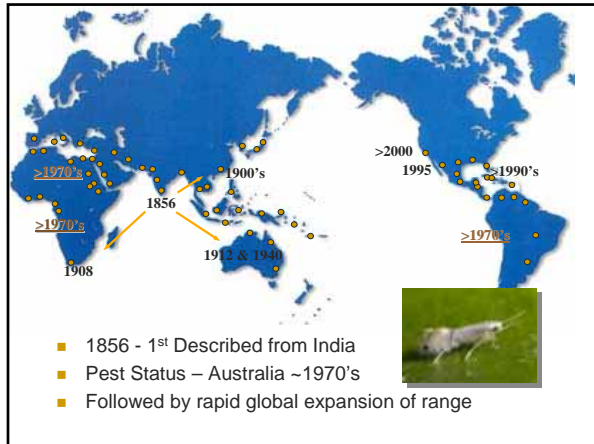
- Moving organisms long distances N/S makes establishment challenging
- SLO populations that become acclimated, may be more useful for moving them farther north to bay area

Citrus Leafminer

Phyllocnistis citrella

...finally here





Host Range

- CLM is found primarily on citrus and plants in the family Rutaceae (i.e., White sapote, Philodendron)

CLM Damage

Characteristics of CLM mining on leaves and stems

Management

New Leaves mined by CLM are curled and look distorted

Mature Orchards:

- Treatments are not necessary for mature trees. The foliage will look bad, but damage should not affect yield
- Insecticide treatments will disrupt natural enemies and make the situation worse

Management

Cultural controls:

- Avoid pruning live branches more than once a year to limit flush growth
- Do not prune off damaged leaves
- Manage vegetative growth

Monitoring



Examine Flush

Use Pheromone traps

Biological Control in CA



Native parasitoids are attacking citrus leafminer in California

Closterocerus utahensis

Cirrospilus coachellae

Pnigalio spp.

Chrysocharis sp.

Sympiesis sp.



Olive Fruit Fly



Olive fruit fly, *Bactrocera oleae* (Rossi)

- Introduced pest from Africa, Asia, and Europe
- Monophagous on olive fruit
- Female lays eggs singly under olive surface, larva tunnels and feeds in the fruit

Olive Fruit Fly



- First detected in Los Angeles, CA in 1998
 - Rapidly spread throughout the state, at least 45 counties by 2004
 - Mediterranean climate on the coast favorable for populations
 - San Joaquin Valley olive growers not hard hit, 0-5% infestation (summer heat kills eggs and larvae)
 - Growers can sell some infested harvest for oil, not for table olives

Current Management

- Pesticides
 - Spinosad bait sprays (GF-120) attract and kill the adults
- Cultural practices
 - Orchard hygiene
 - Kaolin Clay
 - Annihilation trapping – Magnet OL



Olive Fruit Fly

Biological control

- More than 23 parasitoids of *B. oleae* known from native range
- Ca. 8 spp. of braconid parasitoids imported to UC Berkeley quarantine for evaluation
- A release permit was issued for *Psytalia lounsburyi*, which is now being tested for field release

Biological Control of *B. oleae*

- Native parasitoid reared out of olive samples on central coast in early 2000's (UC & CDFA)
- An undescribed *Pteromalus* (sp. nr. *myopitae*)
 - Thus, no information on host records or biology in general – T. Kapaun

Results

- Five tephritid spp. reared from Asteraceae flower heads, but no *Pteromalus* sp. nr. *myopitae*
- Original host remains unknown



Geographical Range

- San Luis Obispo to Ensenada
 - < 30 mi of coast
- None found in La Paz or Guadalajara (no olive fruit)



Olive Fruit Fly & *Pteromalus*

- *Pteromalus* sp. nr. *myopitae* is a female-biased, solitary ectoparasite of the 3rd instar olive fly; no other hosts are known
- From 2004 – 2005 percent parasitism more than doubled in SLO, and olive fly abundance decreased more than 25%
- In 2006 olive fly abundance plummeted in SLO to < 50% of 2004 levels, and the parasitoids almost disappeared, perhaps due to a very late fruit set

[Conclusions]

- Biological control is in a new era
- There must be integration with ongoing management tactics within commercial settings
- We must pursue biological and ecological research to better use natural enemies for best results