Management of Melon Fly Using Pest Behavior & Environmentally Benign Attract and Kill Technologies

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USDA ARS Area-Wide Pest Management Program

Outcomes Sought:
- Suppression
- Sustainable
- Environmentally friendly
The Melon Fly Problem

- Farmers make cover sprays of organophosphates once a week
- Low infestations on the first crops in the spring
- Complete losses by summer with sequential cropping
- Ave 40% losses
A major pest of fruiting vegetables. Some major hosts are:

- Melon
- Gourd
- Squash
- Tomato
- Pumpkin
- Cucumber
Research showed...

- Dr. T. Nishida found that melon fly had a defined behavior
  - Males & females “roost” on certain species of plants nearby or far away from crop hosts
  - We can take advantage of this by creating a system of trap plantings nearby crops
- McQuate showed that Sudex and Castor oil plant were good “roosting” hosts
Applied Biology and Ecology

- Melon fly female long maturation ca. 3 weeks
- Need protein source
  - We can kill many females and males before they attain sexual maturity using a system of trap plantings and attract & kill food baits
- Melon fly has a long lifespan
  - Reduce the lifespan of females using a system of trap plantings and attract & kill food baits
Melon fly suppression tactics implemented

1) Crop hygiene
Destruction of culled fruit within one week of last harvest
2) **Attract & kill food baits – GF-120NF**

- Bait with spinosad
- Attracts males & females of tropical fruit fly species
- Adults need protein source
- Short-distance attractant
- Certified organic
- Dow AgroScience product
GF-120

- Attracts fruit flies by odors
- Mixed with water 1:4 to 1:10 v/v
- Flies die after feeding on the bait (but not immediately)
Bait Application

- Used as spot or blotch spray
- Hand, backpack or mobile sprayers
- Use nozzle to have low volume output
- 10-16 cm² spot is ok
Trap plants

• Plant melon fly roosting hosts—corn, tapioca, sudex, or castor oil weed

• Roosting host should be on-farm where the food bait can be applied

• Spray once a week, more often during rainy periods
3) Attract & kill mass trapping (male annihilation)

- Mass trapping of male flies using cue lure along with a killing agent
- Reduces mating
- 1 trap per 3 to 4 acres
Hands-on Teaching Philosophy

• HAW-FLYPM gave GF-120, male lures and traps to cooperators who agreed to perform the control program.
• Education was on an area-wide basis.
Sudex Trap Plants
1 double-row per 24 crop rows

GF-120
Spot treatments
Oahu, Ewa: Melon Fruit Fly Population Monitoring

Flies per trap day

Jan May Sep Jan May Sep Jan May Sep Jan May Sep

2000 2001 2002

Male Annihilation

GF 120 Ewa
Maui Suppression Zone

- Implementation area - 10,900 acres
- Fruiting vegetables
  - Melons - summer
  - Squash - weekly
  - Tomato - weekly
- Tree fruits
  - Persimmon
- Fruit fly pests:
  - Melon fly is key pest
  - Med fly
  - Oriental fruit fly
Castor oil plant

- Preferred trap plant
- Drought tolerant
- Perennial
- High association with melon flies in vicinity of susceptible crops
GF-120 alone may not be sufficient

Attract & kill male trapping helps in suppression
Small Farm Infestations
Kula, Maui 2004

- Multiple crops
- Small clustered farms
- Small sequential plantings

Prior to Program: 30 to 40% Infestation

1-2-3 Suppression

Without 1-2-3 Suppression

Infested Fruit

Percent fruit

Mar-04  Apr-04  May-04  Jun-04  Jul-04
HAW-FLYPM Demonstration

Farmer decisions only

No trap plants; cover sprays

2004 2005
Economic Impacts
Melon Fly Suppression in Zucchini

• Twenty growers interviewed
• Universal view that they have significantly benefited from program adoption
• Benefits
  – Increase in marketable yield
  – Price increases resulting from improved quality
    • 80% grade A compared with 40% prior to adoption of 1-2-3
  – Reduction in labor costs with harvesting and grading
  – Savings associated with reduced insecticides use
• Financial benefits minus 1-2-3 costs
  – $6,359 per acre