Walnut Husk Fly:

Biology, Monitoring and Management

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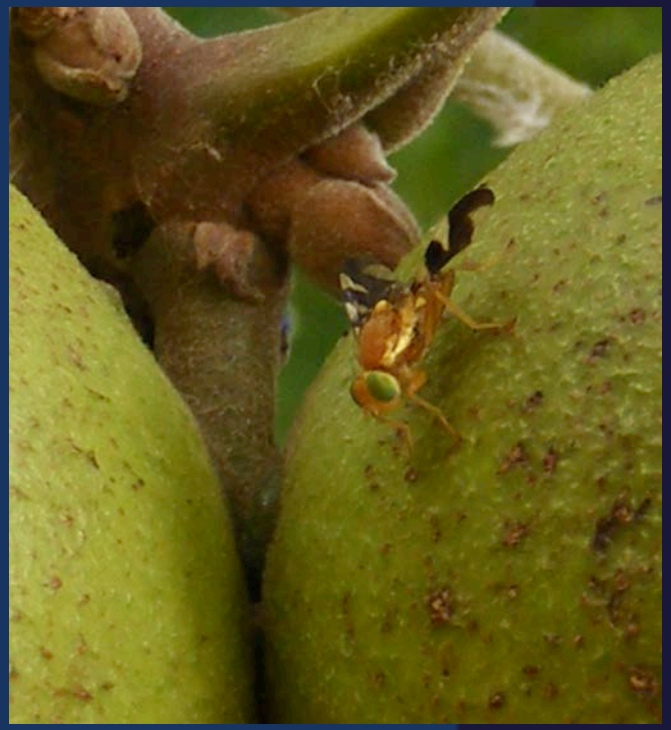
Walnut Husk Fly: Biology

- *Rhagoletis completa* – a tephritid fruit fly native to Texas and surrounding states.
- One generation per year
- Emergence from late May through early September
  - Peak emergence usually July/August



Walnut Husk Fly: Life Cycle

Walnut Husk Fly: ID

Male

Female

Walnut Husk Fly: Damage

- Maggots feed inside husk, turning it soft and black
  - Fleshy parts decay and stain the nutshell
- Early season: shriveled and darkened kernels, mold, lower yields
- Late season: stain shells, make husk removal difficult
  - Stained nuts unable to be sold in-shell

Cultivar Susceptibility

SUSCEPTIBLE

Hartley
Tulare
Franquette
Payne
Serr
Howard
Ashley
Chico
Chandler

TOLERANT

** Even less susceptible varieties can be damaged by high populations of walnut husk fly **

Monitoring: Traps and Baits

- Yellow sticky panel or “apple maggot” (AM) trap.
  - Buy “no-bait” traps (no bait in the stickem)
- Attach bait: ammonium carbonate
- Place traps prior to expected emergence of first flies
  - mid May to early June .

Monitoring: Traps and Baits

- Many trap manufacturers: Trece, Suterra, Alpha Scents, etc.
  - Vary somewhat in trap size, type of stickem and bait dispenser
  - Alpha Scents has performed the best
- Replace traps and bait regularly
- Place traps on N side of tree hanging freely within canopy cover, not in the sun

Research on Impacts of WHF on Walnut Quality

- 2005 – 2008: Bill Coates collected samples from several orchards with a range of cultivars
- Paired samples: 100 nuts infested with WHF and 100 nuts uninfested from the same trees.
- Nuts were husked, dried and loose adhering husk was scraped off
- Nuts rated for a wide range of quality characteristics

Early vs. Late WHF Damage (Chandler 2007)

Characteristic	Early	Late	Uninfested
Mean Nut Weight	7.46	9.09	9.62
% Adhering Hull	5.2	3.6	2.9
% Large Sound	0.0	0.0	64.8
% Edible Yield	45.4	52.0	51.4
% Mold	32.8	26.4	0.0
% Shrivel	3.7	0.9	1.0
% Extra-Light	0.0	10.6	70.4
Reflective Light Index	47.2	50.7	55.6
Relative Value	0.78	0.96	1.04

Chemical Control of Walnut Husk Fly

Control Timing

- Timing is critical for WHF control
- 1st spray: when the first flies are caught for GF-120 or the first significant rise in trap counts for other materials
  - Fly counts should drop to zero or near zero after you spray
- Additional sprays: applied at two to three week intervals or when fly catches increase rapidly
- Sprays usually are not needed after hull checking or less than one month before harvest

Control: Spray Techniques

- Two spray techniques have been utilized

1. Full coverage sprays
   - Usually as part of a codling moth spray program
   - Some CM insecticides are not effective for WHF control

1. Bait sprays – specific for WHF
   - Often more effective than full coverage sprays without bait

- No effective biological or cultural controls

Control: Spray Volume

- Traditionally: sprays applied with air blast sprayers at 100 gal/ac
- Most sprays: concentrate or semi-concentrate sprays
- Latest trend: concentrated bait sprays (1 to 25 gal/ac)
  - Reduced cost and time required

Insecticide Efficacy: Methods

- Orchard of ‘Hartley’ walnuts near Hollister, CA with a high WHF population

- Treatments applied with hand-gun orchard sprayer
  - Operated at 250 psi, final spray volume of 300 gal/ac

Insecticide Efficacy: Methods

- 3 to 4 applications each year
  - Mid-late July, mid-August, late-August/early September (every 3 weeks)
- Treatments replicated 4 times in RCB design
  - Replicates consisted of a single tree
- Evaluation of 125 nuts/replicate before commercial harvest (mid-Sep)

Excellent Efficacy 95-100% Control	Good Efficacy 75-95% Control	Moderate Efficacy 50-75% Control	Little Efficacy 20-50% Control
Leverage 360 2.8 fl.oz/acre (beta-cyfluthrin and imidacloprid)	Temitry 14.0 oz/acre (malathion and gamma-cyhalothrin)	Success (Entrust) 6.4 oz/acre (spinosad)	Malathion 64.0 fl.oz/acre
Assail 8.0 oz/acre (acetamiprid)	Assail 6.0 oz/acre (acetamiprid)	Assail 4.0 oz/acre (acetamiprid)	Harvanta 16.4 fl. oz/acre (Cyclaniliprole)
Danitol + Belay 21.3 fl.oz + 6 fl.oz/acre (fenpropathrin + clothianidin)	Belay 6.0 fl.oz/acre (clothianidin)	Athena 20.0 fl.oz/acre (bifenthrin)	**No Efficacy** 0-20% Control
Stallion + Brigadier 11.8 fl.oz + 12.8 fl.oz/acre (bifenthrin and imidacloprid + zeta-cypermethrin and chlorpyrifos)	Danitol 21.3 fl.oz/acre (fenpropathrin)	Warrior 2.56 fl.oz/acre (lambda-cyhalothrin)	Bexar 27.0 fl.oz/acre (tolfenpyrad)
Baythroid 2.8 fl.oz/acre (beta-cyfluthrin)	Athena + Brigadier 20.0 fl.oz + 12.8 fl.oz/acre (bifenthrin and avermectin + zeta-cypermethrin and chlorpyrifos)	Belay 3.0 fl.oz/acre (clothianidin)	Altacor 4.0 oz/acre (chloraniliprole)
	Brigade + Brigadier 16.0 oz + 12.8 fl.oz/acre (bifenthrin + zeta-cypermethrin and chlorpyrifos)	Delegate 3.2 oz/acre (spinetoram)	
	Provado 7.0 fl.oz/acre (imidacloprid)	Intrepid Edge 12.75 fl.oz/acre (spinetoram and methoxyfenozide)	
		Venerate XC 128.0 fl.oz/acre (*Burkholderia* fermentation product)	
		Exirel 20.5 fl.oz/acre (cyantraniliprole)	

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