Optimizing Cherry Fruit Fly Trapping and Evaluation of Insecticides for Fruit Fly Control

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Cherry Fruit Fly Trapping and Control

- Monitoring and Spray Timing Issues
  - Low fruit fly populations
  - Difficult to set biofix & spray timing
  - Do all orchards have to be sprayed all the time?
  - Zero tolerance for larvae in fruit
- Optimize monitoring
  - Trap type
  - Trap density and placement
- Relationship of egg-laying to fruit maturity/color
- Performance of new insecticides

Trap Type

Monitoring Trap

Deformed F-shaped bands
Small, clear pane above F
(Apple maggot – F,
Walnut husk fly – V)

Pherocon AM Trap
+ Ammonium Carbonate
Bait Box

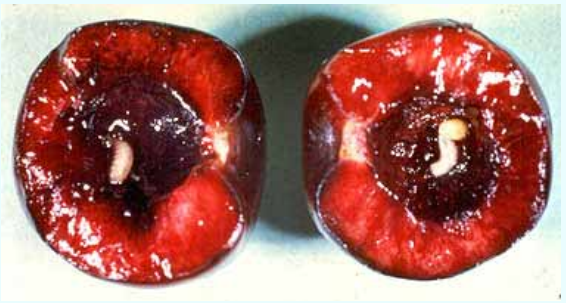
Traditional Recommendations for Trap Placement

- Hotspots / Borders nearest sources
- 2 traps per acre / At least 2 traps per orchard
- Hang within canopy (6 ft)
- Hang so trap is visible & open
- Pherocon AM Trap
- Extra ammonium carbonate bait
  - Increase catch, extend longevity

Trap Density and Placement

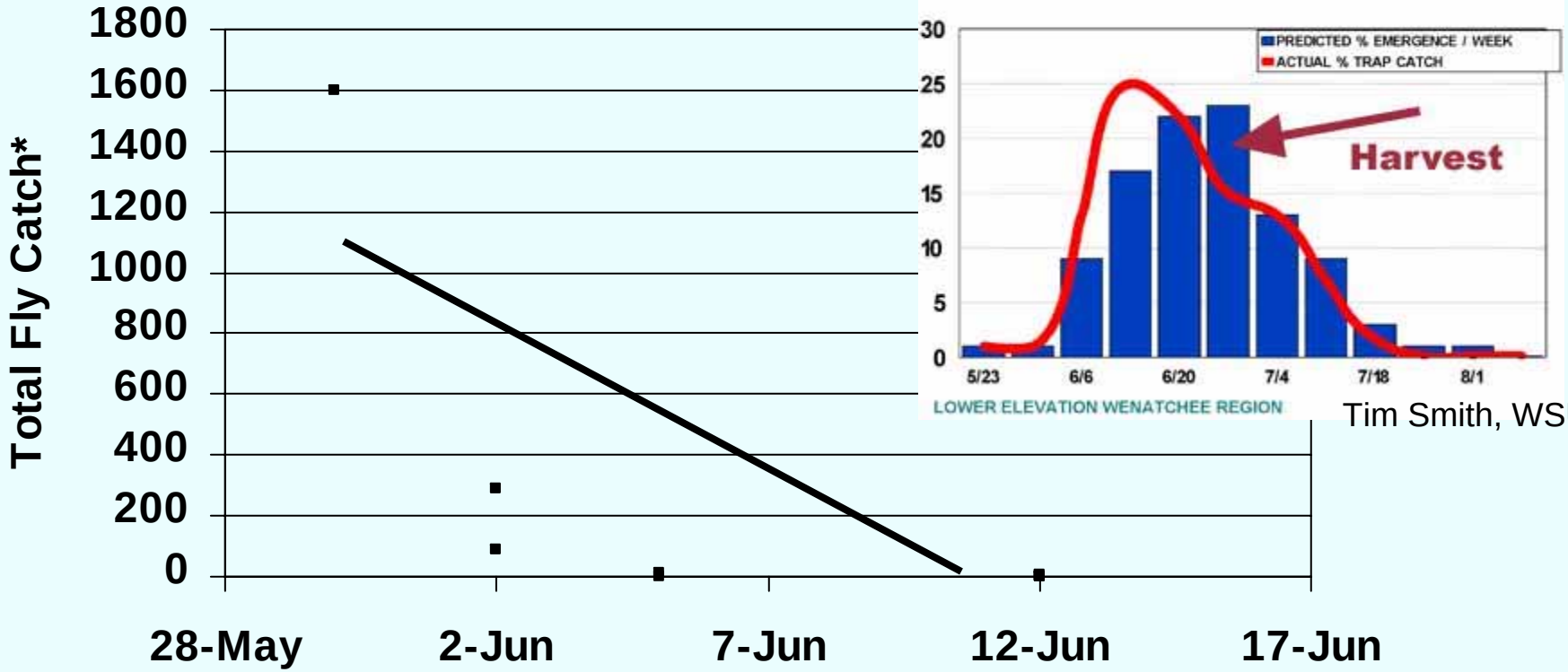
2003 Study to Evaluate Optimal Trap Density and Placement

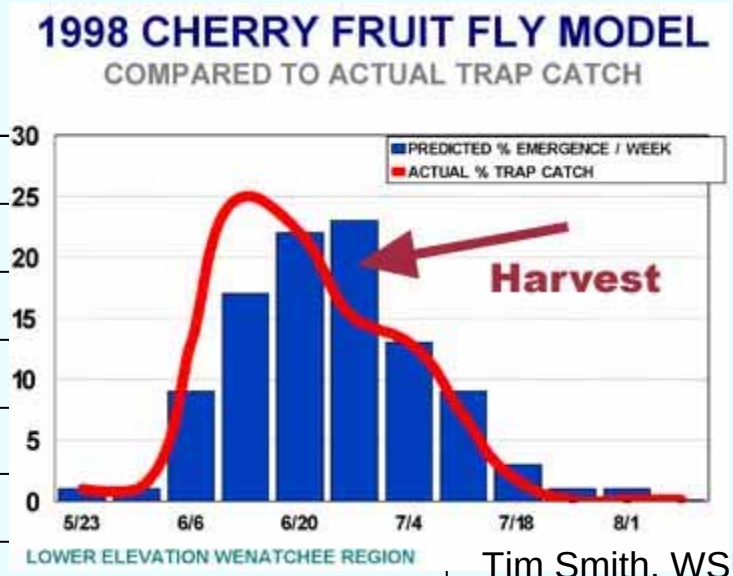
- 3 areas in Utah Co.:
  - Payson (tarts)
  - Santaquin (tarts)
  - Genola (tarts and sweets)
- 4 orchard replicates in each area (12 orchards) + home yards
- Orchard size: 4-14 acres
- 2 trap densities:
  - 1 trap per acre
  - 3 traps per acre



- 2 trap placement designs:
  - Borders only
  - Half in borders and half in interiors

Date of 1st Fly Catch in Relation to Total Catch





Tim Smith, WSU

*Total number of flies caught per orchard from May 30-Jun 12
Flies were caught in 9 of 12 orchards; no flies caught in 3 orchards; no flies were caught in home yard trees

Trap Density and Placement

No. traps per acre	Mean no. flies per orchard	Trap placement	Total no. flies	Mean no. flies per trap
1	49.2	Border	957 flies per 136 traps	7.0 flies per trap
3	284.3	Interior	1044 flies per 51 traps	20.5 flies per trap

Relationship of Fruit Fly Egg Laying to Fruit Color and Firmness

Fruit Color and Firmness

Date	Fruit Color	Fruit Firmness
May 28	G	Max.
May 30	G, Y(sw)	Max.
Jun 2	G, Y(sw)	Max.
Jun 5	G, Y(t), Ro, Rd(sw)	<Max.
Jun 12	G – Rd (t, sw)	<Max.
Jun 19	G - Rd	<Max.
Jun 26	Y - Rd	<Max.
Jul 10	Ro - Rd	<Max.

Female Fruit Fly Ovary Maturity

Date	% Females with Mature Eggs
May 30	0
Jun 2	32
Jun 5	30

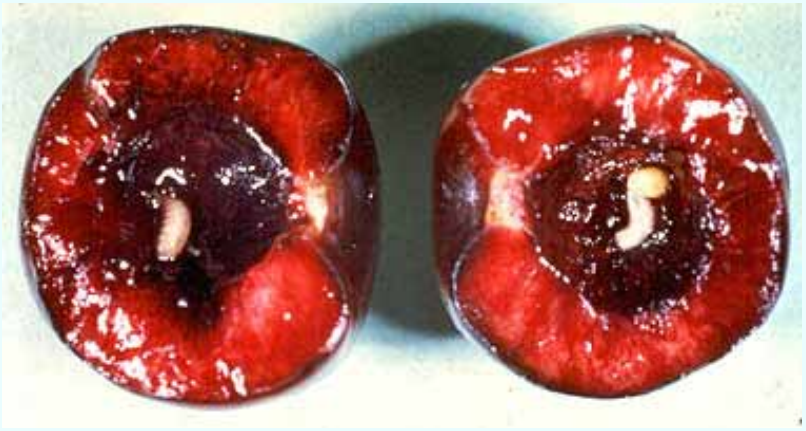
Females with mature eggs were present on Jun 2; before fruit were susceptible to egg laying (Jun 5 for sweets & Jun 12 for tarts)

Timing Control

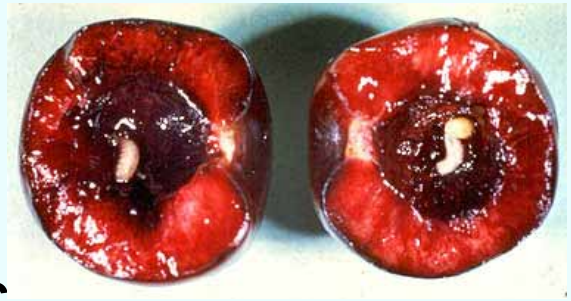
- Use both fruit color & trapping data
- Fruit color / firmness / penetration
  - Yellow was too firm / Rose blush for penetration
- Trapping
  - 3 traps per acre 5-6X > 1 trap per acre
  - Interior traps 3X > Border traps
- First flies on traps / spray within 7 days
  - Number of flies on traps
- Degree-day model to predict fly emergence

<u>Zero Tolerance</u>

Performance of New Insecticides for Western Cherry Fruit Fly Control



Cherry Fruit Fly Control Research Trials



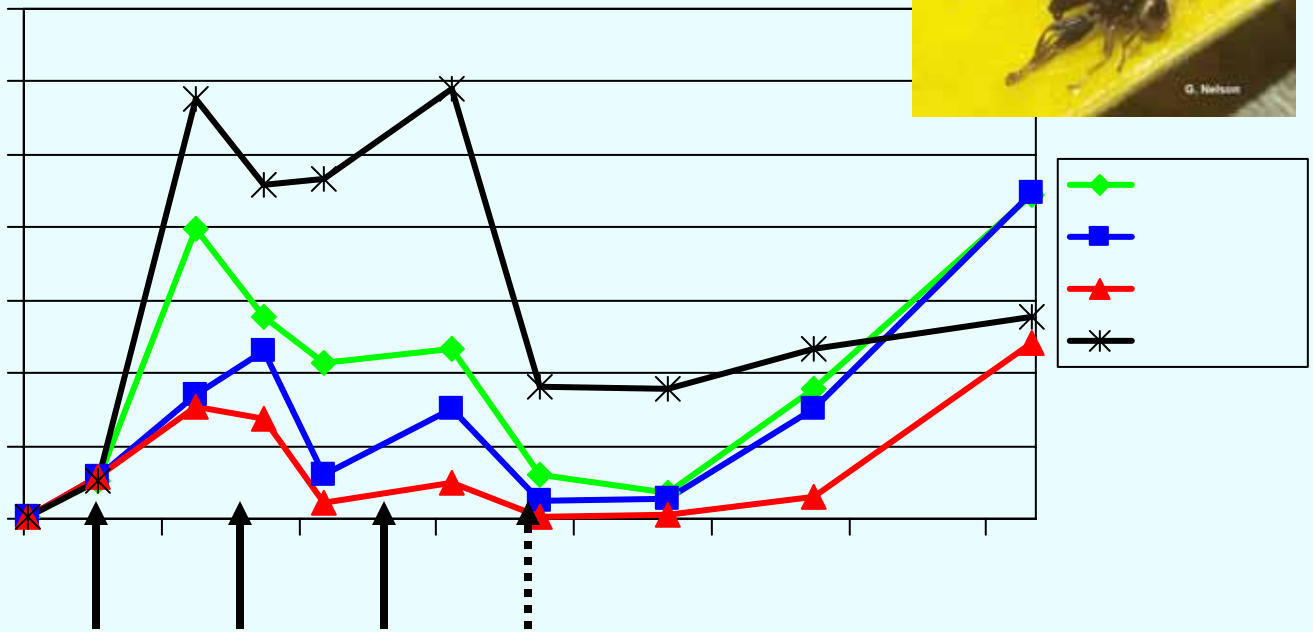
- 4 years of research plot trials
  - Small plots, Large plots, Whole orchards
- Moderate to high fruit fly populations
- Fruit injury (knock-down & residual activity)
- Suppression of adults (knock-down activity)
- Non-target effects (spider mites)

Utah WCFF Control Trials

Insecticide	% Fruit Injury at Harvest				
	2000	2001	2002	2003	
Calypso	0	0.1	--	2.7	14 d
Provado	0	0	0.001	0	14 d
Success	0	--	--	--	7 d
Guthion	0	0	0	0	14 d
Check	0.3	2.8	94.1	20.6	
	Small plots		Orchards	Large plots	

Knock-down Activity of Neonicotinoids

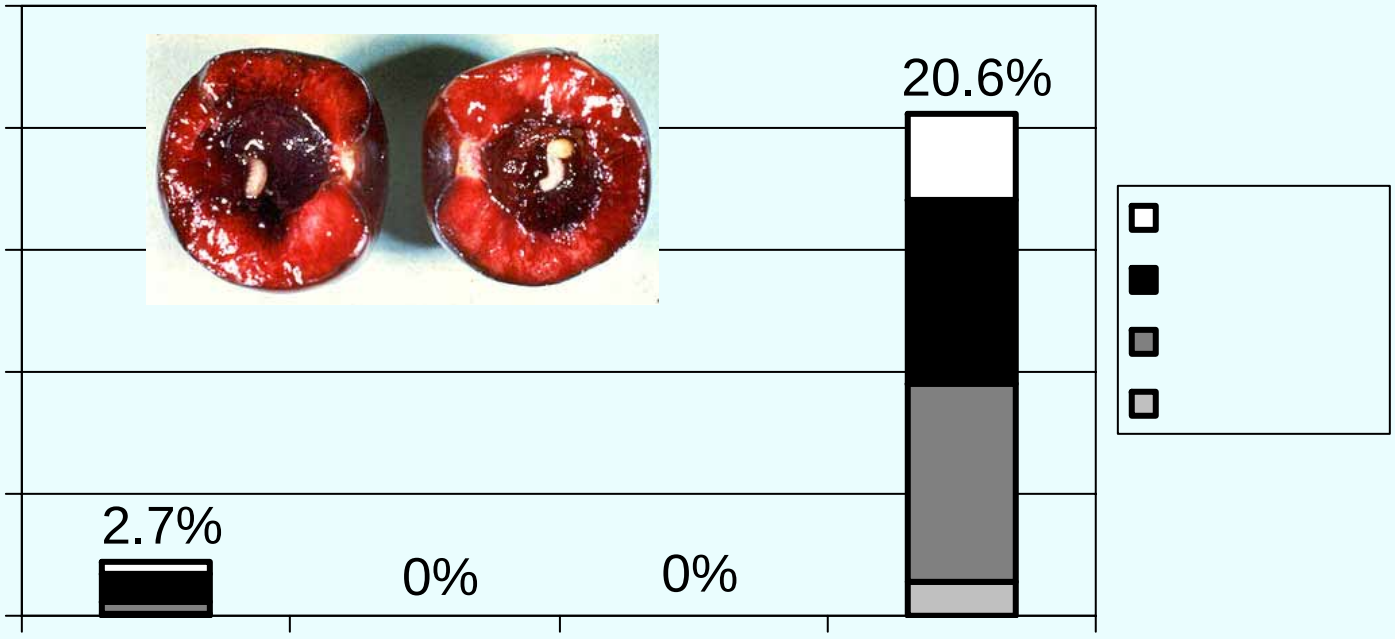
Mean number of western cherry fruit fly adults caught per trap (mean of four replications) as influenced by insecticide treatment and date, Kaysville, 2003



Solid arrows indicate insecticide spray timings; broken arrow indicates cherry harvest date

Residual Activity / Repellency of Neonicotinoids

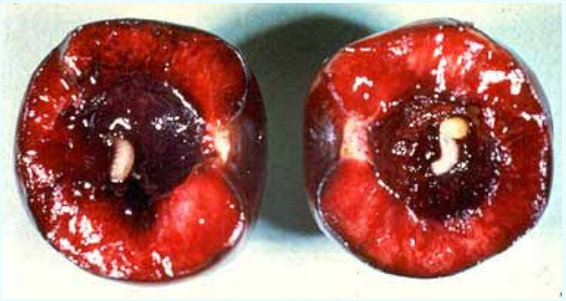
Infestation of cherry fruits with western cherry fruit fly at harvest,
July 17, 2003 - Kaysville



Neonicotinoids can stimulate spider mites

Treatment	Phytophagous motile stages	Phytophagous eggs	Predaceous motile stages	Predaceous eggs
Calypso	16.5 a	78.3 b	3.3 bc	2.0
Provado	5.0 b	350.5 a	8.0 a	3.0
Guthion	0 b	5.8 c	5.8 ab	2.8
Untreated	1.5 b	16.0 c	2.0 bc	1.5
P>F	0.007	<0.0001	0.02	0.52

Cherry Insecticides



- Organophosphates
  - Guthion, Imidan, Dimethoate, Diazinon, Malathion
- Carbamates
  - Sevin
- Pyrethroids
  - Asana, Warrior
- Neonicotinoids
  - Provado
- Biologicals/Microbials
  - Success/Entrust
- Attract-and-Kill
  - Bait: GF-120NF (spinosad bait)
  - Killing station (bait + permethrin)

WCFF Control Recommendations

- Longevity of Guthion (2005) ?
- Dimethoate is being removed
- Maintain insecticide protection through harvest
- Rotate different materials to gain experience with them
- Concern for mite flare-ups with repeated sprays of Provado (14 d reappl./ 7dPHI)
- Success/Entrust (7 d reappl./ 7 d PHI)

GF-120NF Bait

Tim Smith, WSU in Wenatchee – Back yard sweet cherries and small orchards

GF-120NF (Bayer): spinosad bait and feeding attractant

20 oz product per acre (minutes to apply), weekly applications

Future Research Plans

- USDA RAMP Tart Cherry Grant (2003-07; $94,686)
- On-Farm Trials
  - Must develop experience with new tools & how best to implement them
  - Provado, Success, Monitoring, Timing
- Attract-and-Kill
- USU Extension wants to work with you

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