



# Stink bug biology, behaviour and management options

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## Introduction and Background

- Conspense stink bug (*Euschistus conspersus*) continues to be a pest of orchards in North Central Washington
- No effective monitoring or controls and little life history data
- There is a complex of damaging stink bug species in North-central Washington, but *Euschistus conspersus* (conspense stink bug) is dominant
- Stink bug immigration/damage occurs in late summer as second-generation adults move into orchards
- Stink bugs can be attracted in large numbers using synthetic pheromone-baited host plants (eg. mullein)
- Carzol may give effective in-orchard control - but its use is limited to one spray/year and is regulated by prescriptive use rules
- Natural enemies (parasites) of stink bugs are present in low number only - insufficient for viable effective biocontrol

## Why not pyrethroids?

- **Danitol** (fenpropathrin) and **Warrior T** (lambda-cyhalothrin) have been shown to be highly efficacious in trials... why not use as in-orchard stink bug treatment?
- **Possible hazard:** Non-target effects upon predator mites = flare-up of pest mites in orchard... this could result in higher pest management costs.
- **Methods:**
  - Danitol applied at label rate (20 oz/acre) to 7 orchards, paired with untreated check plots
  - Leaves sampled in orchard for both pest and predatory mites, before and after sprays applied (**Table 3**)
  - Samples will be conducted in Spring 2002 to reveal whether pest mite densities increase or if predators recover from Danitol sprays
  - Fruit damage by stink bugs in treated orchards was also recorded (**Figure 1**)

## Other management options: Bait-and-spray trials

- Continuation of 2000 work using pheromone-baited mullein plants to aggregate-and-kill stink bugs
- **Methods:**
  - Borders of 4 commercial orchards were each divided into 2 X 40' sections
  - In one section, mullein plants at 20' intervals were flagged and baited with synthetic pheromone (methyl 2,4-decadienoate), the other section left as an untreated check
  - Baited plants sprayed to drip at weekly intervals using Carzol applied using a hand sprayer at the label rate of 1.5 lb./acre
  - Sprays applied beginning in mid-May and continued through the end of June - targeting reproductive stink bugs to reduce mating/egg-laying
  - Counts of damaged fruit were conducted at harvest comparing treated (baited+sprayed) with untreated (check) sections of border (**Figure 2**)

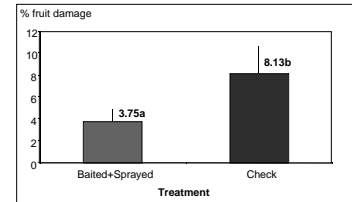
## Stink bug control - Insecticide trials

- A series of contact insecticides were evaluated for control of conspense stink bug, including both 'old' and 'new' chemistries
- Evaluations were conducted in 2 ways:
  - **Acute toxicity:** Insecticides applied directly to anesthetized adult stink bugs using Potter spray tower. Mortality evaluated over 1 week period (**Table 1**). Insecticides that performed well in this preliminary screen were then carried forward to examine field activity
  - **Field residual activity:** Stink bugs exposed to mullein leaf discs previously treated with insecticides and evaluated periodically (**Table 2**).

**Table 3.** Mite populations in orchards treated with Danitol at 20 oz./acre vs. unsprayed check plots. Counts are expressed as mean no. mites/leaf. Means with different letter superscript are significantly different ( $P < 0.05$ ).

Date	Spider mites*		Rust	Beneficials**		Ratio ERM/Beneficial
	Egg	Mottle		Egg	Mottle	
<b>Pre-count</b>						
8/13/01						
Treated	12.1*	2.3*	10.1*	0.29*	0.96*	2.75:1*
Check	18.5*	2.7*	6.8*	0.64*	1.24*	1.84:1*
<b>24-h post</b>						
8/21/01						
Treated	6.1*	0.5*	42.04*	0.02*	0.04*	9:1*
Check	13.6*	8.8*	71.84*	0.04*	0.36*	18:1*
<b>8-wk post</b>						
10/11/01						
Treated	2.2*	0.8*	55.28*	0	0*	--
Check	10.8*	5.9*	97.24*	0	0.92*	5.17:1

\*counts of spider mites represent totals of European Red Mite and Two-spotted spider mites  
\*\*counts of beneficials represent totals of Typhlodromus + Zetzella spp.



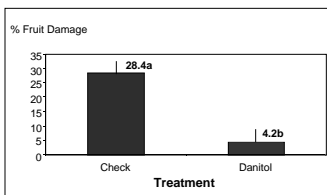
**Figure 2.** In-orchard assessment of fruit damage at harvest in orchards treated using an aggregate-and-kill strategy vs. untreated controls. Bars with different letter superscript are significantly different ( $P < 0.05$ ). (n=4 orchards).

**Table 1.** Corrected percent mortality of stink bugs exposed to insecticides applied in Potter tower bioassay.

Treatment	Rate (ppm)	Rate (Form./100 gal)	Corrected % mortality			
			24 h.	48 h.	96 h.	1 week
Carzol 92SP	413	6 oz.	12	35	63	74
Danitol 2.4 EC	106	4.8 fl. oz.	98	98	98	98
Thiodan 50WP	149	1 lb.	12	42	59	91
Warrior T 1SC	7	1 oz.	64	96	96	96

**Table 2.** Corrected mortality of stink bugs exposed to insecticides applied to mullein leaf discs.

Treatment	Rate (ppm)	Rate (Form./100 gal)	Corrected % mortality			
			24 h.	48 h.	72 h.	120 h.
Carzol 92SP	413	6 oz.	12	12.5	16	16
Danitol 2.4 EC	106	4.8 fl. oz.	76	84	89	92
Thiodan 50WP	149	1 lb.	84	84	100	100
Warrior T 1SC	7	1 oz.	16	21	21	23



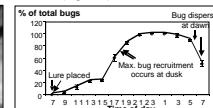
**Figure 1.** In-orchard assessment of fruit damage at harvest in orchards treated using single spray of Danitol at label rate (20 fl.oz/acre) vs. unsprayed check. Bars with different letter superscript are significantly different ( $P < 0.05$ ). Spray applied on August 13, 2001 (n=7 orchards).

## Stink bug behavior: "A day in the life of a mullein plant"

- Counts of bugs on baited mullein plants always performed during daylight... **What happens at night?**
- **Methods:**
  - Videocamera with infrared recording was used to record stink bug activity on 3 pheromone-baited mullein plant for 24 hours (**Figure 3**)
  - The number of bugs arriving at the plant over 24-h period was recorded to determine time of peak recruitment (**Figure 4**)



**Figure 3.** Stink bugs on baited mullein plant under infrared illumination



**Figure 4.** Stink bug recruitment to pheromone-baited mullein plants over 24-h period (n=3)