

#### 4. Chemical Control

### SPINOSAD EFFECT ON DIPTEROUS PESTS OF FRUIT AND POTENTIAL AS A FRUIT PROTECTANT.

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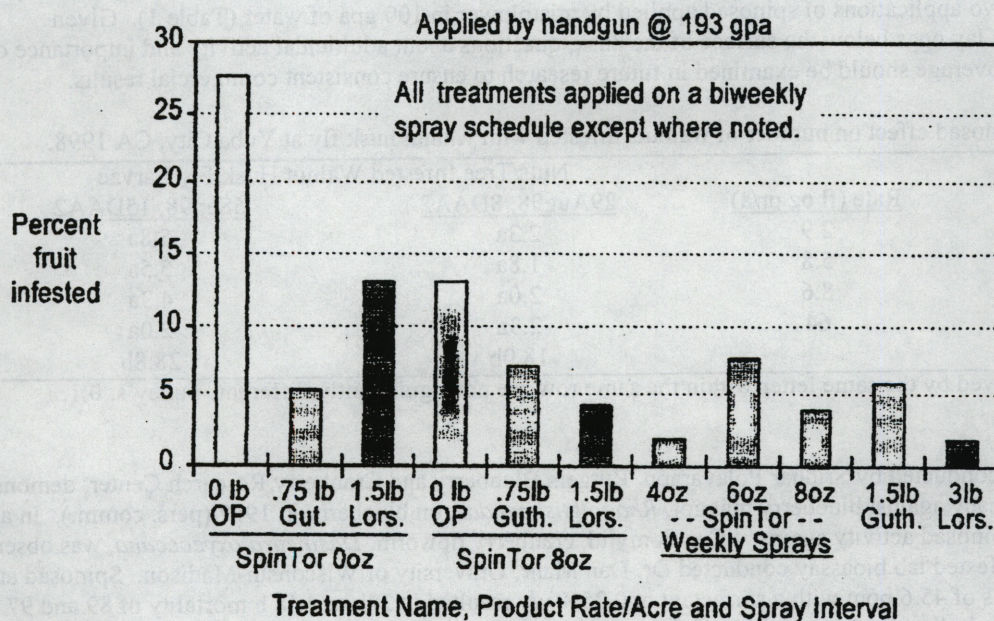
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Spinosad registrations approved, under review, and soon to be submitted to EPA and IR-4 for both Success 2SC and SpinTor 2SC will encompass most key fruit crops in North America, some damaged by Diptera species. Until recently, only limited research with spinosad had been conducted against these pests. Uptake of spinosad includes both ingestion and contact. Spinosad controls larval and adult stages of many Lepidoptera species. Knockdown and residual control of important economic Diptera pest species, (primarily Tephritids) is critical for production of fruit, though less important for some processing uses, fresh market has low or no tolerance for maggots as contaminants or their damage.

Comparative efficacy trials conducted in Sodus, New York, in 1998 demonstrated some fruit protection from spinosad against apple maggot, *Rhagoletis pomonella*, when applied on a biweekly schedule. However, when applied weekly, spinosad treatments provided commercial levels of fruit protection at all rates tested (Figure 1).

Fig. 1 Percent of apple fruit infested with apple maggot at Sodus, NY 1998

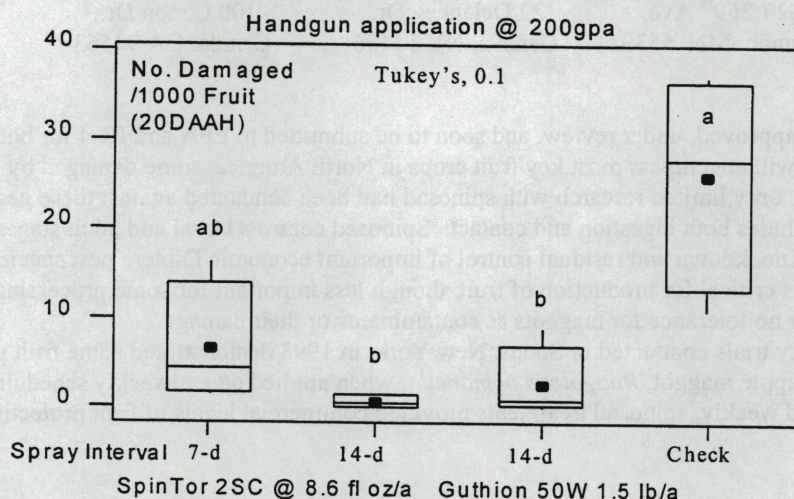


Under this shorter spray interval it appears that it will be possible to at least cut spinosad rates to one-half and prevent unacceptable apple maggot damage. This approach may be examined in characterization of spinosad efficacy against other key Diptera damaging fruit. Effect of spinosad on all life stages of Diptera has not been explored adequately to understand what contribution ovicidal, larvicidal and adulticidal activity determines crop protection over time in the field.



In 1998 studies were conducted to assess spinosad crop protection against cherry fruit flies, *Rhagoletis indifferens*, *R. cingulata*, and *R. fausta*, in the PNW, Midwest and Northeast cherry growing regions. Field response data from all regions were similar and indicated spinosad can reduce fruit damage and adult activity in the area of spinosad-treated trees. Spinosad provided commercial levels of fruit protection against cherry fruit fly in Sodus, NY (Figure 2).

Fig. 2 SpinTor 2SC Full-Season Treatment Effect on Cherry Fruit Fly Damage to Tart Cherry - Sodus, NY 1998



In a California trial, the number of walnut husk fly, *Rhagoletis completa*, infested nuts were significantly reduced by two applications of spinosad applied by mistblower in 100 gpa of water (Table 1). Given female adults lay eggs below the surface of the husk, questions about adulticidal activity and importance of timing and coverage should be examined in future research to ensure consistent commercial results.

Table 1. Spinosad effect on number of walnuts infested with walnut husk fly at Yuba City, CA 1998.

Treatment	Rate (fl oz pr/a)	Nuts/Tree Infested Walnut Husk Fly Larvae	
		29Aug98, 8DAA2	5Sep98, 15DAA2
Success 2SC	2.9	2.3a	5.8a
Success 2SC	5.8	1.8a	5.5a
Success 2SC	8.6	2.0a	4.3a
Lorsban 4E	64	2.3a	2.0a
Untreated		18.0b	28.8b

Means followed by the same letter within the same row are not significantly different, Tukey's, 0.1,  $X(\text{Log}_{10}+1)$ .

Research conducted by Sridhar Polavarapu, Rutgers Blueberry and Cranberry Research Center, demonstrated spinosad efficacy against blueberry maggot, *Rhagoletis mendax*, on blueberry in 1997 (pers. comm.). In addition to Tephritids, spinosad activity against a Cecidomyiid, cranberry tipworm, *Dasineura oxycoccana*, was observed in an artificially-infested lab bioassay conducted Dr. Dan Mahr, University of Wisconsin-Madison. Spinosad at concentrations of 45.6 ppm with a surfactant at 0.25% v/v resulted in 24h and 48 h mortality of 89 and 97 percent, a concentration similar to a labeled dilute rate for apple. Additional work in the field with airblast equipment is planned for 1999 (1998 Cranberry Institute Report). In contrast, a similar bioassay, naturally infested, conducted by Anne Averill, University of Massachusetts-Wareham, saw no response to spinosad but also observed no activity from any compound tested.

Spinosad has demonstrated it can be used as a commercial treatment against Diptera pest species. However insect behavioral and life stage responses, in addition to application timing and coverage influence will need greater scrutiny to ensure consistent crop protection at economical use rates.