

IV. Chemical Control / New Products

c. Biological Control

1. Western Tentiform Leafminer / Apple

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Western tentiform leafminer control with spinosad 1.6WP in commercial apple orchards in the PNW, 1995.

Spinosad, the first active ingredient in the naturalyte class of insect control products, was evaluated under commercial use conditions for the control of western tentiform leafminer (*Phyllonorycter emalella*) in apples in Washington and Oregon. Six Experimental Use Permit trials of 0.5-1.0 acre each were conducted during the 1995 apple production season. Commercial performance of spinosad 1.6WP was compared to the industry standard Vydate¹ L and an untreated check. Spinosad was applied at the rate of 0.041 lb ai/100 gal spray volume, based on standard Tree-Row-Volume (TRV) dilute spray volume calculations². Actual treatments were from 0.062 to 0.122 lb ai/A depending on tree size. Vydate L was applied at 0.25-1.0 lb ai/A, depending on the standard practices at the individual orchards. Applications were made with commercial orchard speed-sprayer equipment per normal practices for the individual orchards, and were timed at first appearance of 2nd generation tissue-feeding mines at 5 sites and at first appearance of 3rd generation tissue-feeding mines at 1 site.

A summary across the six trials showed average total pre-treatment WTLM populations of 5.9 mines/leaf, well above the accepted economic injury level of 2 mines/leaf. About 0.6 mines/leaf or 10% of the mines were in the tissue-feeding stage at time of treatment.

Post-treatment check populations increased from pre-treatment levels to about 10 mines/leaf, with 6.3 or 63% of the mines in the tissue-feeding stage. Numbers of tissue-feeding mines were lower in the Vydate and spinosad treatments than in the check, with 1.4 and 2.5 mines/leaf in the Vydate and spinosad treatments, respectively.

Mine dissections showed that post-treatment mortality of both sap and tissue-feeding mines was significantly greater in both the Vydate and spinosad treatments than in the check. However, Vydate resulted in significantly greater mortality of tissue-feeding mines than spinosad, suggesting a possible greater residual mortality with Vydate.

¹ Vydate is a trademark of E.I. Du Pont De Nemours and Company.

² TRV-dilute (gpa) = $\frac{30 \times \text{in-row tree spacing (ft)} \times \text{tree height (ft)}}{\text{between-row tree spacing (ft)}}$

Post-treatment parasitism of tissue-feeding mines averaged about 32%, with no significant differences between treatments, although both the untreated and spinosad treatments averaged about twice the level of parasitism as the Vydate treatments. The higher levels of post-treatment parasitism in the spinosad treatments suggests a lesser impact on parasite populations than the Vydate treatments.

An example of a clearly undesirable negative impact on beneficial arthropod populations was observed in one of the trials. At 35 days post-treatment, the European red mite population increased over 15-fold in the Vydate treatments to 31 mites/leaf compared to 2 mites/leaf in both the untreated and spinosad treatments. Predator mite populations were likely disrupted by the Vydate and the ERM flared to levels necessitating a miticide application which was not needed in either the spinosad or check treatments.

Overall treatment differences for WTLM control were determined from post-treatment numbers of viable (live, non-parasitized) mines. Vydate resulted in significantly fewer viable mines than the check treatments, while spinosad treatments were intermediate with no significant difference between either the check or Vydate treatments. Vydate and spinosad significantly reduced WTLM populations compared to the check, providing 94% and 71% control, respectively. Although Vydate generally outperformed spinosad in these trials, the relative difference would seem acceptable considering long-term values of preserving beneficial populations with spinosad.

In conclusion, under conditions of moderate to high WTLM population pressure, commercial applications of spinosad 1.6WP at 0.041 lb ai/100 gal TRV-dilute (0.062-0.112 lb ai/A, depending on tree size), did not reduce leafminer populations equivalent to that of Vydate. However, spinosad significantly reduced leafminer populations compared to the check with less impact on beneficial populations than Vydate. Since spinosad has little to no adverse affects on beneficial parasite or predator populations compared to most conventional insecticides, and since it has acceptable activity on tentiform leafminer as well as excellent activity on leafrollers (reported elsewhere), spinosad has the potential to become a valuable tool in apple IPM strategies to manage pest populations while preserving beneficial populations.