

Chemical Control/New Products

Influence of pH on Spinosad Residual on Apple Pest Management

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A common practice with some insecticides is to add acidifying agents to increase performance. Another common practice is the addition of foliar nutrients during pesticide applications. Three studies, 2 field and one lab, were conducted to test the effects of low pH and foliar nutrients on the residual performance of spinosad, the active ingredient in Success* Naturalyte* insect control. Laboratory studies have shown no physical or chemical degradation of spinosad at low pH, however a slight increase in solubility occurs. Increased solubility results in smaller particle sizes on leaf surfaces and could potentially result in greater photolysis. Trials were done with obliquebanded leafrollers (OBLR) and western tentiform leafminers (WTLM).

OBLR Field Sprayed Lab Bioassay

Apple trees were treated with 4 fl.oz./A of Success, which is below the label rate of 6-10 fl.oz./A for leafrollers. Treatments were replicated three times as single tree replicates. At weekly intervals, leaf samples were taken and placed in 5 petri dishes, each containing 5 neonate larvae. Mortality was recorded after 72 hours exposure.

OBLR Laboratory Bioassay

Four replicates of five neonate larvae each were exposed to 1 ppm solutions of spinosad. Larvae were placed in cups and exposed to 24 hr/day UV light to enhance photolysis. Mortality was determined after 48 hr.

WTLM Field Trial

Trees were treated with 6 fl.oz./A of Success. Percent live mines per leaf were determined at weekly intervals.

Treatments

OBLR studies looked at effects of low pH vs. high pH, with foliar nutrients vs. without, and with oil vs. without oil. WTLM studies did not examine effects of oil, since oil adjuvants are recommended for improved leafminer control. Foliar nutrients used in OBLR studies included phosphate, phosphoric acid, Zn, Mg, and Ca. Potassium carbonate was used to buffer back to neutral. Foliar nutrients used in the WTLM study included P, K, CaCl, and TriFol buffer. Solubor (boron) was used to buffer back to neutral.

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Results

Initial control of leafrollers was not affected by pH or foliar nutrients. In all studies, pH of less than 5.0 decreased the residual performance of Success (Table 1). Addition of foliar nutrients that reduced pH also decreased residual performance. Buffering back to neutral improved residuality, but at 28DAA control was still statistically less than without nutrients.

Low pH and foliar nutrients also had an adverse effect on the residual performance of spinosad on western tentiform leafminers in apples (Table 2). Although numerical differences were apparent, high variability in data precluded any statistical differences except for the 26DAA (when transformed due to heterogeneity) and the 46DAA data.

Conclusions

Low pH can decrease length of residual control of Success. Immediate control is not affected. Success is not an organophosphate or carbamate and does not need an acidic buffer to improve performance. Do not add anything to the spray tank that may decrease pH below 5.0 such as foliar nutrients, certain fungicides, or acidifying agents. Keep pH of the solution above 6.0. If pH drops below 6.0, buffering back to neutral will improve residual efficacy. No adverse effects from alkaline (high pH) conditions have been noted in the lab or in the field.

Table 1. Percent control of neonate leafrollers exposed to field-aged leaves (n=3).

Treatment	1DAA	4DAA	8DAA	15DAA	28DAA
Success, 7.1	100 a	100 a	98 a	97 a	85 a
Success, 4.8	100 a	99 ab	88 ab	79 a	50 b
Success+oil, 7.2	100 a	100 a	98 a	99 a	84 a
Success+oil, 4.8	100 a	94 ab	89 ab	39 b	7 c
Success+nutrients, 4.9	100 a	90 ab	85 ab	49 b	13 c
Success+nutrients, 7.0	97 ab	99 ab	88 ab	83 a	61 b
Success+nutr+oil, 4.8	93 b	88 b	22 c	33 b	15 c
Success+nutr+oil, 7.0	94 b	96 ab	72 b	53 b	41 b
Untreated	0 c	0 c	0 c	0 c	0 c

Means followed same letter are not significantly different, Tukey's p=0.05.

Table 2. Number live western tentiform leafminer mines per 20 leaves (n=4).

Treatment	3DBA	4DAA	11DAA	17DAA	26DAA	46DAA
Success, 7.0	23.8 a	5.3 a	4.3 a	0.3 a	0.8 c	3.0 c
Success, 4.0-5.0	24.8 a	11.8 a	9.6 a	2.8 a	3.5 bc	9.5 bc
Success+nutr, 5.0	27.3 a	7.3 a	7.3 a	3.8 a	19.5 a	28.5 a
Success+nutr, 6.0	27.8 a	10.3 a	2.8 a	2.3 a	7.8 abc	28.5 a
AgriMek, 7.0	23.8 a	8.5 a	4.8 a	0.3 a	8.0 abc	22.0 ab
Untreated	24.5 a	7.0 a	12.8 a	1.8 a	15.0 ab	26.0 ab

Means followed by same letter are not significantly different, Tukey's p=0.05.