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Section C: Small Fruits

Target host: Grapevine | *Vitis vinifera*

Evaluation of Residual Activity of Insecticides for Control of Spotted Lanternfly in Grape, 2020

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Grape | *Vitis vinifera*

Spotted lanternfly | *Lycorma delicatula* (White)

The objective of this study was to evaluate the residual efficacy of foliar-applied insecticides for control of spotted lanternfly (*Lycorma delicatula*) on grapevines. Treatments were applied to 4-year old grapevines ('Petit Verdot') in a commercial vineyard in Kutztown, PA. A total of 9 treatments and an untreated check were organized in a randomized complete block design with six replicates. Treatments were applied to a panel of vines (four vines, each spaced 4 ft. apart). To avoid drift, treatments were placed 16 ft. apart and with one guard row between replicates (18 ft. apart). Treatments were applied using a CO_2 pressurized backpack sprayer equipped with a single spray wand and a flat-fan nozzle (Teejet TP8003-VS) calibrated to deliver 27 gallons of water per acre at 25 psi. The spray wand applied product over the entirety of vine canopy. Treatments were applied on 2 Oct 2020. After the applications dried, a single mesh bag (66 x 100 cm BugDorm, MegaView Science Co., Ltd., Taiwan) was added to one of the middle two vines within the panel covering a single grapevine shoot approximately 35 inches long. Ten field-collected adult spotted lanternfly of mixed sex were added to the mesh bags and mortality was rated 24 hours after exposure. This occurred on 1, 3, 5, 7, 11, 15, 21, and 26 days after the treatment (DAT). Mesh bags were removed from shoots between assessment dates. Mean temperature through the duration of the trial was 56.6° F. Rain occurred during the trial on 12 Oct (0.56 inches) and 16 Oct (0.09 inches).

Mortality of spotted lanternfly was calculated by combining the number of moribund and dead adults. Mean check mortality across all assessment dates was 9.7%. Mortality values were adjusted using Abbott's correction factor and treatments were analyzed using a generalized linear mixed model with a Poisson distribution. A separate model was created for each assessment date to provide treatment differences within each assessment date. Treatment was considered a fixed effect and replicate as a random effect (R package; 'lme4'). Models were tested for appropriateness of fit using functions qqnorm() and qqline(). Analyses were conducted in R version 3.6.2.

All compounds tested had above 50% mortality on the first assessment date (1 d after the application) except for Altacor and Sevin (Table 1). These two compounds provided low efficacy for the duration of the trial. A longer exposure time (>24 h) should be reviewed for these compounds in the future. The neonicotinoids evaluated, Venom, Scorpion, and Actara provided >60% mortality up to 5 d after the application; by 7 DAT, however, all went below 50% mortality. The pyrethroids evaluated provided the longest control. Baythroid and both the half and full rate of Bifenture were comparable and provided residual efficacy up to 15–21 d after the application. Danitol provided the most effective residual activity, offering excellent mortality 21 days after the application.[1]

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Table 1.

Treatment (active ingredient)	Rate per acre (oz.)	Adjusted % mortality							
		1 DAT	3 DAT	5 DAT	7 DAT	11 DAT	15 DAT	21 DAT	26 DAT
Actara (thiamethoxam)	3.5	80.6ab	90.4ab	66.2bc	43.5c	42.1d	25.3cd	13.4ef	0.0d
Altacor (chlorantraniliprole)	4.5	27.0d	25.1d	22.1d	6.7d	3.3f	0.0f	3.4g	0.0d
Baythroid (beta-cyfluthrin)	3.2	75.5ab	78.7b	81.2ab	65.4b	45.5cd	66.3ab	48.4c	10.0c
Bifenture (bifenthrin)	6.4	85.6a	80.4ab	77.9bc	68.8b	52.1bc	62.7b	65.1b	18.4b
Bifenture (bifenthrin)	3.2	85.6a	95.5a	84.6a	87.3a	55.4bc	57.9b	48.4c	14.9bc
Danitol (fenpropathrin)	21.33	88.9a	95.5a	84.6a	92.3a	90.9a	80.0a	95.3a	58.4a
Scorpion (dinotefuran)	5	58.2c	87.1ab	69.5bc	33.3c	42.0cd	27.0cd	20.1e	0.0d
Sevin (carbaryl)	32	16.7e	58.5c	42.1c	11.6d	11.8e	13.4e	8.4f	3.3d
Venom (dinotefuran)	3	73.7b	85.5ab	64.3b	38.5c	63.9b	30.4c	33.4d	5.0d
Chi-square		503.4	306.8	322.4	737.3	576.6	777.2	873.3	643.1
Degrees of freedom		8	8	8	8	8	8	8	8
P-value		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Means within columns followed by a different letter are significantly different ($P < 0.05$) across treatments within each sampling date.