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(D8)

ORANGE: *Citrus sinensis* (L.) Osbeck, 'Valencia'

FOLIAR APPLICATIONS OF SPINETORAM COMPARED TO COMMONLY USED INSECTICIDES FOR CONTROL OF ASIAN CITRUS PSYLLID AND CITRUS LEAFMINER IN ORANGES: 2008

Philip A. Stansly
University of Florida/ IFAS
Southwest Florida Res. and Ed. Center
2686 State Road 29 North
Immokalee, FL 34142-9515
Phone: (239) 658-3427
Fax: (239) 658-3469
E-mail: pstansly@ufl.edu

Jawwad A. Qureshi and Barry C. Kostyk

Asian citrus psyllid (ACP): *Diaphorina citri* Kuwayama
Citrus leafminer (CLM), *Phyllocnistis citrella* Stainton

ACP vectors the bacterium *Candidatus* Liberibacter asiaticus, the causal organism of greening or "Huanglongbing" disease of citrus. Feeding damage from CLM larvae facilitates the spread of citrus canker caused by *Xanthomonas axonopodis* pv. *citri*. Effective control measures are needed upon which to develop integrated management strategies against these pests in Florida citrus. The experimental block at the Southwest Florida Research and Education Center, Immokalee, Florida consisted of 13-yr-old sweet orange 'Valencia' trees planted on double-row raised beds at a density of 132 trees/acre. Trees were irrigated by micro-sprinklers and subjected to conventional cultural practices. Bed sides of the trees were pruned with a hand-held hedger to induce new flush and encourage ACP and CLM infestation. Eight treatments and an untreated check were randomly distributed across 4 replicates in 17 rows that included a buffer row after every treated row. Each replicate contained 9 plots of 5 plants distributed across 9 treated rows. Treatments were applied to both bed and swale sides of the trees on 10 Oct 2008 using a Durand Wayland 3P-10C-32 air blast speed sprayer with an array of six # 5 T-Jet stainless steel cone nozzles per side operating at a pressure of 200 psi delivering 130 gpa at a tractor speed of 1.5 mph. Three central trees per plot were included in post treatment evaluations made on 13, 20, and 27 Oct and 3 Nov. A "tap" sample made by striking with the hand a randomly chosen branch 3 times and counting adult ACP falling on a clipboard covered with an 8 ½ × 11 inch laminated white sheet was used to assess density of ACP adults. Two tap samples, one each on the bed and swale sides were conducted on each sampling. Branches with flushes suitable for ACP oviposition and nymphal development were tagged on each tree prior to treatment application. Three young shoots were examined per tree and the presence or absence of eggs and nymphs recorded. One randomly selected shoot from each tree was brought to the lab and examined under the microscope to count ACP nymphs. The same shoot was used to count the number of CLM larvae on five fully expanded leaves. Data were subjected to ANOVA to evaluate treatment effects on ACP and CLM and means separated using LSD (P = 0.05). Numbers of ladybeetles, lacewings, and spiders were too low throughout the trial to observe treatment effects.

At 3 and 10 DAT, numbers of ACP adults, percentage infested shoots (Table 1) and numbers of nymphs (Table 2) were all significantly less than the untreated check with no differences between sprayed treatments. Adult ACP densities remained significantly lower in all treatments at 17 DAT but at 24 DAT numbers observed on trees sprayed with Delegate alone were not different from the untreated check in contrast to the remaining treatments. At 17 DAT, there were no differences compared to the check in the % of ACP-infested shoots between treatments of Delegate except the one including oil alone. No infestations were detected on trees sprayed with Mustang although this was not significantly different from Danitol or Chlorpyrifos. At 24 DAT, the % ACP-infested shoots in the Delegate + Induce and the Mustang treatments were significantly lower than the untreated check. The number of ACP nymphs per shoot at 17 DAT (Table 2) was significantly lower than the untreated check for Delegate + Induce, chlorpyrifos, Danitol and Mustang. At 24 DAT there were no significant differences between treatments. All treatments except Delegate + Induce reduced CLM numbers significantly at 17 DAT, but at 24 DAT, significant reduction was seen only with Danitol, Mustang and the two treatments of Delegate that included oil (Table 2).

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Table 1

Treatment/ Formulation	Rate amt product/ acre or % v/v	Mean no. ACP adults per tap				% Shoots infested with ACP eggs and nymphs			
		13-Oct 3 DAT	20-Oct 10 DAT	27-Oct 17 DAT	3-Nov 24 DAT	13-Oct 3 DAT	20-Oct 10 DAT	27-Oct 17 DAT	3-Nov 24 DAT
Untreated check	---	0.75a	0.71a	0.86a	0.58a	47.2a	44.4a	61.1a	38.9ab
Danitol 2.4 EC	16 oz	0.04b	0.00b	0.42b	0.00d	2.8b	8.3b	16.7bc	16.7bcd
Chlorpyrifos EW	5 pts	0.00b	0.00b	0.04bc	0.00d	13.9b	2.8b	19.4bc	27.8abc
Mustang 1.5 EC	4.3 oz	0.00b	0.04b	0.04bc	0.00d	16.7b	0.0b	0.0c	0.0d
Delegate WG	4 oz	0.00b	0.04b	0.00c	0.42ab	2.8b	2.8b	55.6a	38.9ab
Delegate WG +	4 oz +								
435 Oil	2%	0.00b	0.00b	0.08bc	0.04dc	8.3b	2.8b	27.8b	44.4a
Delegate WG +	4 oz +								
435 Oil +	2% +								
Copper Hydroxide	3 lbs	0.00b	0.04b	0.13bc	0.00d	2.8b	0.0 b	41.7ab	22.2abcd
Delegate WG +	4 oz +								
Induce	0.2%	0.00b	0.00b	0.04bc	0.17dc	0.0b	2.8b	38.9ab	11.1cd
Delegate WG +	4 oz +								
Induce +	0.2% +								
Copper Hydroxide	3 lbs	0.25b	0.13b	0.08bc	0.21bc	8.3b	5.6b	58.3a	44.4a

Means in a column followed by the same letter are not significantly different ($p < 0.05$, LSD).

Table 2

Treatment/ Formulation	Rate amt product/ acre or % v/v	Mean no. ACP nymphs/infested shoot				Mean no. CLM larvae/5 leaves/shoot		
		13-Oct 3 DAT	20-Oct 10 DAT	27-Oct 17 DAT	3-Nov 24 Dat	20-Oct 10 DAT	27-Oct 17 DAT	3-Nov 24 DAT
Untreated check	---	12.5a	4.8a	8.1ab	5.7a	0.00a	2.00a	0.92a
Danitol 2.4 EC	16 oz	0.0b	0.2b	1.8c	0.9a	0.08a	0.33c	0.17b
Chlorpyrifos EW	5 pts	0.0b	0.1b	0.4c	1.3a	0.08a	0.25c	0.33ab
Mustang 1.5 EC	4.3 oz	0.1b	0.0b	0.2c	0.3a	0.00a	0.58bc	0.00b
Delegate WG	4 oz	0.4b	0.3b	4.2bc	9.8a	0.00a	0.33c	0.50ab
Delegate WG +	4 oz +							
435 Oil	2%	0.0b	0.0b	5.3bc	4.3a	0.00a	0.42c	0.00b
Delegate WG +	4 oz +							
435 Oil +	2% +							
Copper Hydroxide	3 lbs	0.0b	0.0b	3.4bc	6.4a	0.00a	0.17c	0.25b
Delegate WG +	4 oz +							
Induce	0.2%	0.0b	0.1b	1.4c	0.1a	0.83a	1.58ab	0.83ab
Delegate WG +	4 oz +							
Induce +	0.2% +							
Copper Hydroxide	3 lbs	0.1 b	0.9b	12.5a	4.4a	0.00a	0.67bc	0.83a

Means in a column followed by the same letter are not significantly different ($p > 0.05$, LSD).