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D15

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

FOLIAR APPLICATIONS OF BYI02960 COMPARED TO COMMONLY USED INSECTICIDES FOR CONTROL OF ASIAN CITRUS PSYLLID AND CITRUS LEAFMINER IN ORANGES: SUMMER, 2010

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

ACP and CLM are two economically important pests of citrus due in large part to their role in the spread of greening disease or "huanglongbing" and citrus canker caused by *Xanthomonas axonopodis* pv. *Citri* respectively. Therefore, control of both ACP and CLM is critical in developing integrated management strategies to reduce the spread of the associated diseases in Florida citrus. The experimental block at the Southwest Florida Research and Education Center (SWFREC), Immokalee, Florida consisted of 15-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. Trees were pruned three weeks prior to application to encourage growth of new shoots essential for reproduction of ACP and CLM. Numerous infested shoots were tagged before treatment application. Nine treatments and an untreated check were randomly distributed across four replicates in two rows separated by a buffer row. Each replicate contained ten four-tree plots. Treatments were applied on 12 Jul 2010 using a Durand Wayland 3P-10C-32 air blast speed sprayer operating at 1500 rpm with 4 stainless steel T-Jet # 5 nozzles per side delivering 130 gpa. Evaluations were made at 3, 10, 17, 24, 31, 38, 45, and 52 DAT. Ten randomly selected shoots per plot were collected and examined under a stereomicroscope in the laboratory to count ACP nymphs. Three fully expanded leaves on each shoot were examined under the microscope to count CLM larvae and empty mines. Density of ACP adults and predators was estimated from three of the four trees in each plot by counting adult insects falling on a white clipboard placed under randomly chosen branches which were then struck three times with the PVC pipe to make a count for one "tap" sample. Four tap samples were conducted per tree. Data were subjected to ANOVA and means separated using LSD ($P = 0.05$).

Significantly more dead nymphs compared to other treatments was observed at 3 DAT in response to Delegate + 435 Oil followed by the low and high rates of BYI02960 + 435 Oil with no difference among the latter. The remaining treatments were not different from the untreated check. All treatments compared to untreated check were equally effective in reducing the number of live nymphs through 17 DAT except 435 Oil alone which did not differ from untreated check at 17 DAT and provided less reduction compared to all other treatments at 3 DAT. All treatments compared to the untreated check provided significant reduction in adult numbers through 52 DAT except 435 Oil alone which reduced adults only at 17 DAT and 38 DAT, Movento which did not differ from untreated check at 3 DAT and the mid and high rates of BYI02960 which did not differ from untreated check at 45 DAT. All treatments of BYI02960 were statistically similar in their efficacy against nymphs and adults of ACP although control at the 10.6 rate tended to be better with either 435 Oil or Induce. Efficacy of these treatments was similar to Delegate and Movento applied with 435 Oil and Provado applied with Induce.

Significantly fewer CLM larvae compared to untreated check were observed in all treatments at 3 DAT but only with Delegate plus 435 Oil at 10 DAT. However, significantly fewer CLM larvae than untreated check were seem at 17 DAT with all three rates of BYI02960, Delegate, and Movento all applied with 435 Oil. There was a significant treatment effect on number of empty mines at 3 DAT but fewest mines at 10 DAT were seen from trees treated with Delegate with all treatments providing some control except for Movento and Provado. At 17 DAT, all treatments except BYI02960 applied alone and Provado 1.6 F with Induce resulted in significantly fewer empty CLM mines compared to untreated check. Spiders were the only common predators seen, averaging 0.7, 0.5, and 0.3 per tap sample at 3, 10, and 17 DAT, respectively with no significant treatment effect observed.

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Table 1.

Treatment/ formulation	Rate amt product/ acre or % v/v	Dead ACP nymphs/shoot/tree 3 DAT	Live ACP nymphs/shoot/tree			ACP Adults/tap sample/tree						
			3 DAT	10 DAT	17 DAT	3 DAT	10 DAT	17 DAT	24 DAT	31 DAT	38 DAT	45 DAT	52 DAT
Untreated check		0.08d	27.15a	18.03a	6.38ab	0.27a	2.75a	1.75a	1.21a	0.79a	1.10a	0.58a	0.65a
435 Oil	2%	1.25cd	13.63b	3.90b	10.18a	0.33a	2.35a	0.83b	0.95ab	0.63ab	0.19bc	0.32ab	0.35ab
BYI02960 200 SL	10.26 oz	1.95cd	3.65c	0.45b	1.33c	0.00c	0.42b	0.67bc	0.58bc	0.31bcd	0.27bc	0.21b	0.13b
BYI02960 200 SL + 435 Oil	6.84 oz + 2%	9.13b	2.13c	0.20b	3.58bc	0.06bc	0.63b	0.36cd	0.35c	0.06cd	0.06bc	0.19b	0.10b
BYI02960 200 SL + 435 Oil	10.26 oz + 2%	2.63cd	1.00c	0.00b	4.10bc	0.02c	0.33b	0.23cd	0.27c	0.35bc	0.04c	0.29ab	0.04b
BYI02960 200 SL + 435 Oil	13.69 oz + 2%	6.25bc	0.05c	0.05b	0.18c	0.00c	0.04b	0.23cd	0.10c	0.08cd	0.08bc	0.29ab	0.08b
BYI02960 200 SL + Induce	10.26 oz + 0.25%	3.73bcd	0.03c	0.13b	0.88c	0.02c	0.15b	0.02d	0.13c	0.21cd	0.13bc	0.04b	0.10b
Delegate 25 WG + 435 Oil	5.0 oz + 2%	18.25a	1.23c	0.85b	0.35c	0.00c	0.06b	0.10d	0.13c	0.08cd	0.21bc	0.04b	0.06b
Movento 240 SC + 435 Oil	10.0 oz + 2%	4.53bcd	0.43c	0.08b	1.33c	0.23ab	0.33b	0.29cd	0.35c	0.19cd	0.42b	0.19b	0.19b
Provado 1.6 F + Induce	10.0 oz + 0.25%	3.98bcd	0.15c	0.00b	1.18c	0.06bc	0.33b	0.27cd	0.27c	0.02d	0.15bc	0.06b	0.15b

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

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Table 2.

Treatment/ formulation	Rate amt product/ acre or % v/v	CLM larvae/3 leaves/ shoot/tree			CLM empty mines/3 leaves/ shoot/tree		
		3 DAT	10 DAT	17 DAT	3 DAT	10 DAT	17 DAT
Untreated check		0.43a	0.23bc	2.13a	0.73a	0.60a	2.70a
435 Oil	2%	0.15bc	0.20bcd	1.65ab	0.60a	0.28bcd	1.43b
BYI02960 200 SL	10.26 oz	0.08bc	0.55a	1.60ab	0.68a	0.40abc	2.08ab
BYI02960 200 SL + 435 Oil	6.84 oz + 2%	0.08bc	0.1bcd	1.03bc	0.55a	0.13cd	1.43b
BYI02960 200 SL + 435 Oil	10.26 oz + 2%	0.08bc	0.20bcd	1.13bc	0.53a	0.28bcd	1.80b
BYI02960 200 SL+ 435 Oil	13.69 oz + 2%	0.08bc	0.08cd	0.75c	0.68a	0.38abc	1.43b
BYI02960 200 SL + Induce	10.26 oz + 0.25%	0.08bc	0.05cd	1.48ab	0.73a	0.28bcd	1.80b
Delegate 25 WG + 435 Oil	5.0 oz + 2%	0.23b	0.00d	0.13bc	0.45a	0.05d	1.35b
Movento 240 SC + 435 Oil	10.0 oz + 2%	0.08bc	0.15bcd	1.33bc	0.88a	0.45ab	1.83b
Provado 1.6 F + Induce	10.0 oz + 0.25%	0.03c	0.30b	2.03a	0.48a	0.43abc	2.10ab

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