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

EFFICACY OF FOLIAR APPLICATIONS OF INSECTICIDES FOR CONTROL OF ASIAN CITRUS PSYLLID AND CITRUS LEAFMINER IN ORANGES DURING SPRING, 2010

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Asian citrus psyllid (ACP): *Diaphorina citri* Kuwayama

Citrus leafminer (CLM): *Phyllocnistis citrella* Stainton

ACP vectors the bacterium *Candidatus* Liberibacter asiaticus, causal organism of citrus greening disease or "Huanglongbing". 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 and 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 had been recently hedged so new shoots for psyllid reproduction were plentiful. Nine treatments and an untreated check were randomly distributed across 4 replicates in 19 rows that included an unhedged buffer row after every treated row. Each replicate contained 10 five-tree treatment plots. Treatments were applied on 14 May 2010 using a Durand Wayland 3P-10C-32 air blast speed sprayer operating at 1500 RPM with 2 stainless steel T-Jet # 5 nozzles per side delivering 65 gpa. The post treatment evaluations were made on 17, 24, and 31 May. Ten to twelve shoots were tagged in each plot prior to treatment application. 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 to count CLM larvae and mines. ACP density was estimated from three central trees in each five-tree plot by counting the adult insects falling on a clipboard covered with an 8 ½ × 11 inch laminated white sheet placed under randomly chosen branches which were then struck 3 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 were separated using LSD ($P = 0.05$).

On 17 May, all treatments significantly reduced the total number of ACP nymphs of all instars compared to untreated check except M-Pede + Addit and the low rate of Belt + Induce. Treatments effects were similar on 24 and 31 May except that 435 oil alone was not different from untreated check on both dates and the high rate of Belt + Induce was not different from untreated check on 31 May. Number of mature nymphal instars was significantly reduced compared to the untreated check by all treatments except M-Pede + Addit on all dates and 435 Oil alone on the last two dates. Movento 240SC, NAI-2302, Agriflex (MK 936) and Micromite 80 WGS all applied with 435 Oil and Portal 0.4EC applied alone provided most reduction in nymphal density. The same four treatments provided most reduction in adult numbers of ACP although no statistically significant difference was observed between treated and untreated trees on 17 May and Movento 240 SC + 435 Oil and untreated check on 24 May. Effects of 435 oil alone and both rates of Belt applied with Induce were more pronounced against adults than those seen against nymphs although all were not statistically different from untreated check on 24 May. Significant reduction in number of CLM larvae compared to the untreated check was observed in all treatments except 435 Oil alone and M-Pede + Addit on 17 and 24 May and Portal 0.4EC and NAI-2302 + 435 Oil on 24 May. Reduction in number of CLM mines compared to the untreated check was observed from all treatments on 17 May, but only from Agriflex (MK 936) treatment on 24 May. Treatment effects against CLM were less marked and more short lived than against ACP.

Treatment/ formulation	Rate amt product/ acre or % v/v	ACP nymphs (all instars)/shoot			ACP nymphs (3+4+5 instar)/shoot			ACP adults/4 tap samples/tree		
		17-May	24-May	31-May	17-May	24-May	31-May	17-May	24-May	31-May
Untreated check		17.28 ab	10.83 b	33.23 b	10.78 a	5.52 b	21.30 b	3.67 b	2.33 abc	5.58 a
Movento 240 SC + 435 Oil	5 oz + 3%	2.10 de	0.18 d	2.60 de	0.88 c	0.10 d	0.03 d	1.25 b	0.58 bcd	0.75 bc
435 Oil	3%	10.23 c	7.93 b	22.63 bc	5.78 b	4.50 bc	13.35 bc	2.58 b	3.42 a	2.08 bc
Portal 0.4EC	64 fl oz	5.88 cde	0.20 d	1.40 de	1.00 c	0.20 d	0.20 d	0.08 b	0.00 d	0.42 bc
NAI-2302 + 435 Oil	24 fl oz + 3%	1.18 de	0.20 d	0.08 e	0.65 c	0.20 d	0.05 d	0.00 b	0.00 d	0.17 c
Agriflex (MK 936) + 435 Oil	8.5 oz + 3%	0.30 e	0.00 d	0.55 e	0.05 c	0.00 d	0.08 d	0.00 b	0.00 d	0.00 c
Belt 4SC + Induce	5 oz + 0.25%	10.75 bc	6.88 bc	11.70 cde	6.07 b	5.80 b	5.28 dc	2.08 b	1.33 abcd	1.75 bc
Belt 4SC + Induce	7.5 oz + 0.25%	7.48 dc	2.50 cd	20.60 bc	4.52 bc	2.38 dc	10.92 c	3.67 b	1.42 abcd	1.67 bc
Micromite 80 WGS + 435 Oil	6.25 oz + 3%	1.65 de	0.78 d	16.23 cd	0.33 c	0.68 d	8.00 dc	0.08 b	0.25 dc	0.25 c
M-Pede + Addit	2% + 0.5%	22.90 a	21.60 a	64.08 a	15.30 a	11.95 a	41.28 a	9.17 a	2.58 ab	2.58 b

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

Treatment/ formulation	Rate amt product/ acre or % v/v	CLM larvae/3 leaves/shoot			CLM mines/3 leaves/shoot		
		17-May	24-May	31-May	17-May	24-May	31-May
Untreated check		2.35 a	8.43 c	8.05 d	3.80 a	10.38 abcd	10.05 d
Movento 240 SC + 435 Oil	5 oz + 3%	0.45 bc	3.65 f	12.38 a	2.50 b	6.35 cde	15.70 a
435 Oil	3%	1.78 a	5.95 d	9.13 cd	2.88 b	7.15 cde	11.13 cd
Portal 0.4EC	64 fl oz	0.08 c	13.03 a	10.63 abc	1.28 c	14.58 ab	12.68 bc
NAI-2302 + 435 Oil	24 fl oz + 3%	0.55 bc	10.58 b	10.18 abcd	2.25 b	12.38 abc	12.08 bcd
Agriflex (MK 936) + 435 Oil	8.5 oz + 3%	0.15 c	0.55 g	9.90 bcd	0.80 c	0.68 e	11.93 bcd
Belt 4SC + Induce	5 oz + 0.25%	0.55 bc	3.93 ef	8.50 cd	1.40 c	5.88 cde	11.20 cd
Belt 4SC + Induce	7.5 oz + 0.25%	0.83 b	5.80 de	8.75 cd	2.30 b	9.80 bcd	11.08 cd
Micromite 80WGS+ 435 Oil	6.25 oz + 3%	0.20 c	3.85 ef	11.80 ab	1.28 c	4.63 de	14.05 ab
M-Pede + Addit	2% + 0.5%	1.98 a	8.88 bc	10.13 abcd	2.90 b	16.83 a	12.38 bc

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

Part II: *Materials Tested for Arthropod Management*

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Brand name	Formulation	Common name	Composition	Manufacturer
435 oil	98.8%L	horticultural spray oil	Refined petroleum distillate	Drexel Chemical Company P.O. Box 13327 Memphis, TN 38113-0327
Induce	90%L	non-ionic adjuvant	Proprietary bland of Alkyl Aryl Polyoxylkane Ethers, Free Fatty Acids, and Dimothyl Polysiloxane	Helena Chemical Company 225 Schilling Blvd. Collierville, TN

				38017
Movento	240 SC	spirotetramat	*cis*-4-(ethoxycarbonyloxy)-8-methoxy-3-(2,5-xylyl)-1-azaspiro[4.5]dec-3-en-2-one	Bayer CropScience LP P.O. Box 12014 1 T.W. Alexander Drive Research Triangle Park, North Carolina 27709
Micromite	80WGS	diflubenzuron	N-[[(4-Chlorophenyl)amino]carbonyl]-2,6-difluorobenzamide	Uniroyal Chemical Company, Inc. A subsidiary of Crompton Corp. Middlebury, CT 06749
Portal	0.4 EC	fenpyroximate	*tert*-butyl (*E*)-α-(1,3-dimethyl-5-phenoxypyrazol-4-ylmethyleneaminooxy)-*p*-toluate	Nichino America Inc. 4550 New Linden Hill Rd. Suite 501 Wilmington DE 19808
Agri-Flex	Experimental Pre-mix	Abamectin + thiamethoxam	(Butyl)-7-((2,6-dideoxy-40-2,6-dideoxy3-0-methyl-x-L-arabinohexopyran osyl)-3-0-methyl-x-L-arabino-hexopyranosyl)oxy)-5'c6,6",7,10,11,14,15,17a,20,20a,20b-dodecanydro-20b-dihydroxy-5'6,8,19-tetramethylsprio (11,16-methano-2H,13H,17H-furo (4,3,2-pg)(2,6) benzodioxacyclootadecin + 4H-1,3,5-Oxadiazin-4-imine,3-((2-chloro-5-	Syngenta Crop Protection P.O. Box 18300 Greensboro, NC 27419

			thiazolyl)methyl)tetrahydro-5-methyl-N-nitro	
Belt	4 SC	Flubendiamide:	*N*2-[1,1-dimethyl-2-(methylsulfonyl)ethyl]-3-iodo-*N*1-[2-methyl-4-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]phenyl]-1,2-benzenedicarboxamide	Bayer CropScience P.O. Box 12014 1 T.W. Alexander Drive Research Triangle Park, North Carolina 27709
M-Pede	49 %	Soap	Potassium Salts of fatty acids	Dow Agrosciences LLC 9330 Zionsville Rd Indianopolis In 46268
Addit		Vegetable oil	Vegetable oil	Koppert Biological Systems Veilingweg 14 Postbus 155 2650 AD Berkel en Rodenrijs Netherlands