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

EFFECT OF SPRAY VOLUME AND SPRAYER TYPE ON EFFICACY OF INSECTICIDES FOR CONTROL OF ASIAN CITRUS PSYLLID AND CITRUS LEAFMINER ON ORANGES: 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 Florida 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. Spray method and spray volume and active ingredient cab all influence the effectiveness of an insecticide application. We evaluated the efficacy of Movento 240 SC in total spray volume 5, 10, 40 and 120 GPA and three other standard treatments. The two lower volume rates were applied with a Proptec™ rotary atomizer sprayer by varying speed of the peristaltic pump. The two higher volume rates were applied with a Durand Wayland™ 3P-10C-32 air blast speed sprayer operating at 2.3 mph and 200 psi with 4 Albuz ATR 80 nozzles per side delivering 40 gpa (white color nozzle) and 120 gpa (green color nozzle). 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 3 weeks prior to application to encourage growth of new shoots essential for reproduction of ACP and CLM. Eight treatment plots of 10 trees were randomly distributed across each of the 4 replicates one per row separated by a buffer row. Treatments were applied on 30 Sept 2010 and evaluations made at 4, 11, 18 and 25 days after treatment (DAT). Fifteen randomly selected shoots per plot were collected and examined under a stereoscopic microscope in the laboratory to count ACP nymphs. Five out of 15 shoots were examined under the microscope to count CLM larvae and empty mines on three fully expanded leaves per shoot. Density of ACP adults was estimated from five trees in each plot by counting those falling on a white clipboard 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 separated using LSD (P = 0.05) are presented.

Significantly more dead ACP nymphs compared to all treatments at 4 DAT were observed in response to Agrimek 0.15 EC + Provado 1.6 F + 435 Oil with Mustang Max and the two lowest volume treatments of Movento 240 SC + 435 oil not different from the check. Fewer live nymphs than the check were seen with all treatments through 25 DAT except Mustang Max 1.5 EC at the last observation. There were no significant differences in number of live nymphs among volume treatments of Movento 240 SC + 435 Oil from 4 through 25 DAT although fewest were seen with the 10 gpa application on all 4 sample dates.. Agrimek 0.15 EC + Provado 1.6 F + 435 Oil was not different from any of the Movento treatments in regard to live nymphs on any date but performed better than either of the pyrethroids (Mustang Max and Baythroid) on all dates. All treatments compared to the untreated check provided significant reduction in ACP adults through 18 DAT but none did at 25 DAT. No differences in adult counts were seen among sprayed treatments except at 18 DAT when all except Movento 240 SC + 435 Oil applied at 5 gpa with the Proptec or 40 gpa with the Airblast were significantly better than Mustang Max 1.5 EC.

Significantly fewer CLM larvae compared to the untreated check were observed on all trees at 4 and 11 DAT except those treated with Mustang Max 1.5 EC. At 18 DAT, significantly fewer larvae compared to the untreated check were observed only with Movento 240 SC + 435 Oil applied at 40 gpa and Agrimek 0.15 EC + Provado 1.6 F + 435 Oil. At 25 DAT none of the treatments were significantly better than untreated check and Agrimek 0.15 EC + Provado 1.6 F

+ 435 Oil was significantly worse. Significantly fewer empty mines were observed in all treatments compared to untreated check at 11 DAT, with most reduction from Agrimek 0.15 EC + Provado 1.6 F + 435 Oil although not different from Movento 240 SC + 435 Oil both applied with at 120 gpa. At 18 DAT, only the Agrimek 0.15 EC + Provado 1.6 F + 435 Oil resulted in significantly fewer empty mines compared to the untreated check. Significantly fewer empty mines compared to the untreated check at 25 DAT was observed with all treatments except Baythroid XL 1 EC and Movento 240 SC + 435 Oil applied at 40 gpa. Thus, Agrimek 0.15 EC + Provado 1.6 F + 435 Oil was clearly the best treatment for CLM although not better than Movento + Oil for ACP. While sprayer type did not produce clear differences, a trend toward better performance was seen with the greater of the two volumes applied by each sprayer.

Treatment/ formulation	Rate amt product/ acre	Sprayer	Total application volume/acre (gallons)	Dead ACP nymphs/shoot/tree 4 DAT	Live ACP nymphs/shoot/tree 4 DAT	11 DAT	18 DAT	25 DAT	ACP Adults/tap sample/tree 4 DAT	11 DAT	18 DAT	25 DAT
Untreated check				0.20 c	24.13 a	16.90 a	31.7 a	19.57 a	0.78 a	0.69 a	0.69 a	0.14 a
Mustang Max 1.5 EC	4 oz	Proptec	5	2.30 bc	7.25b	5.33 b	11.95 b	23.86 a	0.18 b	0.15 b	0.35 b	0.14 a
Baythroid XL 1 EC	3 oz	Proptec	5	4.20 b	5.82 bc	2.52 bc	6.35 bc	10.02 b	0.13 b	0.09 b	0.06 c	0.03 a
Movento 240 SC + 435 Oil	10 oz + 3 gal	Proptec	5	2.33 bc	1.18 cd	3.07 bc	4.50 c	1.52 c	0.30 b	0.18 b	0.15 bc	0.20 a
Movento 240 SC + 435 Oil	10 oz + 3 gal	Proptec	10	1.95 bc	0.73 d	0.20 c	0.35 c	0.44 c	0.08 b	0.06 b	0.03 c	0.00 a
Movento 240 SC + 435 Oil	10 oz + 3 gal	Airblast	40	3.82 b	1.65 cd	2.48 bc	6.85 bc	1.54 c	0.31 b	0.23 b	0.14 bc	0.15 a
Movento 240 SC + 435 Oil	10 oz + 3 gal	Airblast	120	3.08 b	3.02 bcd	1.31 c	3.48 c	3.23 bc	0.28 b	0.19 b	0.06 c	0.23 a
Agrimek 0.15 EC + Provado 1.6 F + 435 Oil	10 oz + 10 oz + 3 gal	Airblast	120	8.25 a	0.25 d	0.20 c	1.18 c	6.32 bc	0.01 b	0.00 b	0.00 c	0.01 a

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

Treatment/ formulation	Rate amt product/ acre	Sprayer	Total application volume/acre (gallons)	CLM larvae/3 leaves/shoot/tree				CLM empty mines/3 leaves/shoot/tree			
				4 DAT	11 DAT	18 DAT	25 DAT	4 DAT	11 DAT	18 DAT	25 DAT
Untreated check				5.70 ab	6.20 bc	5.60 a	1.63 c	1.05 cd	3.25 a	1.55 c	4.32 a
Mustang Max 1.5 EC	4 oz	Proptec	5	7.15 a	10.75 a	6.35 a	2.90 abc	1.70 bc	1.50 b	2.10 bc	3.05 bc
Baythroid XL 1 EC	3 oz	Proptec	5	4.05 bc	7.35 b	4.80 ab	4.00 ab	1.20 cd	2.00 b	2.25 abc	3.20 abc
Movento 240 SC + 435 Oil	10 oz + 3 gal	Proptec	5	1.75 def	3.55 d	4.85 ab	1.55 c	3.55 a	1.40 b	3.35 a	2.70 bcd
Movento 240 SC + 435 Oil	10 oz + 3 gal	Proptec	10	3.30 cd	5.75 bcd	5.65 a	2.47 bc	2.50 b	1.75 b	2.45 abc	2.21 cd
Movento 240 SC + 435 Oil	10 oz + 3 gal	Airblast	40	2.65 cde	4.80 cd	3.00 bc	2.80 abc	0.60 d	1.30 b	2.20 abc	3.53 ab
Movento 240 SC + 435 Oil	10 oz + 3 gal	Airblast	120	0.80 ef	5.75 bcd	4.40 ab	2.35 c	1.35 cd	1.05 bc	3.30 ab	2.55 bcd
Agrimek 0.15 EC + Provado 1.6 F + 435 Oil	10 oz + 10 oz + 3 gal	Airblast	120	0.07 f	0.00 e	1.30 c	4.15 a	1.00 cd	0.10 c	1.15 d	1.85 d

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
Mustang	1.5 EC	Zeta-cypermethrin	S-Cyano (3-phenoxyphenyl)methyl (+) cis/trans 3-(2,2-dichloroethenyl)-2,2 dimethylcyclopropane carboxylate	FMC Corporation Agriculture Products Group 1735 Market Street

				Philadelphia, PA 19103
Agri-Mek	0.15 EC	abamectin	(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	Syngenta Crop Protection P.O. Box 18300 Greensboro, NC 27419
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
Baythroid XL	1EC	ß cyfluthrin	Cyano(4-fluoro-3-phenoxyphenyl)methyl-3-(2,2-dichloroethenyl)-2,2-dimethyl-cyclopropanecarboxylate	Bayer CropScience 2 T.W. Alexander Drive, RTP, North Carolina, 27709
Provado	1.6 F	Imidacloprid	1-[(6-Chloro-3-pyridinyl)methyl]-N-nitro-2-imidazolidinimine	Bayer CropScience LP P.O. Box 12014 1 T.W. Alexander Drive

				Research Triangle Park, North Carolina 27709