

Article

“Predator-In-First”: A Preemptive Biological Control Strategy for Sustainable Management of Pepper Pests in Florida

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Supplementary

Table S1. Generalized linear mixed model statistics for abundance of arthropods in the greenhouse and field trials.

Sampling unit	Arthropod	Effect	Greenhouse study - fall season			Greenhouse study - spring season					
			<i>df</i>	<i>F</i>	<i>P</i>	<i>df</i>	<i>F</i>	<i>P</i>			
Leaf	<i>B. tabaci</i>	Treatment ^a	5, 235	59.86	<0.0001	5, 235	48.43	<0.0001			
		Week ^b	7, 235	53.33	<0.0001	7, 235	51.61	<0.0001			
		Treatment*week	35, 235	4.74	<0.0001	35, 235	1.97	0.0017			
	<i>A. swirskii</i>	Treatment	5, 235	222.83	<0.0001	5, 235	70.63	<0.0001			
		Week	7, 235	137.60	<0.0001	7, 235	87.51	<0.0001			
		Treatment*week	35, 235	13.01	<0.0001	35, 235	7.94	<0.0001			
Flower	<i>F. occidentalis</i>	Treatment	5, 205	8.02	<0.0001	5, 205	4.52	0.0006			
		Week	6, 205	3.12	0.0060	6, 205	23.29	<0.0001			
		Treatment*week	30, 205	1.86	0.0066	30, 205	1.19	0.2387			
	<i>A. swirskii</i>	Treatment	5, 205	10.93	<0.0001	5, 205	2.59	0.0267			
		Week	6, 205	4.61	0.0002	6, 205	3.70	0.0016			
		Treatment*week	30, 205	1.21	0.2020	30, 205	1.12	0.3116			
			First field study – fall season			Second field study – spring season			Third field study – fall season		
			<i>df</i>	<i>F</i>	<i>P</i>	<i>df</i>	<i>F</i>	<i>P</i>	<i>df</i>	<i>F</i>	<i>P</i>
Leaf	<i>B. tabaci</i>	Treatment	7, 315	6.25	<0.0001	7, 395	5.45	<0.0001	7, 315	3.520	0.0012
		Week	7, 315	50.34	<0.0001	9, 395	14.69	<0.0001	7, 315	17.76	<0.0001
		Treatment*week	49, 315	1.53	0.0168	63, 395	1.61	0.0040	49, 315	2.09	<0.0001
	<i>P. latus</i>	Treatment	7, 315	21.94	<0.0001	-	-	-	7, 315	7.08	<0.0001
		Week	7, 315	55.69	<0.0001	-	-	-	7, 315	55.56	<0.0001
		Treatment*week	49, 315	6.01	<0.0001	-	-	-	49, 315	2.35	<0.0001
	<i>A. swirskii</i>	Treatment	7, 315	35.43	<0.0001	7, 395	7.97	<0.0001	7, 315	19.77	<0.0001
		Week	7, 315	47.51	<0.0001	9, 395	28.69	<0.0001	7, 315	11.89	<0.0001
Treatment*week	49, 315	5.70	<0.0001	63, 395	2.15	<0.0001	49, 315	2.30	<0.0001		
Flower	<i>F. occidentalis</i>	Treatment	7, 235	1.12	0.3510	7, 275	2.69	0.0103	7, 235	1.63	0.1278
		Week	5, 235	64.86	<0.0001	6, 275	283.97	<0.0001	5, 235	145.10	<0.0001

	Treatment*week	35, 235	1.24	0.1777	42, 275	2.15	0.0001	35, 235	0.76	0.8346
	Treatment	7, 235	10.49	<0.0001	7, 275	0.89	0.5182	7, 235	2.61	0.0129
<i>A. swirskii</i>	Week	5, 235	14.21	<0.0001	6, 275	2.40	0.0284	5, 235	1.72	0.0002
	Treatment*week	35, 235	2.51	<0.0001	42, 275	0.93	0.6024	35, 235	1.26	0.0608

^a In greenhouse trials, treatments were defined based on the rate of *Amblyseius swirskii* (0, 20, or 40) released per seedling on either '7039' or '7141' pepper cultivar before planting, i.e., a total of six treatments. While in field trials, *A. swirskii* release rates were 0, 20, 40, per seedling or a sachet per 10 seedlings of either 7039 or 7141 pepper cultivars, making a total of 8 treatments; ^b Sampling was conducted weekly for 8 weeks period in greenhouse trials, and 8–10 weeks in field trials.



Figure S1. *Anthonomus eugenii* damage observed in different pepper plots during spring field production season.

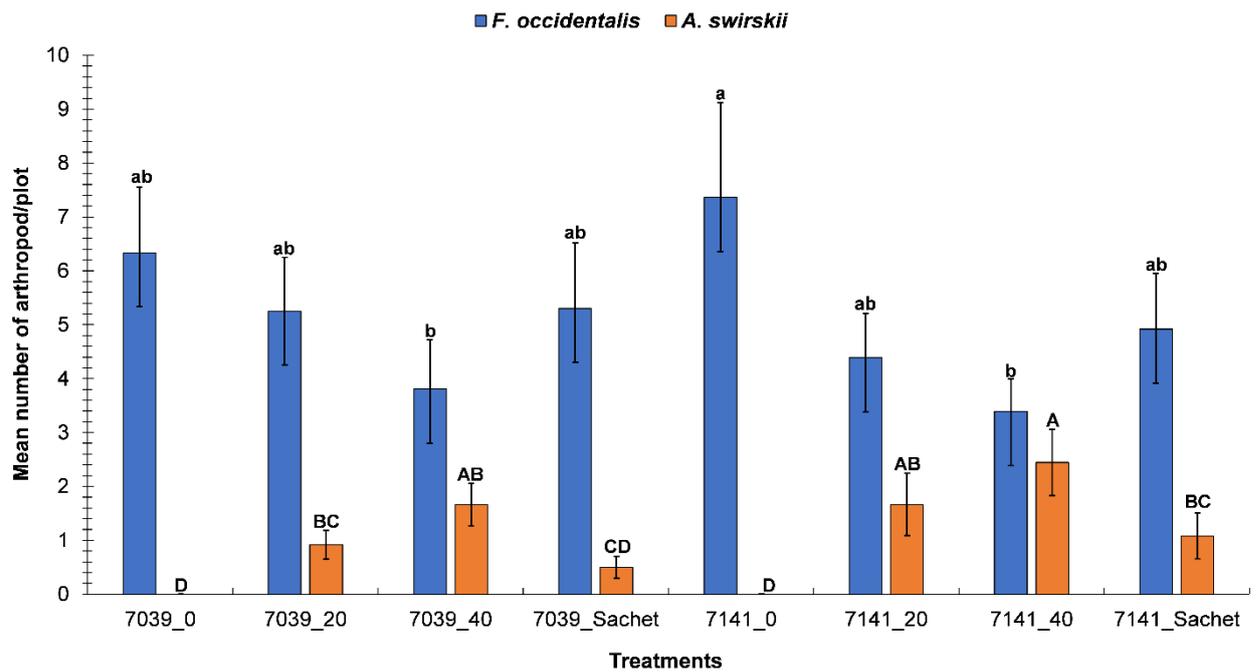


Figure S2. Mean number (\pm SE) of *Frankliniella occidentalis* and *Amblyseius swirskii* observed per plot in pepper flowers during first fall field study. Bars with different lower-case letters shows significant difference among treatments for abundance of *F. occidentalis*, and upper-case letters represents difference between treatments for *A. swirskii* (Fisher's LSD test, $p < 0.05$).

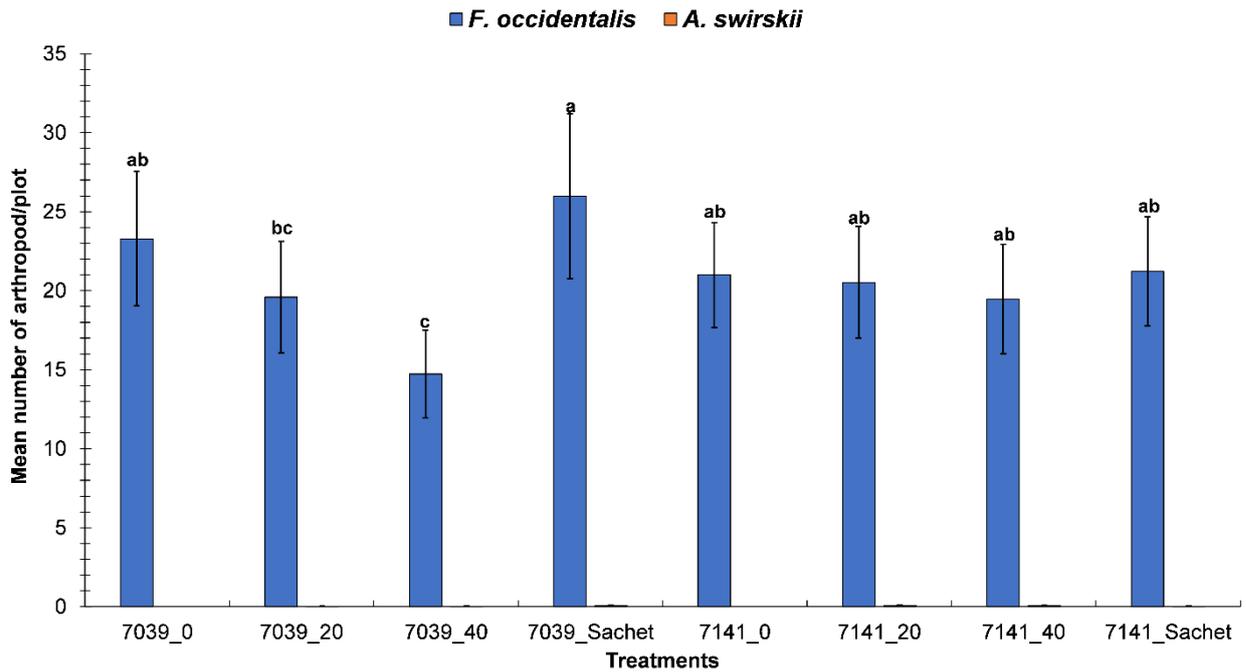


Figure S3. Mean number (\pm SE) of *Frankliniella occidentalis* and *Amblyseius swirskii* observed per plot in pepper flowers during spring field study. Treatment bars with different lower-case letters are significantly different (Fisher’s LSD test, $p < 0.05$).

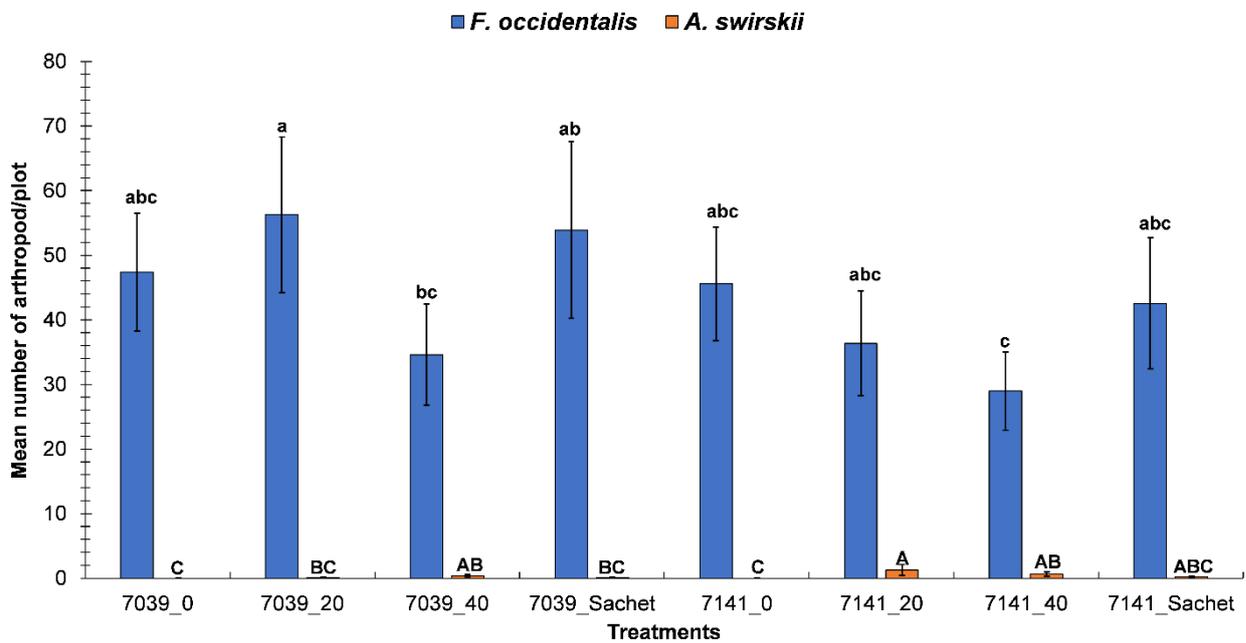


Figure S4. Mean number (\pm SE) of *Frankliniella occidentalis* and *Amblyseius swirskii* observed per plot in pepper flowers during second fall field study. Bars with different lower-case letters shows significant difference among treatments for abundance of *F. occidentalis*, and upper-case letters represents difference between treatments for *A. swirskii* (Fisher’s LSD test, $p < 0.05$).



Figure S5. Pepper fruits from control plot (on top) exhibiting heavy *Polyphagotarsonemus latus* damage, and the treatment with the high rate of 40 *Amblyseius swirskii* per pepper plant (on bottom) during second fall harvest.