

Table 1. Total lepidopteran larval and pupal density (all species pooled), parasitized host density, and % parasitism of hosts/plant (seasonal means) by host, year, location, and treatment. For treatment, BR = broccoli, BW = buckwheat, D/F = dill and fennel combination, S/Y = sunflower and yarrow combination, and SE = standard error. Means within year by location followed by the same letters are not significantly different. ($P > 0.05$, LSD).

Host	Year	Location	Treatment	Host/plant (mean±SE)	Parasitized host/plant (mean±SE)	% parasitism of host/plant (mean±SE)
<i>Larva</i>	2010	Athens	BR	1.20 ± 0.10	0.10 ± 0.00	10.90 ± 2.40
			BW	1.20 ± 0.20	0.30 ± 0.10	31.70 ± 10.80
			D/F	1.60 ± 0.30	0.20 ± 0.10	10.80 ± 5.40
			S/Y	1.50 ± 0.20	0.30 ± 0.10	18.70 ± 4.20
		Tifton	BR	2.60 ± 0.40	1.50 ± 0.2	52.20 ± 3.80
			BW	2.50 ± 0.20	1.50 ± 0.20	58.80 ± 3.80
			D/F	2.30 ± 0.20	1.30 ± 0.20	56.50 ± 4.30
			S/Y	1.80 ± 0.20	1.10 ± 0.20	56.70 ± 4.00
	2011	Athens	BR	1.40 ± 0.30	0.10 ± 0.00	14.00 ± 5.70
			BW	1.10 ± 0.20	0.10 ± 0.00	16.10 ± 5.60
			D/F	1.20 ± 0.20	0.10 ± 0.00	10.60 ± 4.50
			S/Y	1.10 ± 0.20	0.10 ± 0.00	11.00 ± 3.20
		Tifton	BR	1.30 ± 0.200	0.70 ± 0.10	48.10 ± 6.40
			BW	1.10 ± 0.20	0.60 ± 0.10	43.00 ± 5.90
			D/F	1.00 ± 0.20	0.50 ± 0.10	51.90 ± 6.20
			S/Y	0.70 ± 0.10	0.40 ± 0.10	44.40 ± 7.00
2012	Tifton	BR	5.50 ± 0.80	1.20 ± 0.30	17.40 ± 3.10	
		BW	5.80 ± 0.80	1.30 ± 0.30	18.20 ± 2.60	
		D/F	5.70 ± 0.90	1.30 ± 0.30	14.70 ± 2.10	
		S/Y	6.10 ± 0.80	1.30 ± 0.30	14.60 ± 2.20	

Table 1. (cont.)

Host	Year	Location	Treatment	Host/plant (mean±SE)	Parasitized host/plant (mean±SE)	% parasitism of host/plant (mean±SE)	
<i>Pupa</i>	2010	Athens	BR	NA	NA	NA	
			BW	NA	NA	NA	
			D/F	NA	NA	NA	
			S/Y	NA	NA	NA	
	2010	Tifton	BR	0.70 ± 0.10	0.50 ± 0.10	72.60 ± 5.90	
			BW	0.70 ± 0.10	0.60 ± 0.10	79.90 ± 4.80	
			D/F	0.70 ± 0.10	0.60 ± 0.10	83.30 ± 5.40	
			S/Y	0.80 ± 0.10	0.50 ± 0.10	62.90 ± 6.40	
		2011	Athens	BR	0.50 ± 0.10	0.00 ± 0.00	2.50 ± 2.50b
				BW	0.60 ± 0.10	0.10 ± 0.00	15.60 ± 11.40b
				D/F	0.50 ± 0.10	0.20 ± 0.10	52.10 ± 16.50a
				S/Y	0.50 ± 0.10	0.10 ± 0.10	17.50 ± 8.10b
	2011	Tifton	BR	0.40 ± 0.10	0.20 ± 0.00	38.10 ± 10.30	
			BW	0.30 ± 0.10	0.10 ± 0.00	30.20 ± 10.40	
			D/F	0.30 ± 0.10	0.10 ± 0.00	34.60 ± 12.00	
			S/Y	0.50 ± 0.10	0.20 ± 0.10	25.60 ± 9.60	
	2012	Tifton	BR	3.00 ± 0.40	2.00 ± 0.40	53.40 ± 6.20	
			BW	2.80 ± 0.40	1.70 ± 0.30	51.30 ± 5.90	
			D/F	3.10 ± 0.40	1.80 ± 0.40	43.10 ± 6.50	
			S/Y	2.80 ± 0.40	2.00 ± 0.30	54.50 ± 6.20	

Table 2. Total *Pieris rapae* (larva and pupa) density, parasitized *P. rapae* density, and % parasitism of *P. rapae* /plant (seasonal means) by host, year, location, and treatment. For treatment, BR = broccoli, BW = buckwheat, D/F = dill and fennel combination, S/Y = sunflower and yarrow combination, and SE = standard error. Means within year by location followed by the same letters are not significantly different. ($P > 0.05$, LSD).

Host	Year	Location	Treatment	<i>P. rapae</i> /plant (mean±SE)	Parasitized <i>P. rapae</i> /plant (mean±SE)	% parasitism of <i>P. rapae</i> /plant (mean±SE)
Larva	2010	Athens	BR	0.40 ± 0.10	0.00 ± 0.00	0.00 ± 0.00
			BW	0.70 ± 0.20	0.00 ± 0.00	0.00 ± 0.00
			D/F	0.80 ± 0.10	0.00 ± 0.00	0.00 ± 0.00
			S/Y	0.70 ± 0.30	0.00 ± 0.00	0.00 ± 0.00
		Tifton	BR	0.30 ± 0.10	0.00 ± 0.00	0.00 ± 0.00
			BW	0.30 ± 0.10	0.00 ± 0.00	0.00 ± 0.00
			D/F	0.30 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
			S/Y	0.30 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
	2011	Athens	BR	1.50 ± 0.30	0.10 ± 0.00	4.60 ± 2.90
			BW	1.30 ± 0.30	0.10 ± 0.00	7.20 ± 5.20
			D/F	1.50 ± 0.20	0.10 ± 0.00	5.20 ± 3.10
			S/Y	1.10 ± 0.20	0.10 ± 0.00	6.70 ± 3.20
		Tifton	BR	0.40 ± 0.10a	0.00 ± 0.00	0.00 ± 0.00
			BW	0.30 ± 0.00b	0.10 ± 0.00	4.20 ± 4.20
			D/F	0.20 ± 0.00b	0.00 ± 0.00	0.00 ± 0.00
			S/Y	0.30 ± 0.00b	0.00 ± 0.00	0.00 ± 0.00

Table 2 (cont.)

Host	Year	Location	Treatment	<i>P. rapae</i> /plant (mean±SE)	Parasitized <i>P. rapae</i> /plant (mean±SE)	% parasitism of <i>P. rapae</i> /plant (mean±SE)
Larva (cont.)	2012	Tifton	BR	4.80 ± 0.70	1.10 ± 0.30	14.00 ± 2.50
			BW	4.90 ± 0.70	1.10 ± 0.20	15.90 ± 2.70
			D/F	4.80 ± 0.80	1.10 ± 0.30	14.80 ± 2.50
			S/Y	5.20 ± 0.70	1.20 ± 0.30	15.20 ± 2.50
Pupa	2010	Athens	BR	NA	NA	NA
			BW	NA	NA	NA
			D/F	NA	NA	NA
			S/Y	NA	NA	NA
		Tifton	BR	0.20 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
			BW	0.20 ± 0.00	0.20 ± 0.00	100.00 ± 0.00
			D/F	NA	NA	NA
			S/Y	NA	NA	NA
2011	Athens	BR	0.50 ± 0.10	0.00 ± 0.00	2.50 ± 2.50b	
		BW	0.60 ± 0.10	0.10 ± 0.00	15.60 ± 11.40b	
		D/F	0.50 ± 0.10	0.20 ± 0.10	52.10 ± 16.50a	
		S/Y	0.50 ± 0.10	0.10 ± 0.10	18.90 ± 8.60b	

Table 2 (cont.)

Host	Year	Location	Treatment	<i>P. rapae</i> /plant (mean±SE)	Parasitized <i>P. rapae</i> /plant (mean±SE)	% parasitism of <i>P. rapae</i> /plant (mean±SE)
Pupa (cont.)		Tifton	BR	0.40 ± 0.20	0.10 ± 0.10	25.00 ± 25.00
			BW	0.20 ± 0.00	0.00 ± 0.00	16.70 ± 16.70
			D/F	0.20 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
			S/Y	0.20 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
	2012	Tifton	BR	2.90 ± 0.40	1.90 ± 0.40	49.60 ± 6.10
			BW	2.60 ± 0.30	1.60 ± 0.30	46.70 ± 6.40
			D/F	2.70 ± 0.40	1.60 ± 0.40	42.10 ± 6.70
			S/Y	2.60 ± 0.40	1.80 ± 0.30	50.90 ± 6.60

Table 3. Total *Plutella xylostella* (larva and pupa) density, parasitized *P. rapae* density, and % parasitism of *P. rapae*/plant (the whole seasonal mean) by host, year, location and treatment. For treatment, BR = broccoli, BW = buckwheat, D/F = dill and fennel combination, S/Y = sunflower and yarrow combination, and SE = standard error. Means within year by location followed by the same letters are not significantly different. ($P > 0.05$, LSD).

Host	Year	Location	Treatment	<i>P. xylostella</i> /plant (mean±SE)	Parasitized <i>P. xylostella</i> /plant (mean±SE)	% parasitism of <i>P. xylostella</i> /plant (mean±SE)
Larva	2010	Athens	BR	1.10 ± 0.10	0.10 ± 0.00	12.60 ± 2.80
			BW	0.90 ± 0.20	0.30 ± 0.10	42.20 ± 11.10
			D/F	1.20 ± 0.20	0.20 ± 0.10	13.30 ± 5.70
			S/Y	1.10 ± 0.20	0.30 ± 0.10	27.40 ± 6.90
		Tifton	BR	2.40 ± 0.40	1.50 ± 0.20	59.40 ± 4.20
			BW	2.30 ± 0.20	1.50 ± 0.20	64.90 ± 3.70
			D/F	2.10 ± 0.20	1.30 ± 0.20	61.90 ± 4.30
			S/Y	1.70 ± 0.20	1.10 ± 0.20	64.70 ± 5.10
	2011	Athens	BR	0.30 ± 0.00b	0.10 ± 0.10	31.00 ± 11.20
			BW	0.40 ± 0.10b	0.10 ± 0.00	39.10 ± 11.20
			D/F	0.40 ± 0.10b	0.10 ± 0.00	19.80 ± 8.00
			S/Y	0.50 ± 0.10a	0.10 ± 0.00	14.20 ± 4.90
		Tifton	BR	1.10 ± 0.20	0.70 ± 0.10	62.40 ± 7.20
			BW	1.10 ± 0.20	0.70 ± 0.10	62.00 ± 6.80
			D/F	1.00 ± 0.20	0.60 ± 0.10	66.80 ± 6.20
			S/Y	0.70 ± 0.10	0.40 ± 0.10	63.60 ± 8.10
2012	Tifton	BR	0.30 ± 0.00	0.20 ± 0.00	65.20 ± 9.60	
		BW	0.30 ± 0.00	0.30 ± 0.00	85.50 ± 5.20	
		D/F	0.40 ± 0.10	0.30 ± 0.00	71.20 ± 8.70	
		S/Y	0.70 ± 0.10	0.40 ± 0.10	58.60 ± 8.20	

Table 3 (cont.)

Host	Year	Location	Treatment	<i>P. xylostella</i> /plant (mean±SE)	Parasitized <i>P. xylostella</i> /plant (mean±SE)	% parasitism of <i>P. xylostella</i> /plant (mean±SE)
Pupa	2010	Athens	BR	NA	NA	NA
			BW	NA	NA	NA
			D/F	NA	NA	NA
			S/Y	NA	NA	NA
		Tifton	BR	0.70 ± 0.10	0.50 ± 0.10	73.60 ± 5.80
			BW	0.70 ± 0.10	0.60 ± 0.10	79.90 ± 4.80
			D/F	0.70 ± 0.10	0.60 ± 0.10	83.30 ± 5.40
			S/Y	0.80 ± 0.10	0.50 ± 0.10	62.90 ± 6.40
	2011	Athens	BR	NA	NA	NA
			BW	NA	NA	NA
			D/F	NA	NA	NA
			S/Y	NA	NA	NA
		Tifton	BR	0.30 ± 0.00	0.20 ± 0.00	41.00 ± 11.90
			BW	0.30 ± 0.10	0.10 ± 0.00	40.60 ± 13.80
			D/F	0.30 ± 0.00	0.10 ± 0.00	42.40 ± 13.40
			S/Y	0.40 ± 0.10	0.20 ± 0.10	21.40 ± 8.80
2012	Tifton	BR	0.40 ± 0.00	0.30 ± 0.10	69.80 ± 11.00	
		BW	0.30 ± 0.10	0.30 ± 0.10	71.90 ± 10.20	
		D/F	0.40 ± 0.10	0.30 ± 0.10	77.30 ± 8.10	
		S/Y	0.30 ± 0.10	0.30 ± 0.00	91.80 ± 5.40	

Table 4. Broccoli head diameter/plant (cm) by year, location, and harvest. Where present, the same letters following means within rows signify means that are not significantly different. ($P > 0.05$, LSD).

Year	Location	Harvest no.	Flower treatment (no. plants)				
			Broccoli	Buckwheat	Dill/Fennel	Sunflower/Yarrow	
2010	Athens	1	10.7 ± 0.55 (93)	10.7 ± 0.46 (84)	9.2 ± 0.41 (83)	10.5 ± 0.52 (71)	
		2	9.1 ± 0.53 (68)	8.0 ± 0.33 (62)	9.3 ± 0.42 (64)	9.3 ± 0.32 (79)	
		3	8.3 ± 0.46 (81)	7.8 ± 0.38 (80)	7.8 ± 0.46 (66)	7.9 ± 0.32 (89)	
		4	7.3 ± 0.40 (56)	6.6 ± 0.36 (55)	6.3 ± 0.35 (56)	8.4 ± 0.49 (70)	
	Tifton	1	9.5 ± 0.32 (92)	9.0 ± 0.29 (90)	9.3 ± 0.26 (91)	9.3 ± 0.32 (91)	
		2	8.7 ± 0.32 (95)	8.5 ± 0.23 (95)	9.0 ± 0.27 (96)	8.4 ± 0.29 (94)	
		3	5.3 ± 0.17 (96)	5.5 ± 0.17 (96)	10.2 ± 4.84 (96)	5.1 ± 0.13 (96)	
	2011	Athens	1	8.7 ± 0.19 (22)	8.6 ± 0.17 (23)	9.0 ± 0.36 (14)	8.6 ± 0.18 (25)
			2	10.3 ± 0.16 (63)	10.0 ± 0.17 (72)	11.4 ± 0.36 (25)	10.0 ± 0.19 (75)
Tifton		1	16.0 ± 0.43 (48)	16.2 ± 0.42 (48)	16.7 ± 0.43 (48)	17.1 ± 0.52 (48)	
		2	12.6 ± 0.34 (96)	11.7 ± 0.36 (96)	12.0 ± 0.31 (96)	24.9 ± 13.25 (96)	
		3	7.5 ± 0.20 (82)	8.8 ± 0.27 (83)	8.4 ± 0.26 (86)	8.9 ± 0.19 (91)	
		4	8.5 ± 0.61 ab	8.3 ± 0.37 b	7.4 ± 0.32 c	9.0 ± 0.43 a	

(19)

(26)

(45)

(21)

Table 4 (cont.)

Year	Location	Harvest no.	Flower treatment (no. plants)			
			Broccoli	Buckwheat	Dill/Fennel	Sunflower/Yarrow
2012	Tifton	1	13.2 ± 0.43 (95)	12.5 ± 0.54 (71)	12.4 ± 0.41 (92)	11.5 ± 0.46 (94)
		2	11.9 ± 0.34 (96)	11.2 ± 0.31 (95)	11.1 ± 0.35 (96)	11.0 ± 0.28 (96)

Fig. 1. Incidence of lepidopteran host species in broccoli trials as percentage of overall numbers collected, by year and location. “Others” are *Trichoplusia ni* (Hübner), *Spodoptera exigua* (Hübner), and *Spodoptera eridania* (Cramer).

Fig. 2. Relative abundance of parasitoid taxa reared from *P. xylostella* larvae and pupae as percentage of overall parasitoid numbers reared from this species, by year and location.

Fig. 3. Relative abundance of parasitoid taxa reared from *P. rapae* larvae and pupae as percentage of overall parasitoid numbers reared from this species, by year and location.

Figure 1

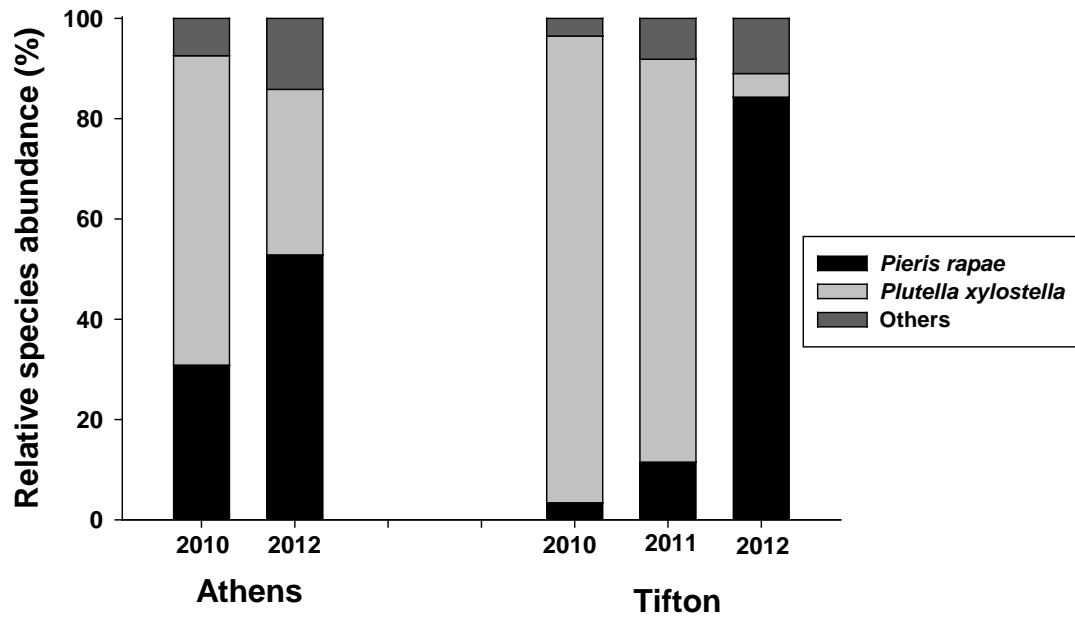


Figure 2

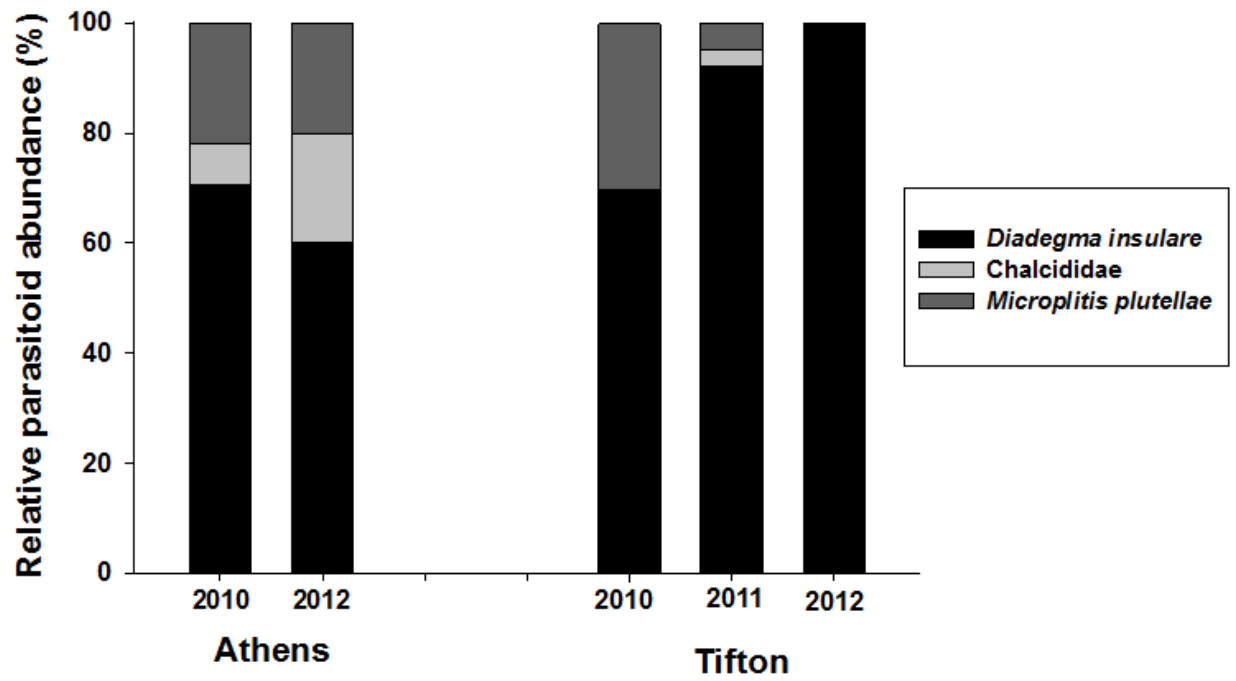
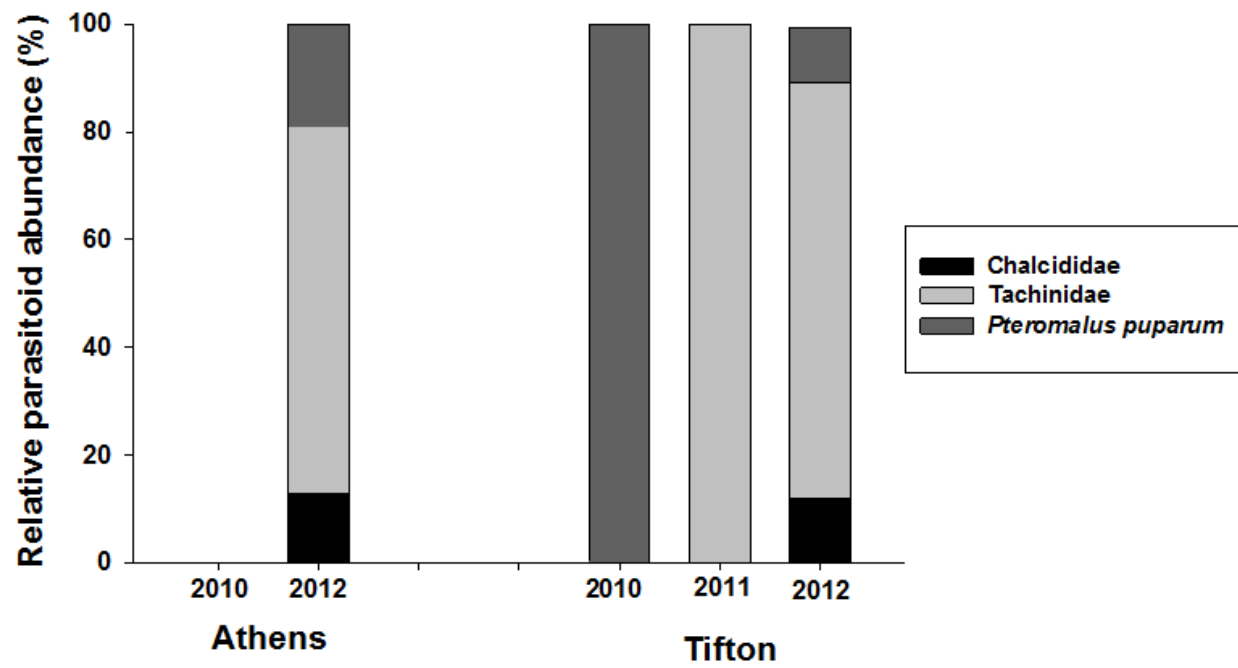


Figure 3



Appendix

Table A1. Treatment ANOVA table for total lepidopteran larval and pupal (all species pooled), by host, year, and location. P value followed by * is significant at $\alpha = 0.05$.

Variable	Host	Year	Location	DF	SS	Mean Square	F Value	Pr > F	
Total host/plant	Larva	2010	Athens	3,9	1.08	0.36	0.60	0.63	
			Tifton	3,9	8.43	2.81	0.88	0.49	
		2011	Athens	3,9	0.22	0.07	0.07	0.07	0.98
			Tifton	3,9	0.70	0.23	0.24	0.24	0.87
		2012	Tifton	3,9	2.55	0.85	0.12	0.95	
		Pupa	2010	Athens	NA	NA	NA	NA	NA
	Tifton			3,9	0.10	0.03	0.31	0.82	
	2011		Athens	3,9	0.06	0.02	0.25	0.86	
			Tifton	3,9	0.01	0.00	0.05	0.99	
	2012		Tifton	3,9	0.56	0.19	0.13	0.94	
	Parasitized host/plant		Larva	2010	Athens	3,9	0.20	0.07	1.63
		Tifton			3,9	2.35	0.78	0.64	0.61
2011		Athens		3,9	0.00	0.00	0.01	1.00	
		Tifton		3,9	0.06	0.02	0.07	0.97	
2012		Tifton		3,9	0.13	0.04	0.03	0.99	

Table A1 (cont.)

Variable	Host	Year	Location	DF	SS	Mean Square	F Value	Pr > F
Parasitized host/plant (cont.)	Pupa	2010	Athens	NA	NA	NA	NA	NA
			Tifton	3,9	0.03	0.01	0.26	0.86
		2011	Athens	3,9	0.10	0.03	1.46	0.29
	Tifton		3,9	0.03	0.01	0.40	0.76	
	2012	Tifton	3,9	0.89	0.30	0.41	0.75	
	% parasitism of host/plant	Larva	2010	Athens	3,9	0.52	0.17	2.05
Tifton				3,9	0.12	0.04	0.54	0.66
2011			Athens	3,9	0.15	0.05	0.33	0.80
			Tifton	3,9	0.59	0.20	1.75	0.23
2012			Tifton	3,9	0.11	0.04	0.44	0.73
Pupa			2010	Athens	NA	NA	NA	NA
		Tifton		3,9	0.61	0.20	1.22	0.36
		2011	Athens	3,9	1.91	0.64	4.46	0.04*
			Tifton	3,9	0.39	0.13	1.14	0.39
2012		Tifton	3,9	1.27	0.42	1.30	0.28	

Table A2. Treatment ANOVA table for total *Pieris rapae* (larvae and pupae), by host, year, and location. P value followed by * is significant at $\alpha = 0.05$.

Variable	Host	Year	Location	DF	SS	Mean Square	F Value	Pr > F	
Total hosts/plant	Larva	2010	Athens	3,7	1.21	0.40	3.12	0.10	
			Tifton	3,6	0.03	0.01	1.10	0.42	
		2011	Athens	3,9	0.78	0.26	0.21	0.89	
			Tifton	3,9	0.04	0.01	4.15	0.04*	
		2012	Tifton	3,9	1.41	0.47	0.10	0.96	
		Pupa	2010	Athens	NA	NA	NA	NA	NA
	Tifton			1,0	0.00	0.00	NA	NA	
	2011		Athens	3,9	0.06	0.02	0.24	0.86	
			Tifton	3,4	0.03	0.01	0.19	0.90	
	2012		Tifton	3,9	1.13	0.38	0.33	0.81	
	Parasitized hosts/plant		Larva	2010	Athens	3,7	0.00	0.00	NA
		Tifton			3,6	0.00	0.00	NA	NA
2011		Athens		3,9	0.00	0.00	0.02	1.00	
		Tifton		3,9	0.00	0.00	0.19	0.90	
2012		Tifton	3,9	0.11	0.04	0.02	0.99		

Table A2 (cont.)

Variable	Host	Year	Location	DF	SS	Mean Square	F Value	Pr > F
Parasitized hosts/plant (cont.)	Pupa	2010	Athens	NA	NA	NA	NA	NA
			Tifton	1,0	0.02	0.02	NA	NA
		2011	Athens	3,9	0.13	0.04	1.79	0.22
	Tifton		3,4	0.01	0.00	0.68	0.61	
	2012	Tifton	3,9	0.84	0.28	0.39	0.77	
	% parasitism of host/plant	Larva	2010	Athens	3,7	0.00	0.00	NA
Tifton				3,6	0.00	0.00	NA	NA
2011			Athens	3,9	0.01	0.00	0.03	0.99
			Tifton	3,9	0.01	0.00	0.19	0.90
2012			Tifton	3,9	0.03	0.01	0.38	0.77
Pupa			2010	Athens	NA	NA	NA	NA
		Tifton		1,0	1.23	1.23	NA	NA
		2011	Athens	3,9	1.90	0.63	4.43	0.04*
			Tifton	3,4	0.78	0.26	0.68	0.61
2012		Tifton	3,9	0.22	0.07	2.22	0.16	

Table A3. Treatment ANOVA table for total *Plutella xylostella* (larvae and pupae) density, by host, year, and location. P value followed by * is significant at $\alpha = 0.05$

Variable	Host	Year	Location	DF	SS	Mean Square	F Value	Pr > F
Total host/plant	Larva	2010	Athens	3,9	0.20	0.07	0.19	0.90
			Tifton	3,9	7.39	2.46	0.74	0.55
		2011	Athens	3,9	0.45	0.15	5.54	0.02*
			Tifton	3,9	0.22	0.07	0.07	0.97
		2012	Tifton	3,9	0.15	0.05	0.47	0.71
		Pupa	2010	Athens	NA	NA	NA	NA
	Tifton			3,9	0.12	0.04	0.38	0.77
	2011		Athens	NA	NA	NA	NA	NA
			Tifton	3,9	0.07	0.02	0.34	0.79
	2012	Tifton	3,9	0.11	0.04	0.20	0.90	
Parasitized hosts/plant	Larva	2010	Athens	3,9	0.30	0.10	2.81	0.10
			Tifton	3,9	2.35	0.78	0.64	0.61
		2011	Athens	3,9	0.02	0.01	0.24	0.87
			Tifton	3,9	0.06	0.02	0.07	0.98
		2012	Tifton	3,9	0.04	0.01	1.21	0.36

Table A3 (cont.)

Variable	Host	Year	Location	DF	SS	Mean Square	F Value	Pr > F
Parasitized hosts/plant (cont.)	Pupa	2010	Athens	NA	NA	NA	NA	NA
			Tifton	3,9	0.04	0.01	0.32	0.81
		2011	Athens	NA	NA	NA	NA	NA
Tifton	3,9		0.06	0.02	0.77	0.54		
		2012	Tifton	3,9	0.14	0.05	0.38	0.77
% parasitism of hosts/plant	Larva	2010	Athens	3,9	1.19	0.40	2.44	0.13
			Tifton	3,9	0.15	0.05	0.67	0.59
		2011	Athens	3,9	1.09	0.36	0.59	0.63
			Tifton	3,9	0.53	0.18	0.76	0.54
		2012	Tifton	3,9	0.70	0.23	0.65	0.60
		Pupa	2010	Athens	NA	NA	NA	NA
	Tifton			3,9	0.62	0.21	1.29	0.34
	2011		Athens	NA	NA	NA	NA	NA
		Tifton	3,9	1.32	0.44	1.70	0.24	
		2012	Tifton	3,9	0.57	0.19	0.43	0.74