Supporting material: Objective 1

Table S1: LME model of trapped ant richness from cucumber plots

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: richness ~ treatment + soil compaction + soil ph + mean air temp + aphid presence + (1|block) + (1|round) + (1|site)	(Intercept)	1.947011	1.199131	2.712474	1.624	0.2124
	PP	-0.42266	0.193885	182.2561	**-2.18**	**0.0305**
	W	-0.44118	0.193677	182.5306	**-2.278**	**0.0239**
	SC	-0.32143	0.269404	183.3775	-1.193	0.2344
	Mean air temp	0.009184	0.027769	182.8794	0.331	0.7412
	Aphid leaf presence	0.507282	0.237072	183.303	2.14	**0.0337**

Linear mixed effects model examining ant species richness from pooled tuna baits, honey baits, ant pitfalls in cucumber plots. Data used consists of specimens from the three combined replicates from each block (n = 193). W = weedy fallow, C = control, PP = partridge pea, and SC = soil compaction. Rsquared: R2m = 0.02620692, R2c = 0.6923685. Significant p-values are in bold.

Table S2: Post hoc analysis of ant richness from cucumber plots by treatment

Pairwise comparison	Estimate	SE	DF	t-ratio	p-value
C - PP	0.4227	0.197	182	2.146	0.0835
C - W	0.4412	0.195	183	2.261	0.064
PP - W	0.0185	0.195	182	0.095	0.995

Post-hoc pairwise comparisons of the significant treatment effect generated from the linear mixed-effects model examining ant species richness from cucumber plots. Estimated marginal means were used to make comparisons. Data used consists of pooling the three replicate samples from each block and combining the three ant trap types: tuna bait, honey bait, and pitfall traps (n = 193). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Table S3: Permanova on ant community structure from cucumber plots by treatment

	DF	SumOfSqs	R2	F	p-value
Model	304	1.957	0.01864	2.8876	**0.0026**
Residual	304	102.991	0.98136		
Total	306	104.948	1.00000		

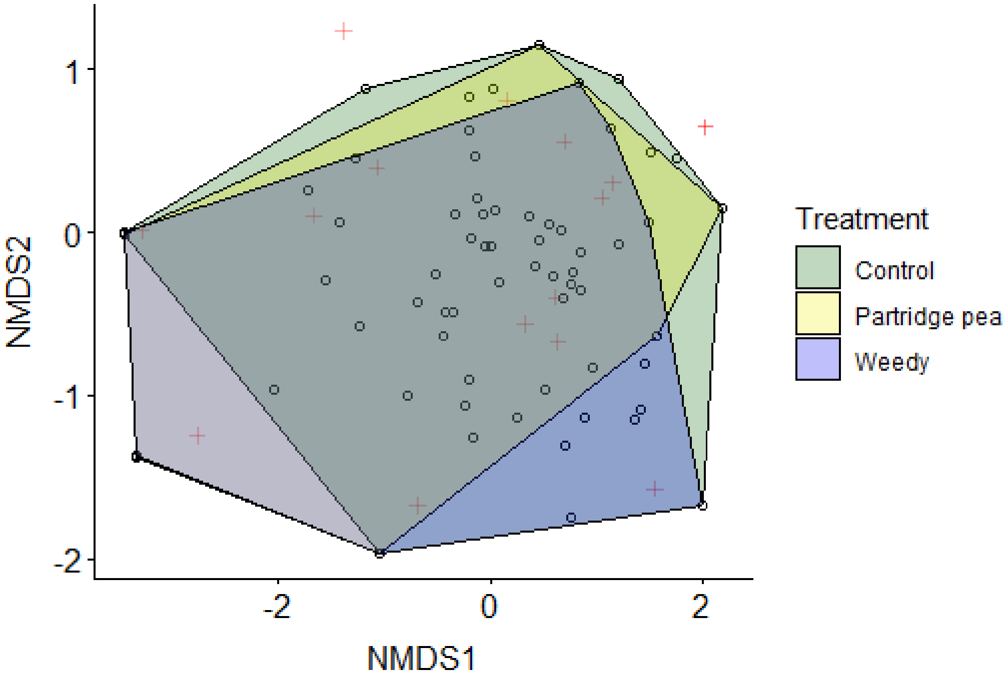
Permanova comparing ant community structure by treatment from pooled traps. Data consists of specimens from tuna baits, honey baits, and pitfall traps (n = 307). Significant p-values are in bold.

Table S4: Ant community structure post-hoc analysis between cucumber plot treatments

Pairwise comparison	DF	SumOfSqs	F.model	R2	Adj p-value
W - PP	1	0.75575	2.307398	0.011694	0.051699
W - C	1	0.865225	2.496378	0.011748	**0.04917**
PP - C	1	1.309003	3.832858	0.018531	**0.01005**

Adonis post-hoc analysis on pairwise interactions of sticky card community structure between cucumber treatments from traps. Data consists of specimens from tuna baits, honey baits, and pitfall traps (n = 307). Significant p-values are in bold.

Fig S1: NMDS plot of insect community structure from cucumber sticky cards



Non-Metric Dimensional Scaling ordination plot showing variations in ant species structure between cucumber plot treatments. Data represents all ant species pooled from the three trap types of each sampling block (n = 307). Circles represent site scores of each sample. Red plus symbols represent the score of each insect group quantified. Polygons represent the clustering of site scores within each treatment. K = 2, stress = 0.066.

Table S5: LME model of beetle family richness from cucumber pitfalls

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: log+1(richness) ~ treatment + soil compaction + soil ph + (1|row) + (1|round) + (1|site)	(Intercept)	2.28237	0.78162	100.5206	2.92	**0.00432**
	PP	0.09046	0.06913	178.6123	1.309	0.19235
	W	0.21996	0.07122	177.0779	3.088	**0.00234**
	SC	0.03851	0.09599	165.6974	0.401	0.68882
	SPH	-0.27193	0.1158	106.6675	-2.348	**0.0207**

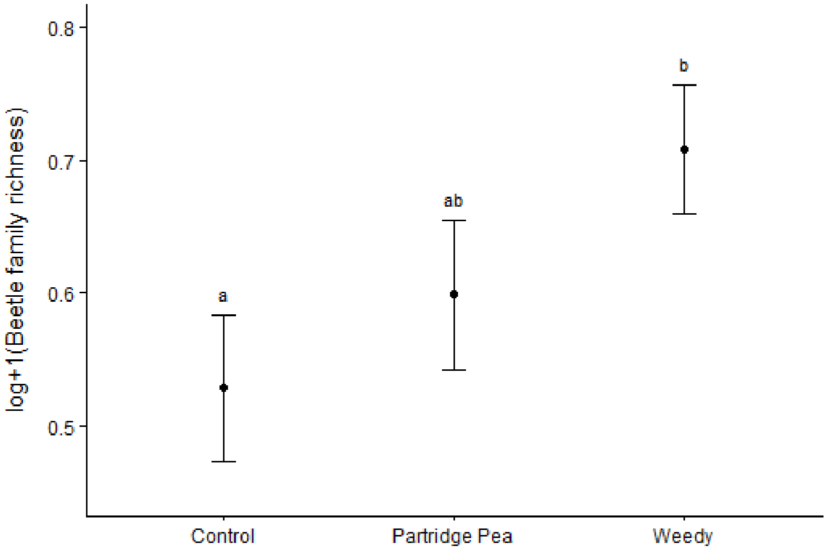
Linear mixed effects model examining beetle family richness from cucumber pitfall traps. Data was generated from a combined sum from the three replicate samples from each block (n = 188). W = weedy fallow, C = control, and PP = partridge pea treatments. SC = soil compaction, SPH = soil pH. Rsquared: R2m = 0.06752338, R2c = 0.2748301. Significant p-values are in bold.

Table S6: Post hoc analysis of beetle family richness in cucumber plots by treatment

Pairwise comparison	Estimate	SE	DF	t.ratio	p-value
C - PP	-0.0905	0.0697	179	-1.297	0.3986
C - W	-0.22	0.0726	178	-3.029	**0.0079**
PP - W	-0.1295	0.072	180	-1.798	0.173

Post-hoc pairwise comparisons on the significant treatment effect generated from the LME examining beetle family richness from cucumber pitfall traps. Estimated marginal means were used to make comparisons (n = 188). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S2: Beetle family richness by cucumber treatment



Mean beetle family richness by cucumber treatment from pitfall traps Data was generated from pooled replicate samples from each block (n = 188). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Table S7: Linear mixed-effects model of Carabid abundance from cucumber pitfall traps

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: log+1(richness) ~ treatment + soil compaction + soil ph + (1|row) + (1|block) + (1|round) + (1|site)	(Intercept)	3.1231	1.3294	153.1273	2.349	0.02009
	PP	0.1024	0.1146	176.1081	0.893	0.3729
	W	0.3773	0.1169	178.6182	3.228	**0.00148**
	SC	-0.1365	0.1576	156.8392	-0.866	0.38773
	SPH	-0.365	0.1967	172.5878	-1.856	0.06522

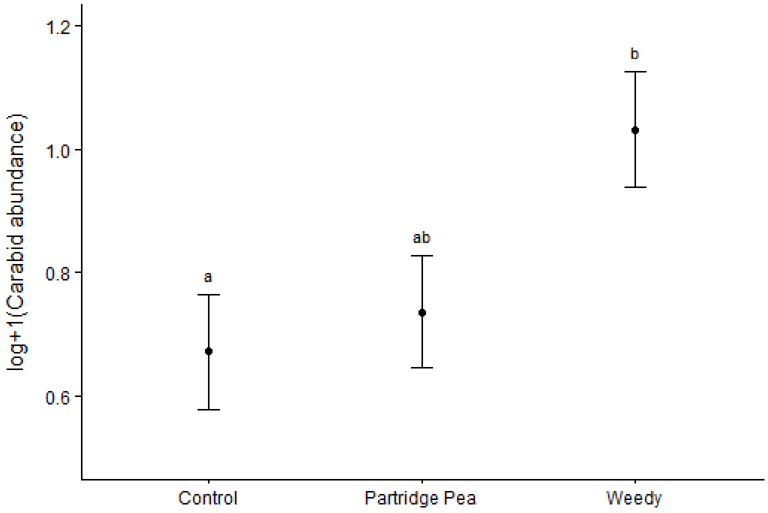
Linear mixed effects model examining Carabid abundance from cucumber pitfall traps. Data was generated from a combined sum from the three replicate samples from each block (n = 188). W = weedy fallow, C = control, and PP = partridge pea treatments. SC = soil compaction, SPH = soil pH. Rsquared: R2m = 0.06709792, R2c = 0.3630364. Significant p-values are in bold.

Table S8: Post hoc analysis of Carabid abundance in cucumber plots by treatment

Pairwise comparison	estimate	SE	DF	t-ratio	p.value
C - PP	-0.102	0.118	176	-0.871	0.6591
C - W	-0.377	0.119	179	-3.164	**0.0052**
PP - W	-0.275	0.118	179	-2.32	0.0556

Post-hoc pairwise comparisons on the significant treatment effect of Carabid abundance from cucumber pitfall traps. Estimated marginal means were used to make comparisons (n = 188). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S3: Carabid abundance by cucumber treatment



Mean Carabid abundance by cucumber treatment from pitfall traps Data was generated from pooled replicate samples from each block (n = 188). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Table S9: LME model of parasitoid wasp abundance from cucumber sticky cards

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: abundance ~ treatment + mean air temp + mean rh + (1|site) + (1|round)	(Intercept)	-64.7301	49.3575	9.1173	-1.311	0.2218
	PP	6.7491	4.7163	179.3390	1.431	0.1542
	W	-3.2813	4.6972	179.3220	-0.699	0.4857
	Mean air temp	1.5236	0.7081	41.9524	2.152	**0.0372**
	Mean rh	1.6659	0.7178	6.4760	2.321	0.0563

Linear mixed effects model examining parasitoid wasp abundance from cucumber sticky cards. Data was generated from a combined sum from the three replicate samples from each block (n = 191). W = weedy fallow, C = control, and PP = partridge pea treatments. Rsquared: R2m = 0.1489526, R2c = 0.324612. Significant p-values are in bold.

Table S10: LME model of aphid abundance from cucumber sticky cards

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: log+1(abundance) ~ treatment + mean air temp + mean rh + (1|site) + (1|round)	(Intercept)	3.95862	1.94908	63.10426	2.031	**0.04647**
	PP	-0.41951	0.14817	181.80374	-2.831	**0.00516**
	W	-0.35590	0.14757	181.80111	-2.412	**0.01687**
	Mean air temp	0.17197	0.02443	167.5883	7.040	**<0.0001**
	Mean rh	-0.07915	0.02847	94.40706	-2.781	**0.00655**

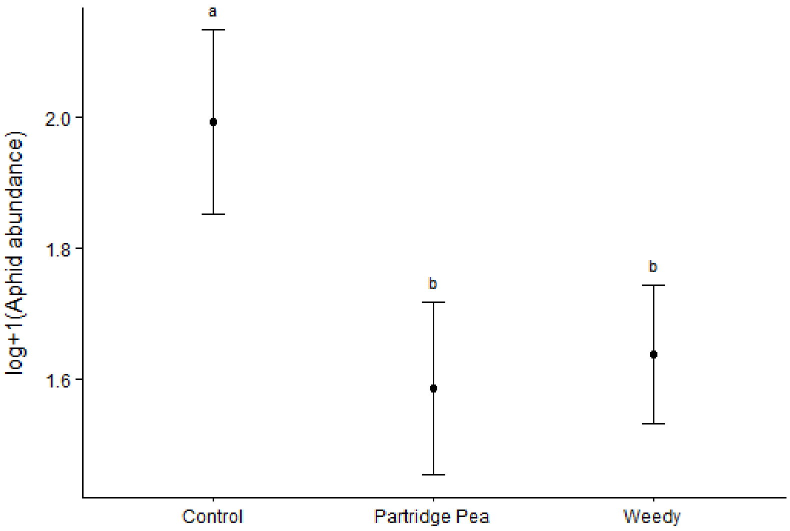
Linear mixed effects model examining aphid abundance from cucumber sticky cards. Data was generated from a combined sum from the three replicate samples from each block (n = 191). W = weedy fallow, C = control, and PP = partridge pea treatments. Rsquared: R2m = 0.2794943, R2c = 0.6848769. Significant p-values are in bold.

Table S11: Post hoc analysis of aphid abundance from cucumber plots by treatment

Pairwise comparison	Estimate	SE	DF	t-ratio	p-value
C - PP	0.4195	0.148	182	2.831	**0.0142**
C - W	0.3559	0.148	182	2.412	**0.0443**
PP - W	-0.0636	0.148	182	-0.429	0.9035

Post-hoc pairwise comparisons on the significant treatment effect generated from the LME examining aphid abundance from cucumber sticky cards. Estimated marginal means were used to make comparisons (n = 191). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S4: Aphid abundance by cucumber treatment



Mean aphid abundance by cucumber treatment from pitfall traps Data was generated from pooled replicate samples from each block (n = 191). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Table S12: Poisson GLMM on striped cucumber beetle abundance from cucumber sticky cards

Model formula	Fixed effect	Estimate	SE	z-value	p-value
Poisson GLMM: abundance ~ treatment + mean air temp + mean rh + (1|row) + (1|block) + (1|site) + (1|round)	(Intercept)	-5.4124	3.14104	-1.723	0.084869
	PP	-0.00959	0.228118	-0.042	0.966461
	W	-0.44552	0.234567	-1.899	0.057521
	Mean air temp	0.211794	0.059636	3.551	**0.000383**
	Mean rh	-0.00214	0.05422	-0.039	0.968596

Poisson generalized linear mixed-effects model examining striped cucumber beetle abundance from cucumber sticky cards. Data was generated from a combined sum from the three replicate samples from each block (n = 191). W = weedy fallow, C = control, and PP = partridge pea treatments. Trigamma Rsquared: R2m = 0.1804658, R2c = 0.4599563. Significant p-values are in bold.

Table S13: LME model of bee abundance from cucumber sticky cards

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: sqrt(abundance) ~ treatment + mean air temp + mean rh + (1|site) + (1|round)	(Intercept)	-3.071660	1.395639	5.595038	-2.201	0.0733
	PP	0.129355	0.124742	181.202298	1.037	0.3011
	W	-0.073294	0.124235	181.197409	-0.590	5.5559
	Mean air temp	0.008072	0.019083	25.100462	0.423	0.6759
	Mean rh	0.050271	0.019792	3.238870	2.540	0.0785

Linear mixed effects model examining bee abundance from cucumber sticky cards. W = weedy fallow, C = control, and PP = partridge pea treatments. Data was generated from a combined sum from the three replicate samples from each block (n = 191). Trigamma Rsquared: R2m = 0.08566493, R2c = 0.5411385. Significant p-values are in bold.

Table S14: LME model of Syrphid adult abundance from cucumber sticky cards

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: sqrt(abundance) ~ treatment + mean air temp + mean rh + (1|row) + (1|site) + (1|round)	(Intercept)	3.94015	1.66719	41.49866	2.363	0.0229
	PP	-0.02394	0.12436	180.47985	-0.193	0.8476
	W	-0.13053	0.12431	163.80542	-1.05	0.2953
	Mean air temp	-0.04325	0.02037	156.92193	-2.123	**0.0353**
	Mean rh	-0.02838	0.02365	81.36412	-1.2	0.2336

Linear mixed effects model examining Syrphid adult abundance from cucumber sticky cards. W = weedy fallow, C = control, and PP = partridge pea treatments. Data was generated from a combined sum from the three replicate samples from each block (n = 191). Trigamma Rsquared: R2m = 0.04396204, R2c = 0.6635275. Significant p-values are in bold.

Table S15: LME model of ladybeetle adult abundance from cucumber sticky cards

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: sqrt(abundance) ~ treatment + mean air temp + mean rh + (1|row) + (1|block) + (1|site) + (1|round)	(Intercept)	-1.81553	1.015139	11.44867	-1.788	0.1002
	PP	0.275599	0.107338	179.027	2.568	**0.0111**
	W	0.229422	0.106855	173.474	2.147	**0.0332**
	Mean air temp	0.084678	0.01501	40.05365	5.641	**<0.0001**
	Mean rh	0.004558	0.014436	8.347958	0.316	0.76

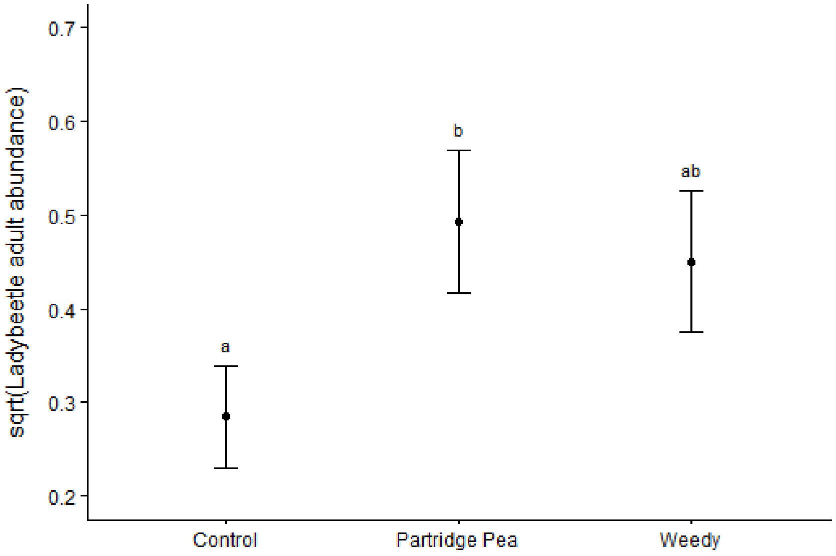
Linear mixed effects model examining ladybeetle adult abundance from cucumber sticky cards. W = weedy fallow, C = control, and PP = partridge pea treatments. Data was generated from a combined sum from the three replicate samples from each block (n = 191). Trigamma Rsquared: R2m = 0.2037196, R2c = 0.4412115. Significant p-values are in bold.

Table S16: Post-hoc analysis of ladybeetle abundance from cucumber plots by treatment

Pairwise comparison	Estimate	SE	DF	t-ratio	p-value
C - PP	-0.2756	0.111	178	-2.478	**0.0375**
C - W	-0.2294	0.111	173	-2.07	0.0991
PP - W	0.0462	0.11	174	0.419	0.9076

Post-hoc pairwise comparisons on the significant treatment effect generated from the LME examining ladybeetle adult abundance from cucumber sticky cards. Estimated marginal means were used to make comparisons (n = 191). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S5: Ladybeetle adult abundance from cucumber sticky cards by treatment



Mean ladybeetle adult abundance by treatment collected from cucumber sticky cards (n = 191). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Table S17: Poisson GLMM on rove beetle abundance from cucumber sticky cards

Model formula	Fixed effect	Estimate	SE	z-value	p-value
Poisson GLMM: abundance ~ treatment + mean air temp + mean rh + (1|row) + (1|block) + (1|site) + (1|round)	(Intercept)	-2.09329	3.55479	-0.589	0.555952
	PP	-0.1076	0.20137	-0.534	0.593112
	W	-0.09579	0.20292	-0.472	0.636882
	Mean air temp	0.2095	0.05718	3.664	**0.000248**
	Mean rh	-0.0492	0.05922	-0.831	0.406077

Poisson generalized linear mixed-effects model examining rove beetle abundance from cucumber sticky cards. Data was generated from a combined sum from the three replicate samples from each block (n = 191). W = weedy fallow, C = control, and PP = partridge pea treatments. Trigamma Rsquared: R2m = 0.1980727, R2c = 0.6631298. Significant p-values are in bold.

Table S18: Poisson GLMM on vespid wasp adult abundance from cucumber sticky cards

Model formula	Fixed effect	Estimate	SE	z-value	p-value
Poisson GLMM: abundance ~ treatment + mean air temp + mean rh + (1|row) + (1|block) + (1|site) + (1|round)	(Intercept)	0.74603	4.75993	0.157	0.875
	PP	1.27530	0.18574	6.866	**<0.0001**
	W	-0.38571	0.26761	-1.441	0.149
	Mean air temp	-0.02712	0.07999	-0.339	0.735
	Mean rh	-0.02134	0.06586	-0.324	0.746

Poisson generalized linear mixed-effects model examining rove beetle abundance from cucumber sticky cards. Data was generated from a combined sum from the three replicate samples from each block (n = 191). W = weedy fallow, C = control, and PP = partridge pea treatments. Trigamma Rsquared: R2m = 0.1189948, R2c = 0.8441592. Significant p-values are in bold.

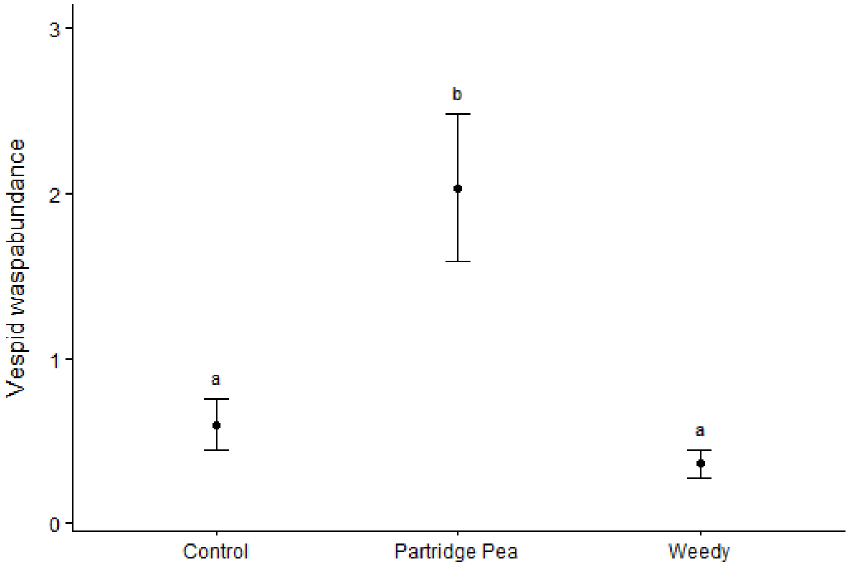
Table S19: Post-hoc analysis of vespid wasp abundance from cucumber plots by treatment

Pairwise comparison	Estimate	SE	t-ratio	p-value

C - PP	-1.275	0.186	-6.866	**<0.0001**
C - W	0.386	0.268	1.441	0.3197
PP - W	1.661	0.231	7.195	**<0.0001**

Post-hoc pairwise comparisons on the significant treatment effect generated from the Poisson GLMM examining vespid wasp abundance from cucumber sticky cards. Estimated marginal means were used to make comparisons (n = 191). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S6: Vespid wasp abundance from cucumber sticky cards by treatment



Mean vespid wasp abundance by treatment collected from cucumber sticky cards (n = 191). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Table S20: Permanova on sticky card community structure from cucumber plots by treatment

	DF	SumOfSqs	R2	F	p-value
Model	2	0.625	0.01908	1.8284	**0.0437**
Residual	188	32.121	0.98092		
Total	190	32.746	1		

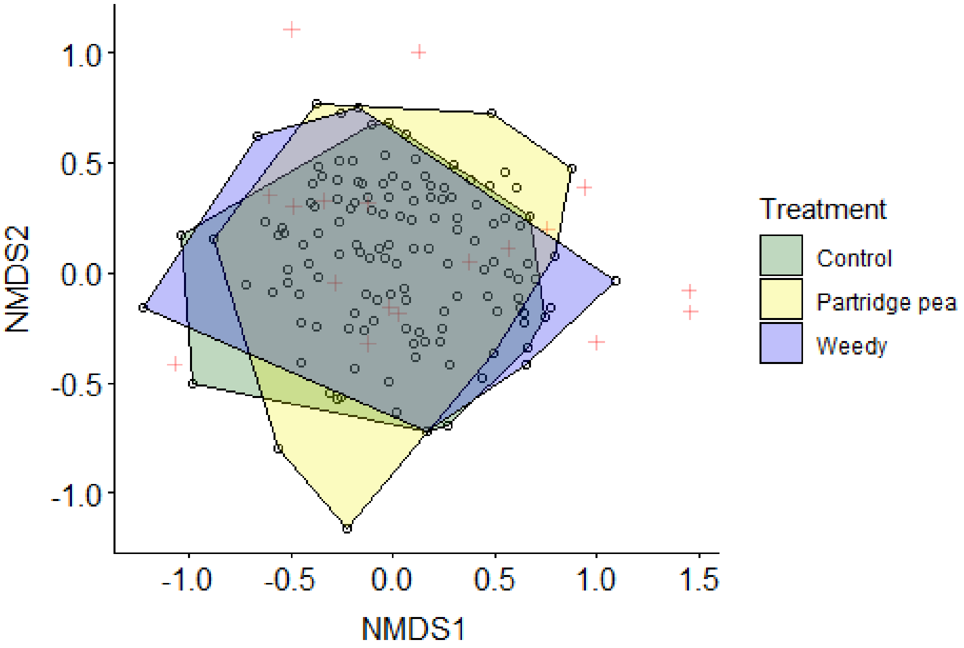
Permanova comparing sticky card insect community structure by treatment from pooled traps. Data consists of specimens from tuna baits, honey baits, and pitfall traps (n = 307). Significant p-values are in bold.

Table S21: Sticky card community structure post-hoc analysis between cucumber plot treatments

Pairwise comparison	DF	SumOfSqs	F.model	R2	Adj p-value
W - PP	1	0.436023	2.530727	0.019844	0.062579
W - C	1	0.153395	0.922023	0.007264	0.483565
PP - C	1	0.349012	2.006351	0.015797	0.100184

Adonis post-hoc analysis on pairwise interactions of sticky card community structure between cucumber treatments from traps. Data consists of specimens from tuna baits, honey baits, and pitfall traps (n = 191). Significant p-values are in bold.

Fig S6: NMDS plot of insect community structure from cucumber sticky cards



Non-Metric Dimensional Scaling ordination plot showing variations in insect community structure between cucumber plot treatments. Data represents all identified insects pooled from the three replicate samples of each sampling block (n = 191). Circles represent site scores of each sample. Red plus symbols represent the score of each insect group quantified. Polygons represent the clustering of site scores within each treatment. K = 2, stress = 0.248.

Supporting material: Objective 2

Table S22: LME model on total cucumber yield

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: sqrt(weight) ~ treatment + (1|row) + (1|site) + (1|date)	(Intercept)	11.90049	2.38021	1.28861	5.000	0.0849
	PP	-0.02424	0.13282	693.87910	-0.182	0.8553
	W	-0.40158	0.15084	530.26950	-2.662	**0.0080**

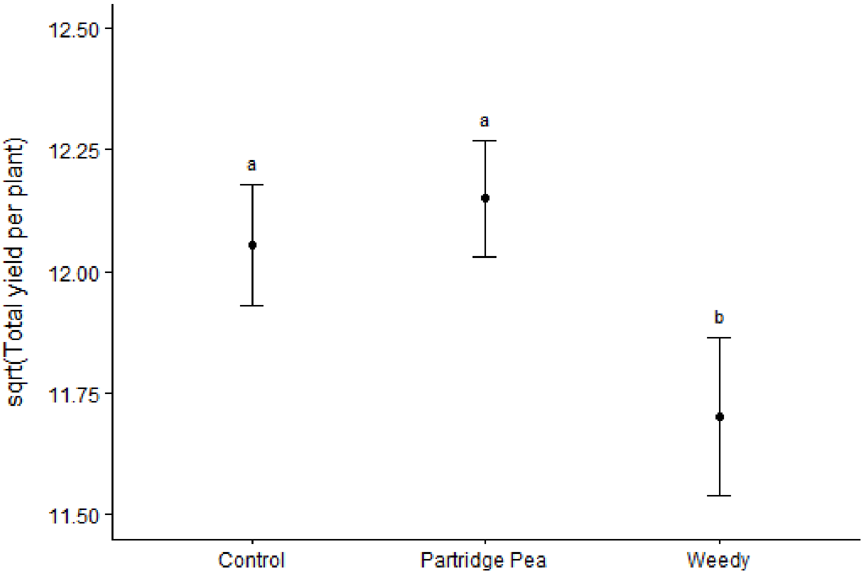
Linear mixed effects model examining total cucumber yield (marketable + unmarketable fruit). Data was generated from cucumbers harvested and weighed (g) from all ten plants of each replicate block (n = 1949). W = weedy fallow, C = control, and PP = partridge pea treatments. Rsquared: R2m = 0.0009716653, R2c = 0.7903832. Significant p-values are in bold.

Table S23: Post-hoc analysis of total cucumber yield

Pairwise comparison	Estimate	SE	DF	t-ratio	p-value
C - PP	-0.00818	0.13	1927	-0.063	0.9978
C - W	0.40834	0.148	1925	2.762	**0.016**
PP - W	0.41652	0.148	1927	2.81	**0.0139**

Post-hoc pairwise comparisons on the significant treatment effect generated from the LME examining total cucumber yield. Estimated marginal means were used to make comparisons (n = 1949). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S7: Total yield across cucumber treatments



Mean total cucumber yield per plant by treatment (n = 1949). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Table S24: LME model on marketable cucumber yield

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: sqrt(weight) ~ treatment + (1|row) + (1|site) + (1|date)	(Intercept)	12.1834	1.6373	1.4229	7.441	**0.0414**
	PP	-0.1624	0.1352	743.1452	-1.201	0.2301
	W	**-0.3959**	**0.1575**	**469.0033**	**-2.514**	**0.0123**

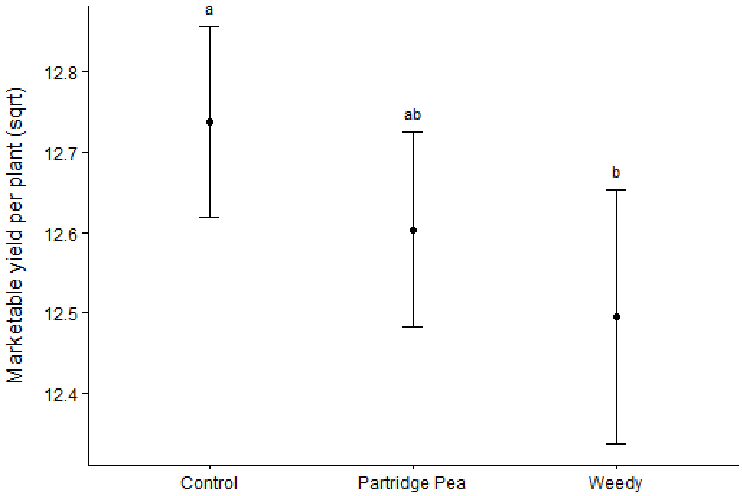
Linear mixed effects model examining marketable cucumber yield. Data was generated from cucumbers harvested and weighed (g) from all ten plants of each replicate block (n = 1594). W = weedy fallow, C = control, and PP = partridge pea treatments. Rsquared: R2m = 0.001255736, R2c = 0.7120292. Significant p-values are in bold.

Table S25: Post-hoc analysis of marketable cucumber yield

Pairwise comparison	Estimate	SE	DF	t-ratio	p-value
C - PP	0.162	0.139	695	1.172	0.4701
C - W	0.396	0.163	429	2.427	**0.0413**
PP - W	0.233	0.159	664	1.471	0.3055

Post-hoc pairwise comparisons on the significant treatment effect generated from the LME examining marketable cucumber yield. Estimated marginal means were used to make comparisons (n = 1594). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S8: Marketable cucumber yield by treatment



Mean marketable cucumber yield per plant by treatment (n = 1594). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Table S26: LME model on total cucumber count

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: log+1(count) ~ treatment + (1|row) + (1|date)	(Intercept)	1.29191	0.07624	23.51923	16.944	**<0.0001**
	pp	0.03909	0.05169	405.302	0.756	0.45002
	w	-0.17074	0.05388	367.9101	-3.169	**0.00166**

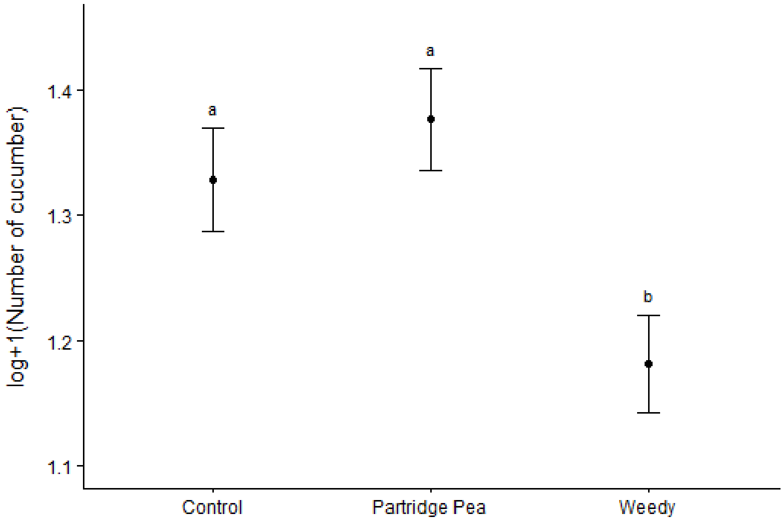
Linear mixed effects model examining total cucumber fruit count. Data was generated from cucumbers harvested and summed within each replicate block (n = 579). W = weedy fallow, C = control, and PP = partridge pea treatments. Rsquared: R2m = 0.02259963, R2c = 0.2492387. Significant p-values are in bold.

Table S27: Post-hoc analysis of total cucumber count

Pairwise comparison	Estimate	SE	DF	t-ratio	p-value
C - PP	-0.0391	0.053	404	-0.737	0.7415
C - W	0.1707	0.0555	366	3.077	**0.0063**
PP - W	0.2098	0.0556	399	3.775	**0.0005**

Post-hoc pairwise comparisons on the significant treatment effect generated from the LME examining total cucumber count. Estimated marginal means were used to make comparisons (n = 579). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S9: Total cucumber count by treatment



Mean total cucumber count per block by treatment (n = 579). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Table S28: LME model on marketable cucumber count

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: log+1(count) ~ treatment + (1|row) + (1|date)	(Intercept)	1.3603	0.09397	23.1941	14.476	**<0.0001**
	PP	0.11167	0.05757	358.6653	1.94	0.0532
	W	-0.19338	0.06134	315.758	-3.152	**0.00177**

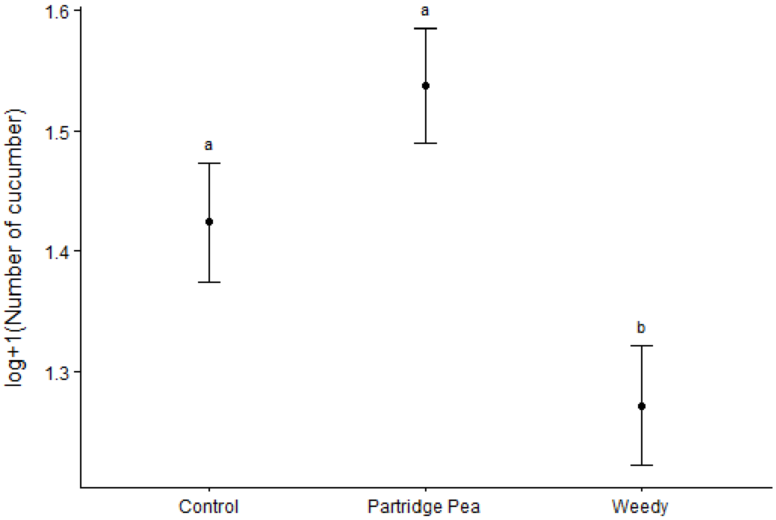
Linear mixed effects model examining marketable cucumber fruit count. Data was generated from cucumbers harvested and summed within each replicate block (n = 408). W = weedy fallow, C = control, and PP = partridge pea treatments. Rsquared: R2m = 0.04054904, R2c = 0.3829561. Significant p-values are in bold.

Table S29: Post-hoc analysis of marketable cucumber count

Pairwise comparison	Estimate	SE	DF	t-ratio	p-value
C - PP	-0.112	0.0586	360	-1.906	0.1383
C - W	0.193	0.0629	316	3.073	**0.0065**
PP - W	0.305	0.0624	353	4.885	**<0.0001**

Post-hoc pairwise comparisons on the significant treatment effect generated from the LME examining marketable cucumber count. Estimated marginal means were used to make comparisons (n = 408). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S10: Marketable cucumber yield by treatment



Mean marketable cucumber yield per plant by treatment (n = 408). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Table S30: LME model on potential profit after controlling for partridge pea expenses

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
LME: profit minus costs ~ treatment + (1|row) + (1|site)	(Intercept)	15.19151	2.64571	1.74751	5.742	**0.03910**
	PP	0.03102	2.00138	41.26547	0.016	0.98771
	W	-5.91304	2.01939	42.93287	-2.928	**0.00544**

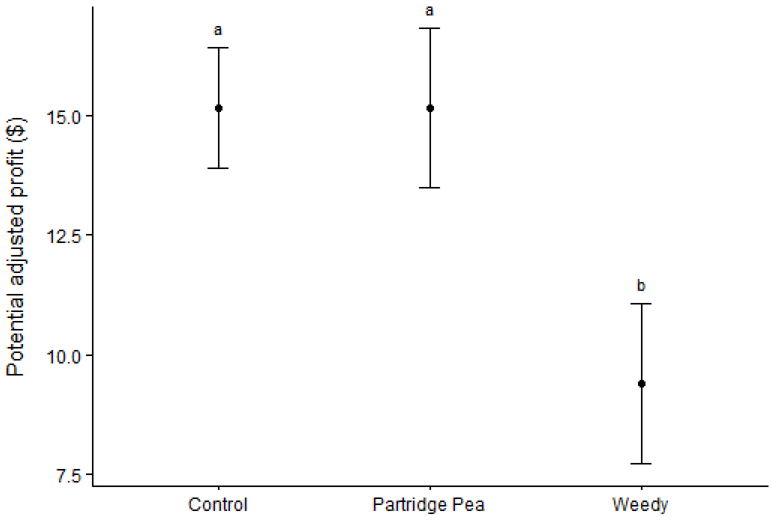
Linear mixed effects model of the cost-benefit analysis examining hypothetical profit generated from our marketable fruit. Data was generated by calculating profit from each replicate block using the average price per pound for cucumbers in the US. Costs associated with including partridge pea into the “PP” treatments were subtracted from total profits of those blocks (n = 48). W = weedy fallow, C = control, and PP = partridge pea treatments. Rsquared: R2m = 0.1563859, R2c = 0.3826866. Significant p-values are in bold.

Table S31: Post-hoc analysis of on potential profit after controlling for partridge pea expenses

Pairwise comparison	Estimate	SE	DF	t-ratio	p-value
C - PP	-0.031	2.03	41.2	-0.015	0.9999
C - W	5.913	2.07	42.9	2.852	**0.0179**
PP - W	5.944	2.07	42.9	2.867	**0.0172**

Post-hoc pairwise comparisons on the significant treatment effect generated from the LME examining hypothetical profit generated from our marketable fruit. Estimated marginal means were used to make comparisons (n = 48). W = weedy fallow, C = control, and PP = partridge pea treatments. Significant p-values are in bold.

Figure S11: Marketable cucumber yield by treatment



Mean profit generated per replicate block in USD by treatment after adjusting for partridge pea expenses (n = 48). Connecting letters represent significant differences from post-hoc analysis. Error bars represent standard error.

Supporting material: Objective 3

Table S32: LME model on ant richness by treatment and plant type

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
richness ~ treatment * plant + soil compaction + (1|row) + (1|block) + (1|phase)	(Intercept)	3.435	0.5228	7.3642	6.57	**0.000251**
	PP	-0.5631	0.3018	60.484	-1.866	0.066946
	Zucchini	-0.8043	0.3405	93.9623	-2.362	**0.020225**
	SC	-0.7297	0.3522	116.9842	-2.072	**0.040482**
	PP:Zucchini	0.8364	0.4147	102.8292	2.017	**0.04633**

Linear mixed effects model examining ant species richness from pooled tuna baits, honey baits, ant pitfalls in cucumber plots, including zucchini data from 2024. Only partridge pea (PP) and control (C) treatments were included in this analysis. Data used consists of specimens from the three combined replicates from each block, summed by block (n = 125). SC = soil compaction. Rsquared: R2m = 0.09171367, R2c = 0.4633329. Significant p-values are in bold.

Table S33: Ant richness post-hoc test using emmeans

Pairwise comparison	Estimate	SE	DF	t-ratio	p-value
C CUC - PP CUC	0.563	0.324	53.5	1.736	0.3157
C CUC - C ZUC	0.804	0.354	88.7	2.273	0.1122
C CUC - PP ZUC	0.531	0.342	82.1	1.553	0.4113
PP CUC - C ZUC	0.241	0.346	89.7	0.698	0.8976
PP CUC - PP ZUC	-0.032	0.318	100.9	-0.101	0.9996
C ZUC - PP ZUC	-0.273	0.3	115.4	-0.911	0.7988

Post-hoc pairwise comparisons on the significant treatment*plant interaction effects generated from the LME examining ant species richness from cucurbits harvested in 2024 and 2025. Estimated marginal means were used to make comparisons (n = 128). C = control, and PP = partridge pea treatments. ZUC = zucchini and CUC = cucumber. Significant p-values are in bold.

Table S34: Permanova on ant community structure from cucumber and zucchini traps

	Df	SumOfSqs	R2	F	p-value
Model	3	1.4578	0.04645	1.8346	**0.0241**
Residual	113	29.9299	0.95355		
Total	116	31.3877	1		

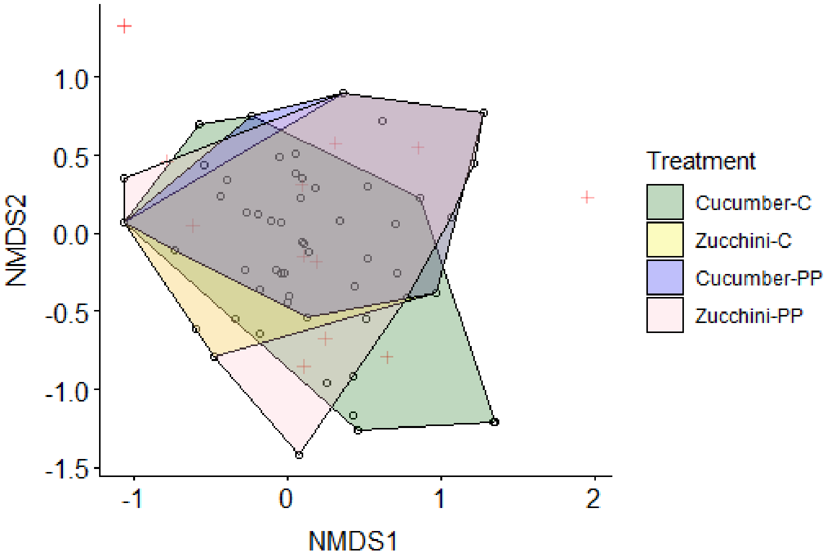
Permanova comparing ant community structure by treatment from pooled tuna, honey, and pitfall traps. Data consists of specimens from both 2024 zucchini and 2025 cucumber datasets, summed by block (n = 117). Significant p-values are in bold.

Table S35: Ant community structure post-hoc analysis between cucumber, zucchini, and their respective treatments

Pairwise comparison	DF	SumOfSqs	F.model	R2	Adj p-value
C ZUC - C CUC	1	0.651413	2.433374	0.043119	0.088019
C ZUC - PP ZUC	1	0.098892	0.333703	0.005721	0.882161
C ZUC - PP CUC	1	0.386828	1.522473	0.028987	0.256737
C CUC - PP ZUC	1	0.50293	1.84E+00	0.02878	0.177798
C CUC - PP CUC	1	0.926364	3.998638	0.067775	**0.00564**
PP ZUC - PP CUC	1	0.371462	1.416316	0.023443	0.256737

Adonis post-hoc analysis on pairwise interactions of ant community structure between cucumber, zucchini, and their respective treatments. Data consists of ants identified to species and pooled from tuna baits, honey baits, and pitfall traps (n = 117). Significant p-values are in bold.

Fig S12: NMDS plot of ant community structure from cucumber and zucchini traps



Non-Metric Dimensional Scaling ordination plot showing variations in ant community structure between cucumber and zucchini plots and combinations of partridge pea (PP) and control (C) treatments. Data represents all identified insects pooled from the three replicate samples of each sampling block (n = 117). Circles represent site scores of each sample. Red plus symbols represent the score of each insect group quantified. Polygons represent the clustering of site scores within each treatment. K = 2, stress = 0.172.

Table S36: Poisson GLMM on striped cucumber beetle abundance from cucumber and zucchini sticky cards

Model formula	Fixed effect	Estimate	SE	z-value	p-value
abundance ~ treatment * plant + soil compaction + (1|block) + (1|phase)	(Intercept)	-0.09886	0.41475	-0.238	0.8116
	PP	-0.43139	0.24583	-1.755	0.0793
	Zucchini	0.99384	0.21613	4.598	**<0.0001**
	SC	0.21012	0.26709	0.787	0.4315
	PP:Zucchini	0.12727	0.28308	0.45	0.653

Poisson generalized linear mixed-effects model examining striped cucumber beetle abundance from cucumber and zucchini sticky cards. Only partridge pea (PP) and control (C) treatments were included in this analysis. Data used consists of specimens from the three combined replicates from each block, summed by block (n = 128). SC = soil compaction. ZUC = zucchini and CUC = cucumber. Trigamma Rsquared: R2m = 0.2332738, R2c = 0.5552917. Significant p-values are in bold.

Table S37: LME model on total zucchini yield

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
Model	(Intercept)	6.23451	0.12124	11.74653	51.422	**<0.0001**
	pp	0.05793	0.05176	398.1294	1.119	0.264

Linear mixed effects model examining marketable cucumber yield. Data was generated from cucumbers harvested and weighed (g) within each block (n = 509). W = weedy fallow, C = control, and PP = partridge pea treatments. Rsquared: R2m = 0.001811114, R2c = 0.3349796. Significant p-values are in bold.

Table S38: LME model on marketable zucchini count

Model formula	Fixed effect	Estimate	SE	DF	t-value	p-value
Model	(Intercept)	2.72	0.5397	13.1983	5.04	**0.000216**
	pp	0.3792	0.2779	119.7719	1.364	0.175037

Linear mixed effects model examining marketable zucchini fruit count. Data was generated from cucumbers harvested and summed within each replicate block (n = 154). W = weedy fallow, C = control, and PP = partridge pea treatments. Rsquared: R2m = 0.007491526, R2c = 0.5055907. Significant p-values are in bold.