

SUPPLEMENTARY MATERIAL

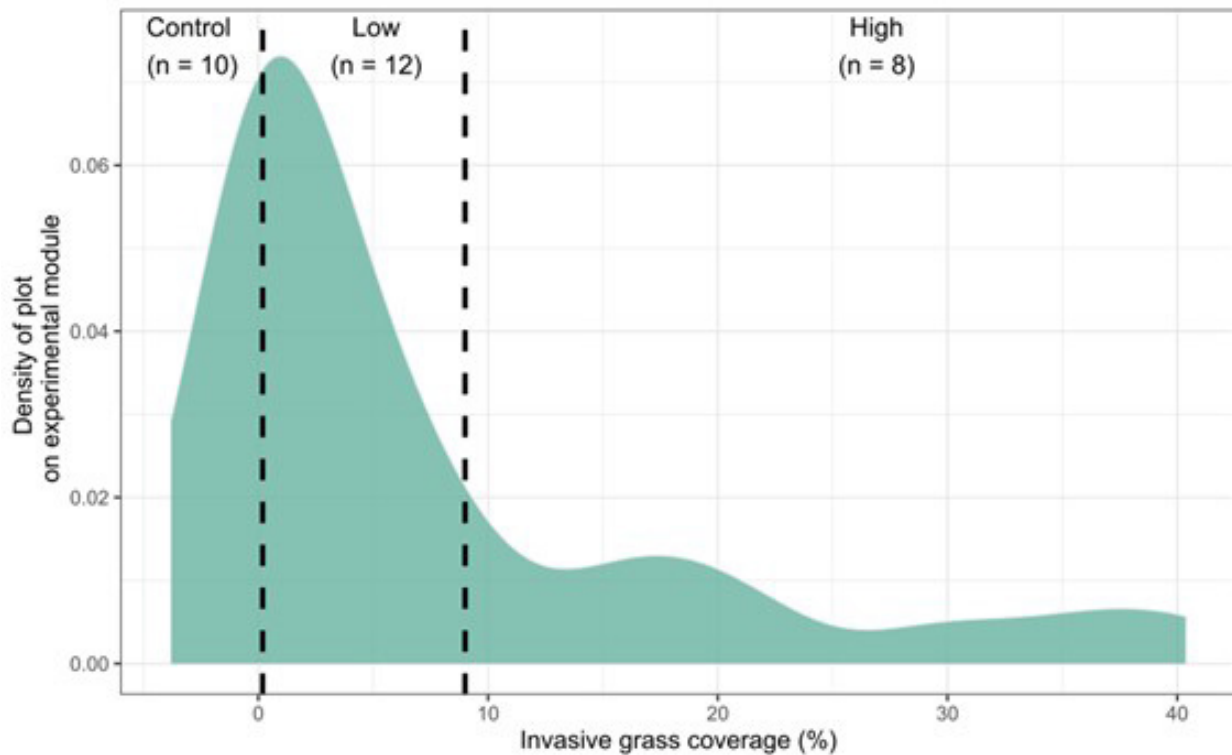


Figure S1. Density of plots on experimental number per invasive grass coverage. We create three groups with distinct invasive grass coverage based using equal-sized quantiles (33%). Control (0% to 1% grass cover) with 10 plots, low dominance (>1% to 9%) with 12 plots, and high dominance (>9%) with 8 plots.

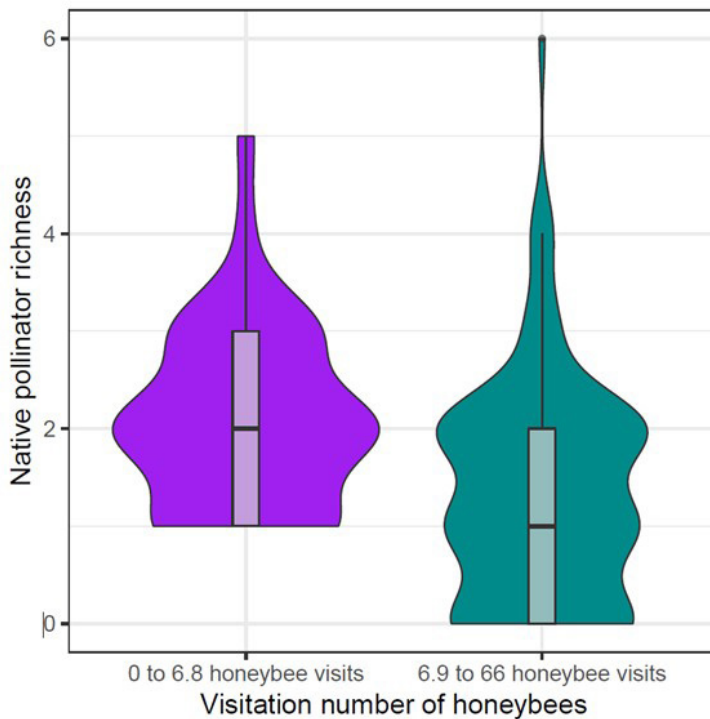


Figure S2. Violin plots summarizing the average richness of native pollinators in plots with a low (0 to 6.8) and high (6.9 to 66) number of honeybee visits. To make easier comparisons, native pollinator richness was compared between plots that received a number of honeybee visits below or above the average (i.e., 6.8).

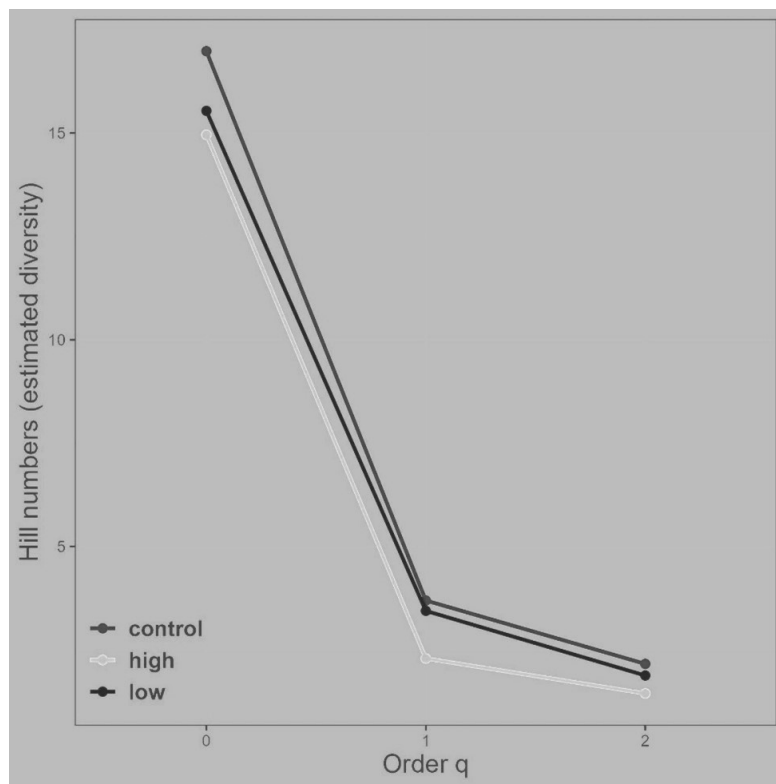


Figure S3. Estimated diversity among treatments compared with Hill numbers from different orders. The advantages of Hill number to estimate diversity is fully described in Chao et al. (2014). The order $q = 0$ represents the estimated diversity without considering species visitation number (i.e., estimate diversity given weight to rare species), $q = 2$ gives proportional weight to species based on their visitation numbers, and $q = 3$ is the estimated diversity considering the effective number of dominant species (i.e., those species with more visits). Because the varying number of visits among treatment may affect our ability to estimate and compare diversity, we used an abundance-based estimation using the number of visits in the less visited plot (i.e., 330 visits in the highly invaded plot). Therefore, the estimated diversity values in Figure S2 were obtained by using an individual-based rarefaction (Gotelli & Colwell 2001).

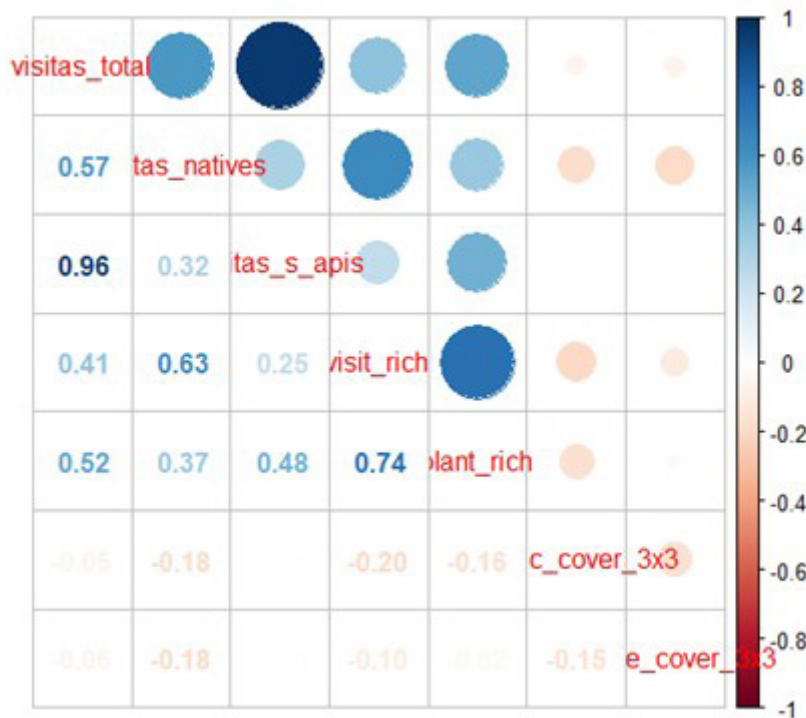


Figure S4. Results of correlation matrix using our predict variables and covariables (please see text to find the variables).

Table S1. List of pollinators species and native plant species sampled along field experiment.

Taxon	
Pollinators	Native plants
Order Diptera	Family Amaranthaceae
Stratiomyidae 1	<i>Froelichia humboldtiana</i>
Order Hymenoptera	Family Asteraceae
<i>Apis mellifera</i>	<i>Ageratum conyzoides</i>
<i>Bombus brevivillu</i>	<i>Lepidaploa chalybaea</i>
Chalcididae 1	Family Cleomaceae
Eucharitidae 1	<i>Tarenaya diffusa</i>
<i>Megachile</i> sp.	Family Euphorbiaceae
<i>Perditomorpha</i> sp.	<i>Cnidoscopus urens</i>
<i>Psaenythia variabilis</i>	Family Fabaceae
<i>Tetrapedia</i> sp.	<i>Chamaecrista rotundifolia</i>
<i>Trigona spinipes</i>	<i>Stylosanthes viscosa</i>
Vespidae 1	Family Malvaceae
Vespidae 2	<i>Herissantia tiubae</i>
Vespidae 3	<i>Pavonia cancellata</i>
Order Lepidoptera	<i>Pavonia varian</i>
<i>Agraulis vanillae</i>	<i>Sida galheirensis</i>
<i>Ascia monuste</i>	Family Portulacaceae
<i>Euptoieta hegesia</i>	<i>Portulaca elatior</i>
<i>Eurema elathea</i>	Family Rubiaceae
<i>Heliopyrgus domicella</i>	<i>Diodella tere</i>
<i>Hemiargus hanno</i>	<i>Mitracarpus eichleri</i>
<i>Panoquina lucas</i>	<i>Richardia grandiflora</i>
<i>Pyrgus veturius</i>	Family Turneraceae
<i>Strymon rufofusca</i>	<i>Piriqueta duarteana</i>

Table SII. Simplification of Generalized Mixed Models (GLMM) and Log-likelihood to obtain the most likely model.

		Model	Log-likelihood
All native visitors	M1	$\log(\text{native visitors} + 1) \sim \text{treatment} * \text{Apis visitors} + \text{plant_richness} + \text{native_coverage} + \text{PC1_soil}, \text{random} = \sim 1 \mid \text{month}$	-147.77
	M2	$\log(\text{native visitors} + 1) \sim \text{treatment} + \text{Apis visitors} + \text{plant_richness} + \text{native_coverage} + \text{PC1_soil}, \text{random} = \sim 1 \mid \text{month}$	-150.19
	M3	$\log(\text{native visitors} + 1) \sim \text{treatment} + \text{plant_richness} + \text{native_coverage} + \text{PC1_soil}, \text{random} = \sim 1 \mid \text{month}$	-150.38
	M4	$\log(\text{native visitors} + 1) \sim \text{treatment} + \text{plant_richness} + \text{native_coverage}, \text{random} = \sim 1 \mid \text{month}$	-151.16
Richness of native visitors	M1	$\log(\text{visitors_richness} + 1) \sim \text{treatment} * \text{Apis visitors} + \text{plant_richness} + \text{native_coverage} + \text{PC1_soil}, \text{random} = \sim 1 \mid \text{month}$	-23.27
	M2	$\log(\text{visitors_richness} + 1) \sim \text{treatment} + \text{Apis visitors} + \text{plant_richness} + \text{native_coverage} + \text{PC1_soil}, \text{random} = \sim 1 \mid \text{month}$	-23.53
	M3	$\log(\text{visitors_richness} + 1) \sim \text{treatment} + \text{Apis visitors} + \text{plant_richness} + \text{native_coverage}, \text{random} = \sim 1 \mid \text{month}$	-23.66
<i>Apis mellifera</i>	M1	$\log(\text{Apis visitors} + 1) \sim \text{treatment} + \text{plant_richness} + \text{native_coverage} + \text{PC1_soil}, \text{random} = \sim 1 \mid \text{month}$	-200.59
	M2	$\log(\text{Apis visitors} + 1) \sim \text{treatment} + \text{plant_richness} + \text{PC1_soil}, \text{random} = \sim 1 \mid \text{month}$	-200.59
	M3	$\log(\text{Apis visitors} + 1) \sim \text{plant_richness} + \text{PC1_soil}, \text{random} = \sim 1 \mid \text{month}$	-200.85

Table SIII. Average values (and 95% Confidence Intervals) of all dependent variables on each treatment.

Dependents variables	Treatment	Average value	95% Confidence Interval
Native visitation number	control	4.02	1.68
	low	2.33	1.06
	high	1.43	0.55
Honeybee visitation number	control	7.62	3.41
	low	6.07	3.20
	high	6.90	4.66
Native pollinator richness	control	2.00	0.35
	low	1.30	0.26
	high	1.18	0.31
Native plant richness	control	1.56	0.30
	low	1.23	0.23
	high	1.10	0.29

Table SIV. Between-treatment comparisons from each dependent variable. After running each GLMM model (see main text) we performed multiple comparisons using the function `lsmeans` in R. We did not compare the effects of grass cover treatments on honeybees because it was not retained in the model (see main text).

Dependent variables / paired comparisons	Estimate	t ratio	p
Native plant richness			
control vs. low	0.212	2.26	0.064
control vs. high	0.144	1.71	0.206
low vs. high	-0.068	-0.76	0.731
Native pollinator richness			
control vs. low	0.169	3.01	0.009
control vs. high	0.198	3.03	0.008
low vs. high	-0.029	-0.48	0.879
Native visitation number			
control vs. low	0.320	2.47	0.038
control vs. high	0.442	2.96	0.010
low vs. high	-0.122	-0.89	0.647

Table SV. Species list and visitation numbers of native and invasive pollinators on each invasion (invasive grass *Megathyrus maximus*) treatments (control, low and high).

Treatment	Pollinator species	Pollinator origin	Visitation number
control	<i>Apis mellifera</i>	Invasive	381
control	<i>Trigona spinipes</i>	Native	102
control	<i>Hemiargus hanno hanno</i>	Native	18
control	Stratiomyidae	Native	10
control	Polistinae sp3	Native	9
control	<i>Ascia monuste orseis</i>	Native	8
control	<i>Heliopyrgus domicella</i>	Native	8
control	<i>Pyrgus veturius</i>	Native	8
control	<i>Agraulis vanillae maculosa</i>	Native	7
control	<i>Panoquina lucas</i>	Native	6
control	<i>Strymon rufofusca</i>	Native	6
control	<i>Euptoieta hegesia meridiania</i>	Native	5

Table SV. Continuation.

control	Megachile sp	Native	4
control	Tetrapedia sp	Native	4
control	Eurema elathea flavescens	Native	2
control	Bombus brevivillus	Native	1
control	Chalcididae	Native	1
control	Perditomorpha sp.	Native	1
control	Psaenythia variabilis	Native	1
high	Apis mellifera	Invasive	276
high	Stratiomyidae	Native	14
high	Trigona spinipes	Native	14
high	Agraulis vanillae maculosa	Native	6
high	Pyrgus veturius	Native	6
high	Hemiargus hanno hanno	Native	4
high	Ascia monuste orseis	Native	2
high	Perditomorpha sp	Native	2
high	Polistinae sp3	Native	2
high	Tetrapedia sp	Native	2
high	Euptoieta hegesia meridiania	Native	1
high	Heliopyrgus domicella	Native	1
high	Panoquina lucas	Native	1
high	Polistinae sp1	Native	1
high	Strymon rufofusca	Native	1
low	Apis mellifera	Invasive	370
low	Trigona spinipes	Native	29
low	Perditomorpha sp	Native	24
low	Polistinae sp3	Native	19
low	Hemiargus hanno hanno	Native	13
low	Pyrgus veturius	Native	13
low	Ascia monuste orseis	Native	8

Table SV. Continuation.

low	Polistinae sp2	Native	7
low	Stratiomyidae	Native	7
low	Heliopyrgus domicella	Native	5
low	Strymon rufofusca	Native	5
low	Agraulis vanillae maculosa	Native	4
low	Psaenythia variabilis	Native	4
low	Eucharitidae	Native	1
low	Euptoieta hegesia meridiania	Native	1
low	Megachile sp	Native	1
low	Polistinae sp1	Native	1

Literature cited

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