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Supplemental Table S1 | Information on studies used in the meta-analysis

			Shannon's evenness		
Taxa	**Location**	**Crop(s)**	**Conventional**	**Organic**	**Reference**
Carabids	Norway	Barley, oats, potatoes, wheat	0.34	0.34	Andersen & Eltun 2000
Staphylinids	Norway	Barley, oats, potatoes, wheat	0.28	0.30	Andersen & Eltun 2000
Carabids	Scotland	Potatoes	0.62	0.70	Armstrong 1995
Spiders	Germany	Wheat	0.41	0.48	Basedow 1998
Insect predators	New Zealand	Carrots	0.60	0.65	Berry *et al*. 1996
Carabids	Canada	Beans, potato, wheat	0.81	0.84	Bourassa *et al*. 2008
Ground beetles	Canada	Barley, faba bean, fescue	0.36	0.37	Carcamo *et al*. 1995
Spiders	Spain	Olives	0.74	0.83	Cardenas *et al*. 2006
Ground beetles	USA	Tomato	0.56	0.54	Clark 1999
Carabids	Germany	Wheat	0.62	0.63	Clough *et al*. 2007
Staphylinids	Germany	Wheat	0.74	0.78	Clough *et al*. 2007
Spiders	Germany	Wheat	0.68	0.69	Clough *et al*. 2007
Coccinellids	Spain	Olives	0.50	0.55	Cotes *et al*. 2009
Ground beetles	USA	Corn	0.75	0.70	Dritschilo & Erwin 1982
Ground beetles	USA	Corn	0.74	0.69	Dritschilo & Wanner 1980
Spiders	England	Wheat	0.63	0.66	Feber *et al*. 1998
Predatory/omnivorous nematodes	USA	Tomato	0.42	0.43	Ferris *et al*. 1996
Predatory/omnivorous nematodes	USA	Corn, soybean	0.83	0.85	Freckman & Ettema 1993

Spiders	Germany	Barley, rye	0.74	0.89	Glück & Ingrisch 1990
Arthropod predators	Finland	Barley	0.80	0.75	Helenius 1990
Carabids	Germany	Cabbage	0.63	0.59	Hokkanen & Holopainen 1996
Insect predators	USA	Potatoes	0.48	0.63	Koss *et al.* 2005
Carabids	Austria	Potatoes	0.54	0.65	Kromp 1990
Staphylinids	Germany	Wheat	0.47	0.59	Krooss & Schaefer 1998
Insect predators	USA	Tomato	0.65	0.63	Letourneau & Goldstein 2001
Aphid parasitoids	England	Barley, wheat	0.79	0.78	Macfadyen *et al.* 2009
Carabids	Spain	Apples	0.63	0.66	Minarro *et al.* 2009
Staphylinids	Spain	Apples	0.87	0.93	Minarro *et al.* 2009
Ants	Spain	Apples	0.43	0.52	Minarro *et al.* 2009
Spiders	Spain	Apples	0.86	0.85	Minarro *et al.* 2009
Arthropod predators	England	Wheat	0.63	0.62	Moreby *et al.* 1994
Omnivorous nematodes	USA	Clover, corn, flowers, grasses, herbs, rye, oats, pumpkin, vegetables	0.29	0.27	Neher 1999
Predatory nematodes	USA	Clover, corn, flowers, grasses, herbs, rye, oats, pumpkin, vegetables	0.26	0.36	Neher 1999
Predatory/omnivorous nematodes	USA	Clover, corn, oats, soybean	0.78	0.74	Neher & Olson 1999
Spiders	Sweden	Cereals	0.74	0.52	Oberg 2007
Carabids	Ireland	Potatoes	0.72	0.78	O'Sullivan & Gormally 2002
Carabids	Italy	Apples	0.72	0.53	Paoletti *et al.* 1995
Spiders	Italy	Apples	0.61	0.46	Paoletti *et al.* 1995
Mites	Italy	Grapes	0.11	0.13	Peverieri *et al.* 2009
Carabids	Switzerland	Wheat	0.84	0.85	Pfiffner & Niggli 1996
Carabids	Germany	Wheat	0.57	0.58	Purtauf *et al.* 2005
Insect pathogens	USA	Potatoes	0.80	0.97	Ramirez *et al.* 2009

Web-building spiders	Mexico	Coffee	0.72	0.57	Rendon *et al*. 2006
Hunting spiders	Mexico	Coffee	0.87	0.88	Rendon *et al*. 2006
Spiders	Germany	Wheat	0.62	0.60	Schmidt *et al*. 2005
Spiders	New Zealand	Grasses, rye, wheat	0.53	0.99	Topping & Lovei 1997
Predatory nematodes	Wales	Grasses	0.80	0.89	Yeates *et al*. 1997
Omnivorous nematodes	Wales	Grasses	0.56	0.79	Yeates *et al*. 1997

References listed in Table S1 | Asterisks indicate data was obtained directly from the authors

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Supplemental Table S2 | Predator and pathogen species composition and evenness in the field experiment. Experimental treatments reflected the observed variation in predator and pathogen evenness, and dominance of individual species, from the field surveys. Predator species used in the experiments were *Geocoris bullatus*, *Hippodamia convergens, Nabis alternatus*, and *Pterostichus melanarius.* Pathogen species used in the experiments were *Beauveria bassiana*, *Heterorhabditis megidis* and *Steinernema carpocapsae*

	Proportion of each predator species				
Treatment	***Geocoris bullatus***	***Hippodamia convergens***	***Nabis alternatus***	***Pterostichus melanarius***	**Evenness**
1	0.7	0.1	0.1	0.1	0.68
2	0.6	0.2	0.1	0.1	0.79
3	0.3	0.1	0.5	0.1	0.84
4	0.3	0.1	0.1	0.5	0.84
5	0.1	0.1	0.4	0.4	0.86
6	0.5	0.2	0.2	0.1	0.88
7	0.4	0.3	0.1	0.2	0.92

	Proportion of each pathogen species			
Treatment	***Beauveria bassiana***	***Heterorhabditis megidis***	***Steinernema carpocapsae***	**Evenness**
1	0.17	0.80	0.03	0.54
2	0.19	0.19	0.62	0.84
3	0.12	0.35	0.53	0.87
4	0.17	0.47	0.37	0.93
5	0.45	0.27	0.28	0.97
6	0.38	0.34	0.27	0.99

Supplemental Table S3 | Analysis of evenness and species identity effects. Results from forward and backwards stepwise regression, used to determine the effects of evenness and initial abundance of natural enemies on plant biomass (log_{10} transformed), potato beetle abundance (log_{10} transformed), and predator retrieval. Dashes indicate non-significant variables not included in the final model (the α-limit for variables entering or leaving each model was 0.15).

Plants	**Estimate**	***SE***	**95% *CI***	***t***	***df***	***P***
Predator evenness	0.49	0.16	0.15, 0.82	2.96	39	0.0052
Pathogen evenness	0.32	0.079	0.16, 0.48	4.01	39	0.0003
Predator-pathogen interaction	-	-	-	-	-	-
Geocoris bullatus	-	-	-	-	-	-
Hippodamia convergens	-	-	-	-	-	-
Nabis alternatus	-	-	-	-	-	-
Pterostichus melanarius	-	-	-	-	-	-
Beauveria bassiana	-	-	-	-	-	-
Heterorhabditis megidis	-	-	-	-	-	-
Steinernema carpocapsae	-	-	-	-	-	-
CPB	**Estimate**	***SE***	**95% *CI***	***t***	***df***	***P***
Predator evenness	-0.96	0.33	-1.68, -0.22	-2.92	39	0.0058
Pathogen evenness	-0.40	0.16	-0.75, -0.046	-2.55	39	0.015
Predator-pathogen interaction	-	-	-	-	-	-
Geocoris bullatus	-	-	-	-	-	-
Hippodamia convergens	-	-	-	-	-	-
Nabis alternatus	-	-	-	-	-	-
Pterostichus melanarius	-	-	-	-	-	-
Beauveria bassiana	-	-	-	-	-	-
Heterorhabditis megidis	-	-	-	-	-	-
Steinernema carpocapsae	-	-	-	-	-	-
Predator retrieval	**Estimate**	***SE***	**95% *CI***	***t***	***df***	***P***
Predator evenness	0.57	0.14	0.29, 0.85	4.10	40	0.0002
Pathogen evenness	-	-	-	-	-	-
Predator-pathogen interaction	-	-	-	-	-	-
Geocoris bullatus	-	-	-	-	-	-
Hippodamia convergens	-	-	-	-	-	-
Nabis alternatus	-	-	-	-	-	-
Pterostichus melanarius	-	-	-	-	-	-
Beauveria bassiana	-	-	-	-	-	-
Heterorhabditis megidis	-	-	-	-	-	-
Steinernema carpocapsae	-	-	-	-	-	-

Supplemental Table S4 | Extra sum-of-squares *F*-tests for stepwise regression models. For each model selected during stepwise regression (Table S3), we used extra sum-of-squares *F*-tests[32] to determine if variables not retained during stepwise regression significantly impacted results. As shown below, with any response, the variables not retained in the final models did not significantly impact results.

Model	***F***	***df***	***P***
Plants	0.57	7, 32	0.77
CPB	0.40	7, 32	0.90
Predator retrieval	1.05	8, 31	0.42

Supplemental Table S5 | Information criteria for plant weight models. Akaike's information criterion (AIC) and Schwarz' Bayesian information criterion (BIC)[32] were calculated for each of the 1,023 possible models with the response variable plant weight. Each model consisted of a unique combination of the 10 explanatory variables: predator evenness (PredE), pathogen evenness (PathE), the interaction between predator and pathogen evenness (Int), the abundance of *Geocoris bullatus* (Gb), the abundance of *Hippodamia convergens* (Hc), the abundance of *Nabis alternatus* (Na), the abundance of *Pterostichus melanarius* (Pm), the abundance of *Beauveria bassiana* (Bb), the abundance of *Heterorhabditis megidis* (Hm), and the abundance of *Steinernema carpocapsae* (Sc). Models were ranked by each information criterion, and the average ranking across the two criteria was calculated. The 20 models with the lowest average ranking are shown. With any model, the only variables that significantly affected plant weight were predator or pathogen evenness (α = 0.05).

Model	**AIC**		**BIC**		**Average Rank**
	Rank	**Value**	**Rank**	**Value**	
PredE, PathE	1	-211.5	1	-208.6	1
PredE, PathE, Gb	2	-211.0	2	-207.4	2
PredE, PathE, Pt	3	-210.7	3	-207.2	3
PredE, PathE, Hc	4	-210.4	4	-207.0	4
PredE, PathE, Int	5	-209.9	5	-206.5	5
PredE, PathE, Na	6	-209.8	6	-206.5	6
PredE, PathE, Bb	7	-209.6	7	-206.3	7
PredE, PathE, Hm	8	-209.5	8	-206.3	8
PredE, PathE, Sc	9	-209.5	9	-206.3	9
PredE, PathE, Int, Gb	10	-209.3	10	-205.3	10
PredE, PathE, Gb, Na	11	-209.2	11	-205.1	11
PredE, PathE, Gb, Pt	12	-209.1	12	-205.1	12
PredE, PathE, Na, Pt	13	-209.1	13	-205.0	13
PredE, PathE, Gb, Hc	14	-209.0	14	-205.0	14
PredE, PathE, Int, Pt	15	-209.0	15	-205.0	15
PredE, PathE, Bb, Gb	16	-209.0	16	-205.0	16
PredE, PathE, Gb, Hm	17	-209.0	17	-205.0	17
PredE, PathE, Gb, Sc	18	-209.0	18	-205.0	18
PredE, PathE, Hc, Pt	19	-208.9	19	-204.9	19
PredE, PathE, Hc, Int	20	-208.8	20	-204.8	20

Supplemental Table S6 | Information criteria for potato beetle density models. Akaike's information criterion (AIC) and Schwarz' Bayesian information criterion (BIC)[32] were calculated for each of the 1,023 possible models with the response variable potato beetle density. Each model consisted of a unique combination of the 10 explanatory variables: predator evenness (PredE), pathogen evenness (PathE), the interaction between predator and pathogen evenness (Int), the abundance of *Geocoris bullatus* (Gb), the abundance of *Hippodamia convergens* (Hc), the abundance of *Nabis alternatus* (Na), the abundance of *Pterostichus melanarius* (Pm), the abundance of *Beauveria bassiana* (Bb), the abundance of *Heterorhabditis megidis* (Hm), and the abundance of *Steinernema carpocapsae* (Sc). Models were ranked by each information criterion, and the average ranking across the two criteria was calculated. The 20 models with the lowest average ranking are shown. With any model, the only variables that significantly affected potato beetle density were predator or pathogen evenness ($\alpha = 0.05$).

Model	AIC		BIC		Average Rank
	Rank	Value	Rank	Value	
PredE, PathE	1	-135.8	1	-132.7	1
PredE, PathE, Int	2	-135.3	2	-131.4	2
PredE, PathE, Na	3	-134.6	3	-130.9	3
PredE, PathE, Gb	4	-134.2	4	-130.5	4
PredE, PathE, Bb	5	-134.1	5	-130.5	5
PredE, PathE, Hc	7	-134.0	6	-130.4	6.5
PredE, PathE, Hm	8	-134.0	7	-130.4	7.5
PredE, PathE, Int, Na	6	-134.1	10	-129.5	8
PredE, PathE, Pt	9	-133.9	8	-130.3	8.5
PredE, PathE, Sc	10	-133.9	9	-130.3	9.5
PredE, PathE, Gb, Int	11	-133.6	11	-129.2	11
PredE, PathE, Bb, Int	12	-133.6	12	-129.1	12
PredE, PathE, Hc, Int	13	-133.4	13	-129.0	13
PredE, PathE, Hm, Int	14	-133.4	14	-129.0	14
PredE, PathE, Int, Pt	15	-133.3	15	-128.9	15
PredE, PathE, Int, Sc	16	-133.3	16	-128.9	16
PredE, PathE, Bb, Na	17	-132.9	17	-128.6	17
PredE, PathE, Gb, Pt	18	-132.8	18	-128.5	18
PredE, PathE, Hm, Na	19	-132.7	19	-128.5	19
PredE, PathE, Hc, Na	20	-132.7	20	-128.5	20

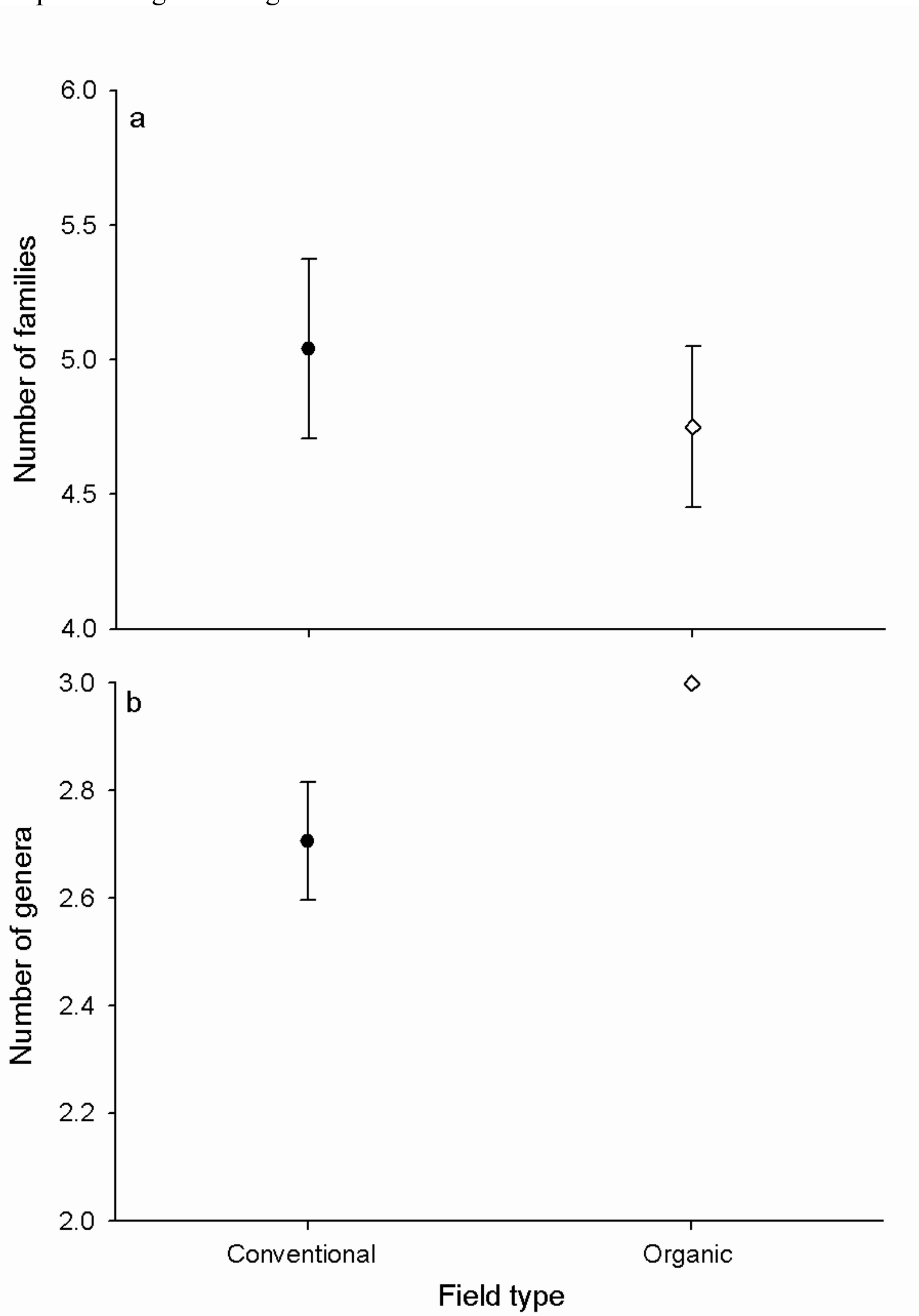
Supplemental Table S7 | Information criteria for predator retrieval models. Akaike's information criterion (AIC) and Schwarz' Bayesian information criterion (BIC)[32] were calculated for each of the 1,023 possible models with the response variable predator retrieval. Each model consisted of a unique combination of the 10 explanatory variables: predator evenness (PredE), pathogen evenness (PathE), the interaction between predator and pathogen evenness (Int), the abundance of *Geocoris bullatus* (Gb), the abundance of *Hippodamia convergens* (Hc), the abundance of *Nabis alternatus* (Na), the abundance of *Pterostichus melanarius* (Pm), and the abundance of *Beauveria bassiana* (Bb), the abundance of *Heterorhabditis megidis* (Hm), and the abundance of *Steinernema carpocapsae* (Sc). Models were ranked by each information criterion, and the average ranking across the two criteria was calculated. The 20 models with the lowest average ranking are shown. With any model, the only variable that significantly affected predator retrieval was predator evenness ($\alpha = 0.05$).

Model	AIC		BIC		Average Rank
	Rank	Value	Rank	Value	
PredE	3	-225.8	1	-223.7	2
PredE, Pt	4	-225.8	2	-223.3	3
PredE, Int, PathE	2	-226.0	4	-222.8	3
PredE, Int, Pt	1	-226.2	6	-222.2	3.5
PredE, Gb	6	-225.3	3	-222.8	4.5
PredE, Gb, Int, PathE	5	-225.6	9	-221.7	7
PredE, Bb	11	-224.6	5	-222.3	8
PredE, Bb, Pt	10	-224.7	8	-221.8	9
PredE, Hc, Int, PathE	7	-225.1	16	-221.3	11.5
PredE, Hm	20	-224.2	7	-221.9	13.5
PredE, Bb, Int, PathE	9	-224.8	22	-221.1	15.5
PredE, Hm, Pt	19	-224.2	14	-221.4	16.5
PredE, Bb, PathE	25	-223.9	10	-221.7	17.5
PredE, Int, PathE, Pt	8	-225.0	28	-220.3	18
PredE, Bb, Gb	21	-224.2	15	-221.4	18
PredE, Int	30	-223.8	11	-221.6	20.5
PredE, PathE, Pt	24	-224.0	17	-221.2	20.5
PredE, Int, PathE, Pt	12	-224.5	29	-220.0	20.5
PredE, Hm, Int, PathE	17	-224.3	25	-220.8	21
PredE, Na	31	-223.8	12	-221.6	21.5

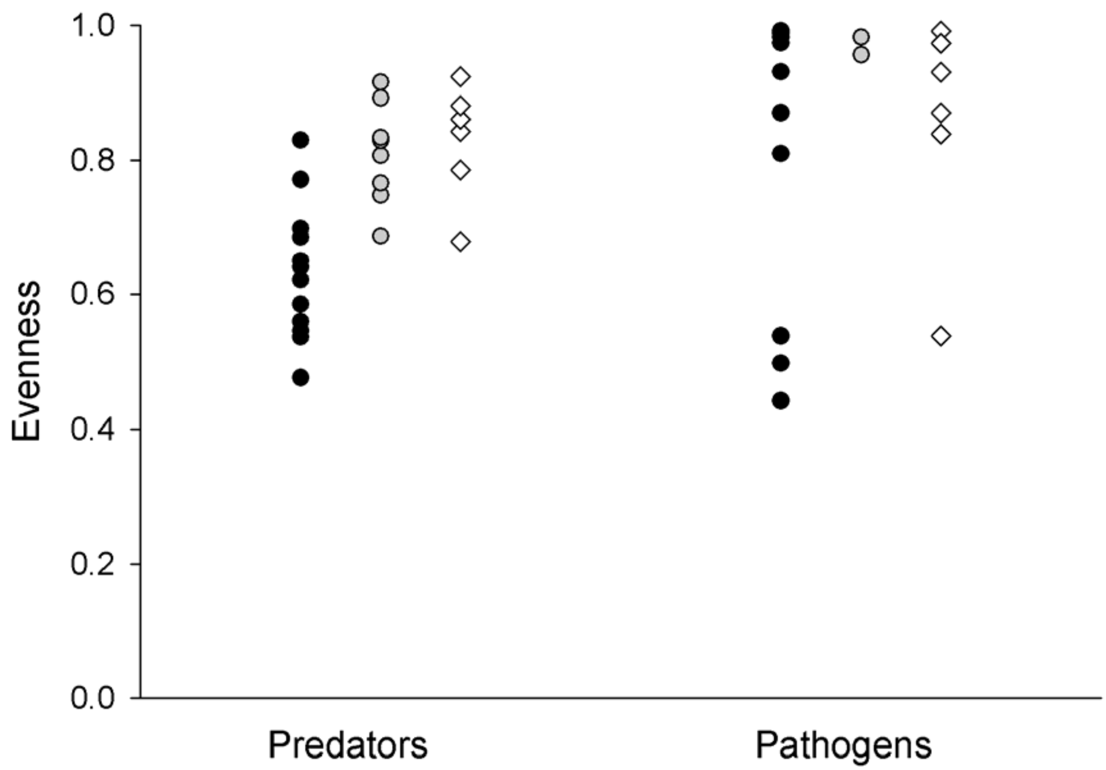
Supplemental Table S8 | Diagnostic tests for normality and homogeneity of variance from the regression models. For each full model selected during stepwise regression (Table S3), which were the same as the best-fit models selected using information criteria (Tables S5-S7), we used Shapiro-Wilk tests for normality and Breusch-Pagan tests for homogeneity of variance[33]. Data were considered non-normal or heteroscedastic when $P < 0.05$ for the Shapiro-Wilk or Breusch-Pagan tests, respectively.

Model	***Normality***		***Homogeneity of variance***		
	W	P	X^2	df	P
Plants	0.97	0.25	4.77	2	0.092
CPB	0.97	0.31	5.34	2	0.069
Predator retrieval	0.95	0.064	1.64	2	0.44

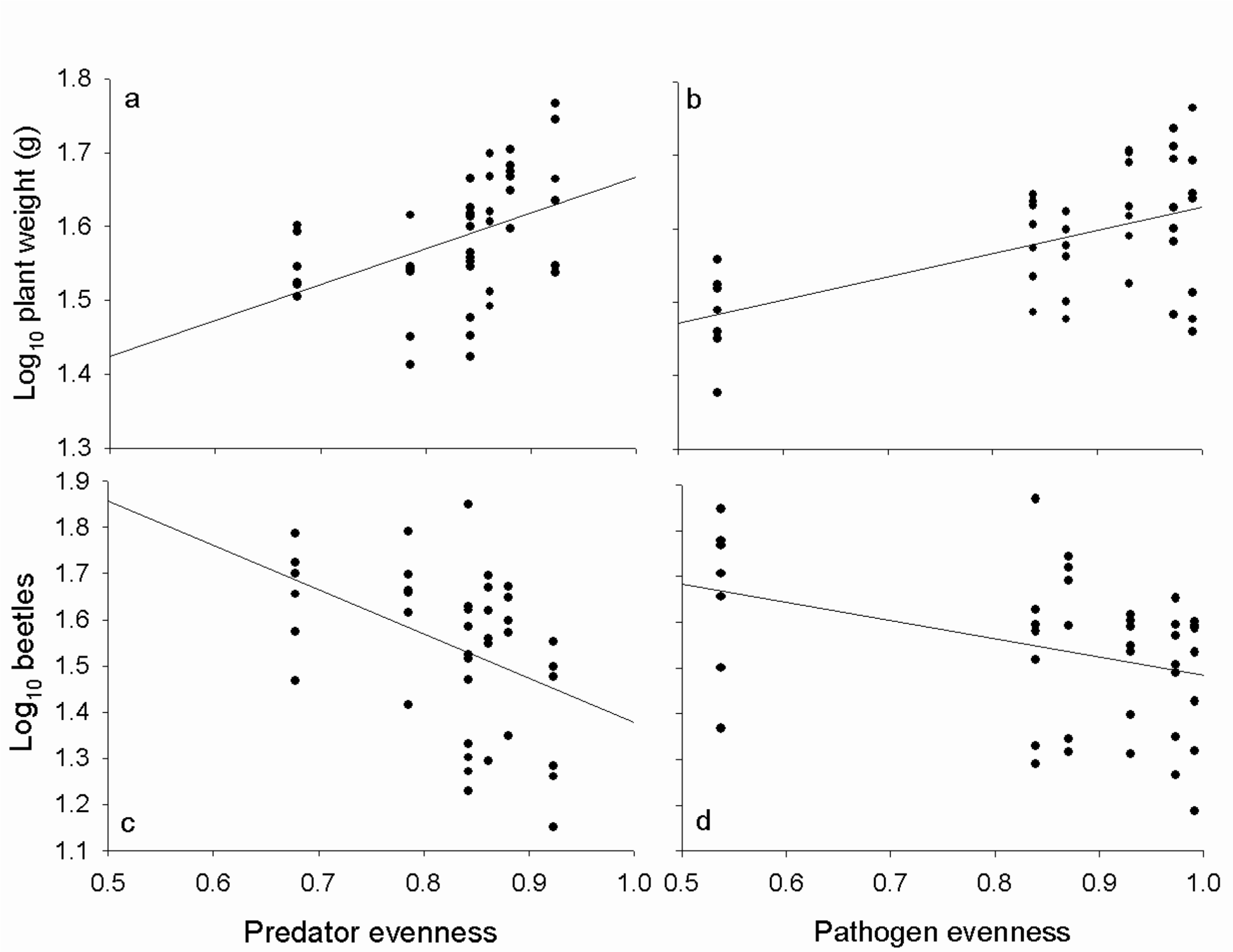
Supplemental Fig. S1 | Natural enemy richness in potato fields. Average richness (± *SE*) of (a) predator families and (b) pathogen genera from surveys of conventional or organic commercial potato fields in Washington, USA. For predators (Mean [95% *CI*]: -0.29 [-1.30, 0.71], $t_{18} = -0.61$, $P = 0.55$) and pathogens ($P = 0.53$), richness did not vary significantly based on pest management regime.



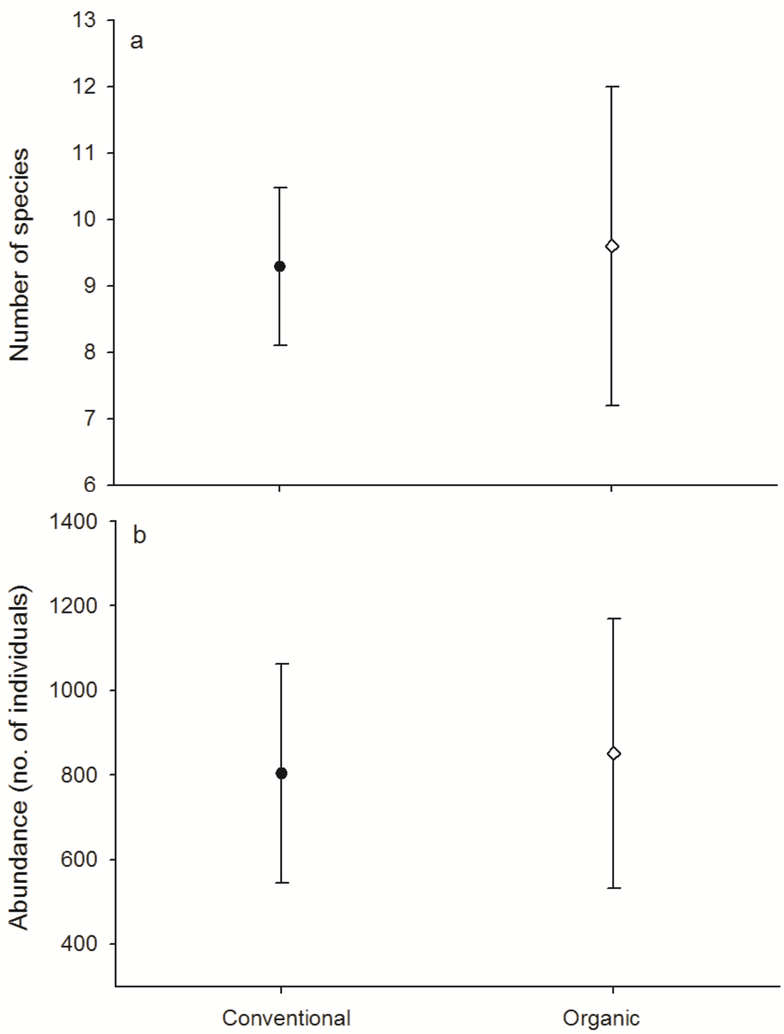
Supplementary Fig. S2 | Natural enemy evenness in surveys and experiment. Comparison of predator and pathogen evenness (Shannon's index) from field surveys (conventional fields are indicated with black circles; organic fields are indicated with gray circles) and in the experiment (diamonds). Values were calculated based on the relative abundance of the natural-enemy species (predators: *Geocoris bullatus*, *Hippodamia convergens*, *Nabis alternatus*, *Pterostichus melanarius*; pathogens: *Beauveria bassiana*, *Heterorhabditis megidis*, *Steinernema carpocapsae*) used in the experiments.



Supplementary Fig. S3 | Leverage plots from the regression models. Effect of (a) predator evenness and (b) pathogen evenness on plant weight ($\log_{10}$ transformed) and effect of (c) predator evenness and (d) pathogen evenness on potato beetle abundance ($\log_{10}$ transformed) in the field-enclosure experiment. For each panel, observed data and the best-fit regression line are shown.



Supplemental Figure S4 | Abundance and richness of alternative prey in potato fields. Alternative prey (i.e., herbivores other than potato beetles and detritivores) (a) richness (number of species collected per field) and (b) abundance (number of individuals collected per field) from three organic and four conventional potato fields (extracted from study of Chang & Snyder[S39]). Means (± *SE*) are shown. Alternative prey species richness (two-sample *t*-test: Mean [95% *CI*]: 0.17 [-10.1, 10.4], $t_5 = 0.040$, $P = 0.97$) and abundance (two-sample *t*-test: Mean [95% *CI*]: -142.7 [-1711, 1427], $t_5 = -0.22$, $P = 0.83$) did not differ significantly between organic and conventional fields. More generally, a recent meta-analysis across multiple cropping systems[24] showed that the richness and density of non-predatory arthropods (which would be prey for predators) were similar in organic and conventional crops, suggesting that the trends observed in our potato system are not unique.



S39. Chang, G. C. & Snyder, W. E. The relationship between predator density, community composition, and field predation on Colorado potato beetle eggs. *Biol. Cont.* **31,** 453-461 (2004).

Supplementary Fig. S5 | Effects of natural enemies in the field-enclosure experiment. Mean (± *SE*) values for (a) plant weight (log_{10} transformed) and (b) densities of herbivorous potato beetles (log_{10} transformed) from the field-enclosure experiment in control treatments without natural enemies (closed circles) and treatments with natural enemies (open circles). Treatments with natural enemies increased plant weight (Mean [95% *CI*]: 0.13 [0.032, 0.22], $t_{46} = 2.93$, $P = 0.0053$) and reduced potato beetle densities (Mean [95% *CI*]: -0.36 [-0.51, -0.21], $t_{46} = -4.76$, $P < 0.0001$) compared to control treatments without natural enemies.