

Landscape Ecology

Supplementary Information for

Agriculturally intensified landscapes are associated with reduced body condition of lady beetles

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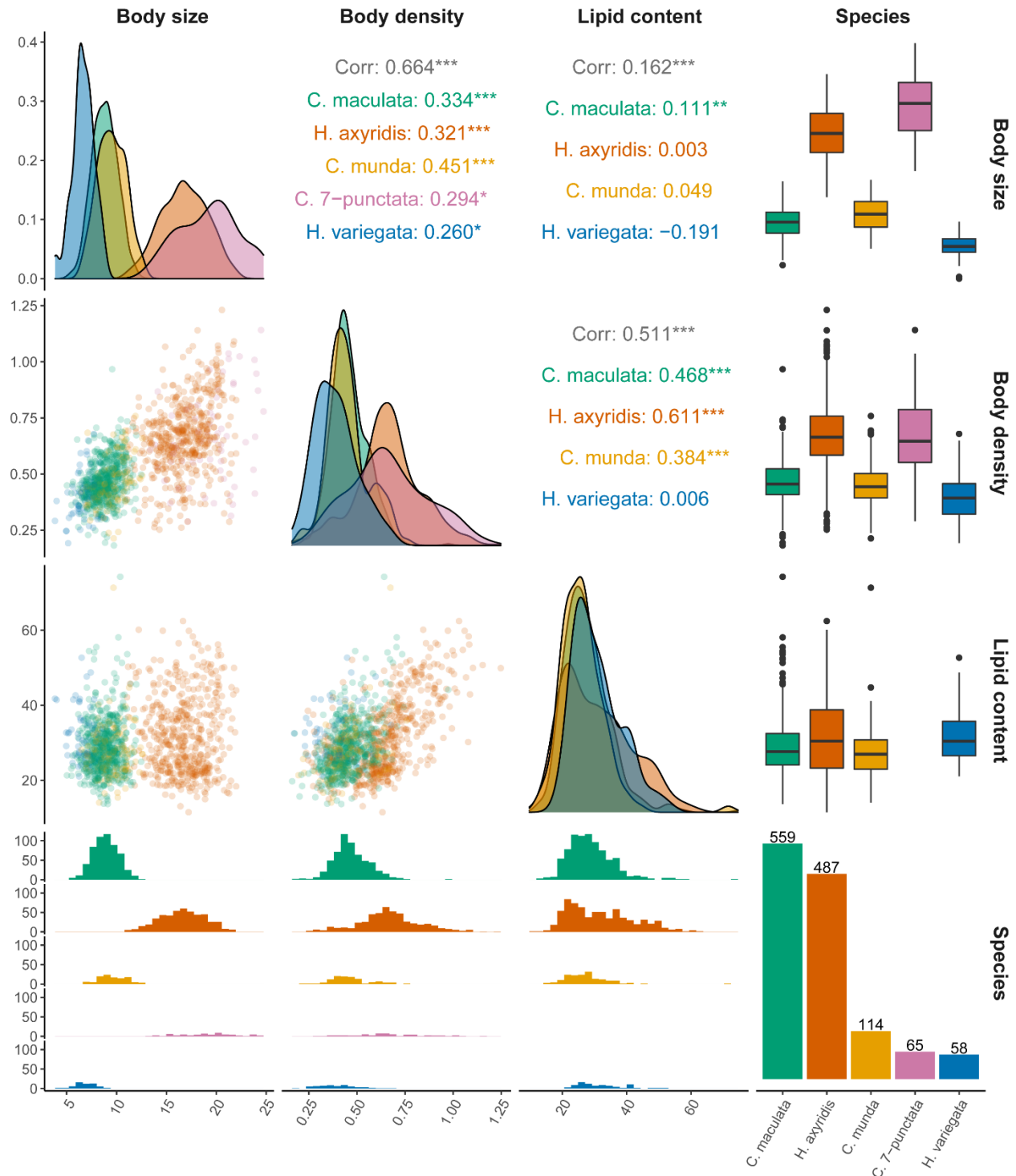
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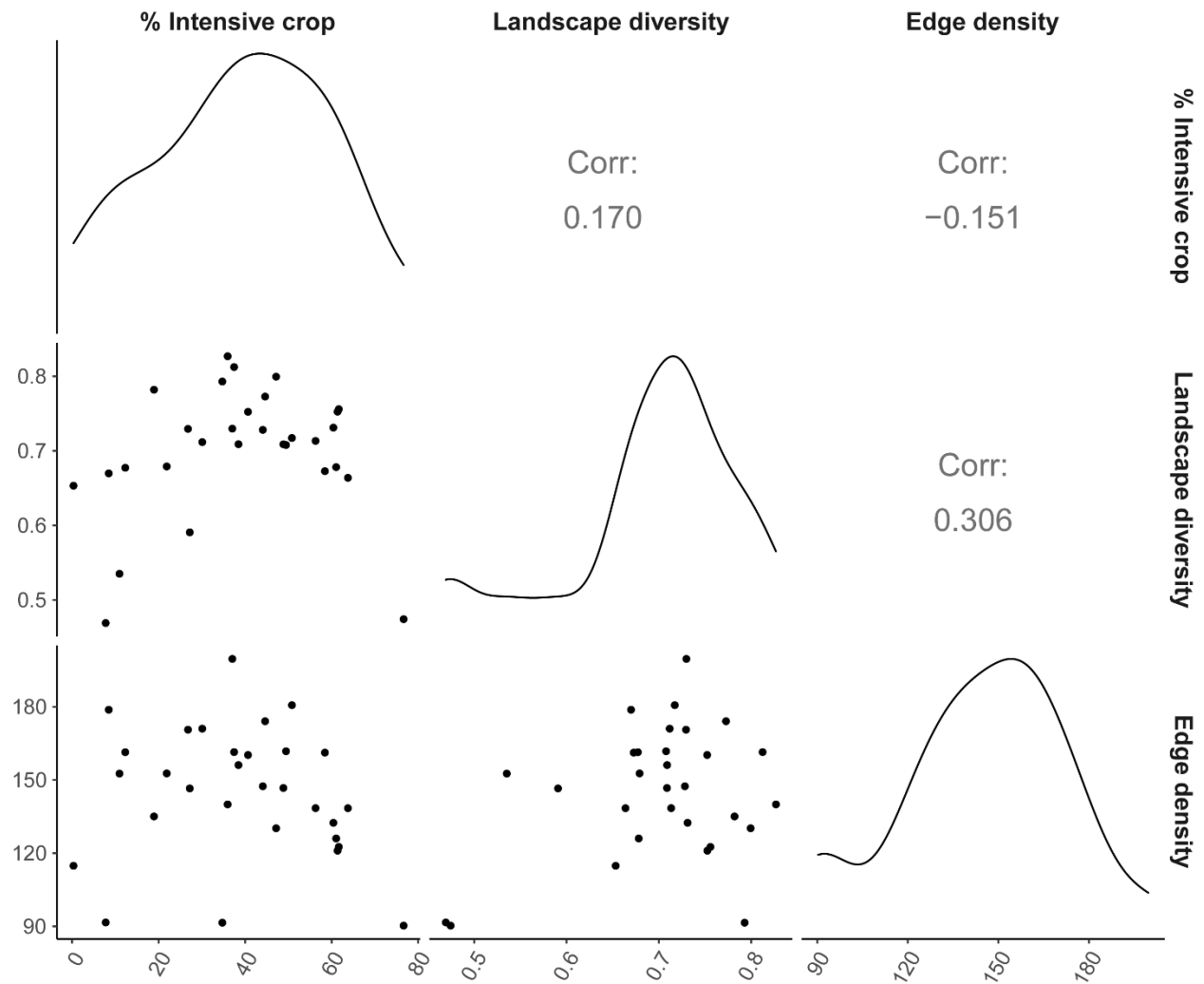
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Fig. S1 Correlations between body condition metrics.

Scatter plots, distributions, and box plots for body condition metrics by species. Panels in the upper middle show Pearson's correlation coefficients between pairs of metrics for all species together and for each species individually.

Fig. S2 Correlations between landscape metrics.

Scatter plots and distributions for landscape metrics within 1 km of the 30 sampling locations. Upper right panels show Pearson's correlation coefficients between pairs of metrics.

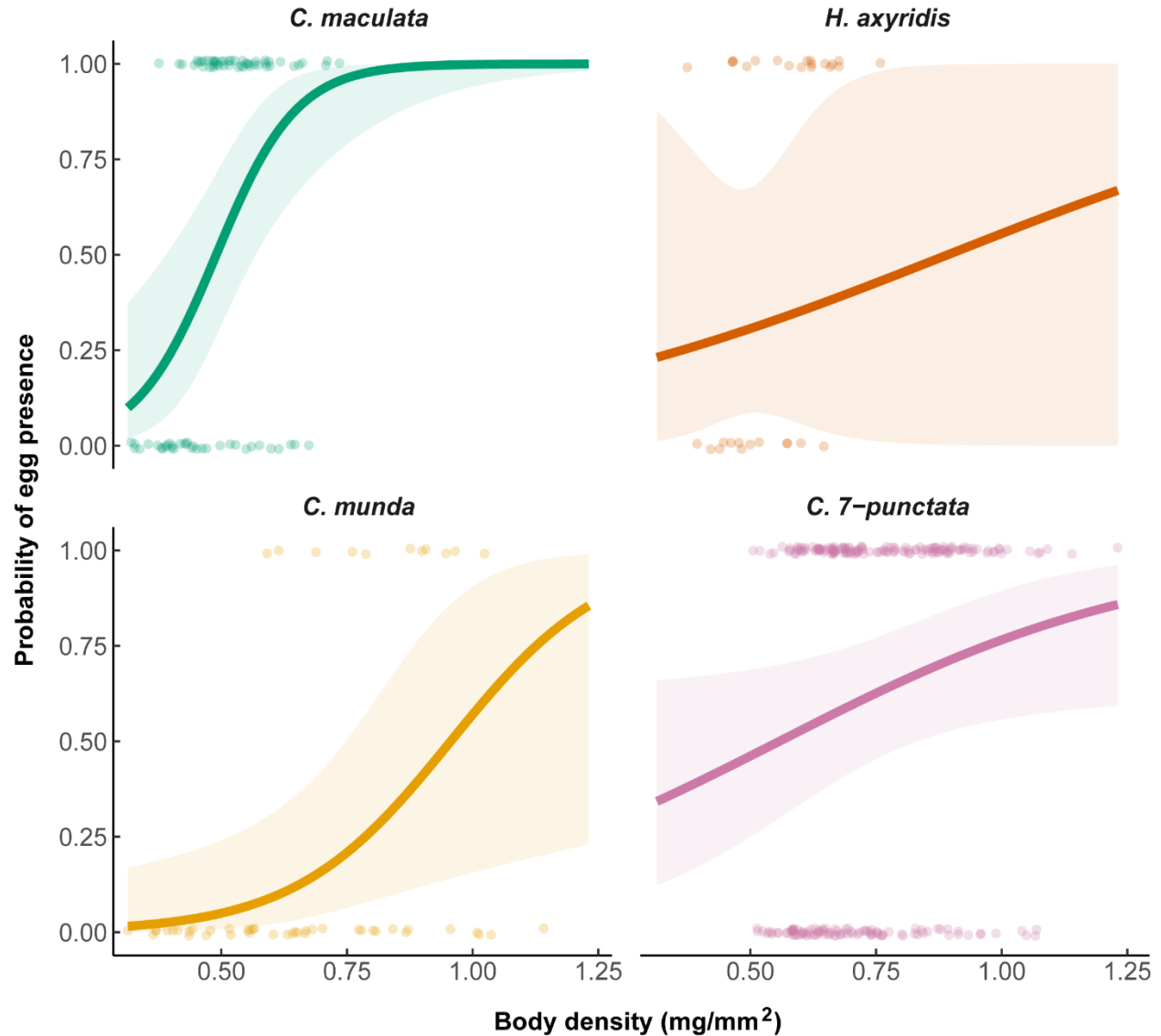
Fig. S3 Relationship between body condition metrics and egg presence.

Fig.S3 Relationship between body density of female beetles and the presence of eggs in four lady beetle species presented as partial residual plots. Trend lines show the predictions and shaded polygons the 95% confidence intervals of the logistic regression model. Species-specific effects are shown for illustrative purposes only; the interaction between landscape metrics and lady beetle species was not significant (see also Online Supplement 1 Table S2 and S3).

Table S1 Deviations of species-specific response from the all-species main effect for all combinations of landscape predictors and body condition metrics.

Response group	Body size					ln(Body density)					ln(Lipid content)				
	Value	SE	df	t-value	p-value	Value	SE	df	t-value	p-value	Value	SE	df	t-value	p-value
%Intensive cropland models															
All species	-0.02	0.02	28	-1.00	0.327	-0.08	0.04	28	-2.09	0.045	-0.13	0.06	28	-2.15	0.040
C. maculata	0.03	0.02	67	1.11	0.269	0.05	0.04	66	1.12	0.268	0.04	0.07	55	0.64	0.527
H. axyridis	-0.01	0.03	67	-0.40	0.693	-0.04	0.05	66	-0.78	0.441	-0.05	0.07	55	-0.69	0.492
C. munda	-0.06	0.04	67	-1.49	0.140	0.00	0.09	66	-0.04	0.973	0.05	0.13	55	0.40	0.692
C. 7-punctata	-0.08	0.13	67	-0.60	0.548	-0.05	0.21	66	-0.24	0.813	-	-	-	-	-
H. variegata	0.11	0.08	67	1.32	0.190	-0.39	0.22	66	-1.80	0.076	-0.27	0.27	55	-1.01	0.315
Landscape diversity models															
All species	0.02	0.02	28	0.72	0.477	0.03	0.04	28	0.65	0.523	-0.05	0.06	28	-0.84	0.408
C. maculata	-0.01	0.02	67	-0.65	0.516	-0.06	0.03	66	-2.21	0.031	-0.07	0.04	55	-1.54	0.129
H. axyridis	0.03	0.03	67	0.78	0.436	0.06	0.05	66	1.15	0.254	0.15	0.08	55	1.90	0.063
C. munda	-0.03	0.05	67	-0.74	0.461	0.05	0.10	66	0.53	0.601	0.00	0.14	55	0.00	0.999
C. 7-punctata	-0.01	0.15	67	-0.04	0.970	0.53	0.29	66	1.83	0.072	-	-	-	-	-
H. variegata	0.03	0.08	67	0.43	0.667	0.07	0.19	66	0.35	0.724	-0.29	0.23	55	-1.23	0.226
Edge density models															
All species	0.02	0.02	28	1.13	0.269	0.06	0.04	28	1.71	0.098	0.06	0.06	28	1.06	0.301
C. maculata	0.00	0.02	67	0.24	0.808	-0.01	0.03	66	-0.18	0.856	0.00	0.04	55	-0.07	0.948
H. axyridis	0.00	0.03	67	-0.13	0.901	0.02	0.05	66	0.44	0.664	0.03	0.08	55	0.36	0.720
C. munda	0.04	0.04	67	0.83	0.407	0.02	0.10	66	0.24	0.812	-0.08	0.14	55	-0.57	0.570
C. 7-punctata	-0.09	0.10	67	-0.95	0.346	-0.30	0.17	66	-1.80	0.076	-	-	-	-	-
H. variegata	0.00	0.05	67	-0.06	0.952	0.22	0.14	66	1.59	0.117	-0.04	0.16	55	-0.22	0.828

Comparison of all-species and species-specific results of linear mixed-effects models testing the effects of landscape predictors on body condition metrics (body size, ln-transformed body density, and ln-transformed lipid content) of coccinellids. The summary t-test statistic is based on type III sums of squares at $\alpha = 0.05$ and allows us to obtain species-specific coefficients of variation, standard errors, and p-

values for taxon contrasts. The corresponding Table 2 shows p-values for all main effects calculated based on type II sum-of-squares Wald chi-square tests. These ignore higher order interactions of the individual terms and therefore provide more accurate p-values that may differ from those shown in this table. P-values <0.05 are reported in bold numbers and p-values <0.10 in italics. Abbreviations: *SE*=standard error, *df* = degrees of freedom.

Table S2 Chi-square test statistics for models testing the relationship between body condition and egg load.

Explanatory variables	χ^2	df	p-value ($>\chi^2$)
<i>Body size model</i>			
Body size	0.6	1	0.456
Species	11.3	3	0.010
Date	7.4	1	0.006
Body size:Species	0.8	3	0.859
Date:Species	7.6	3	<i>0.054</i>
<i>Body density model</i>			
Density	15.4	1	<0.001
Species	11.9	3	0.008
Date	8.0	1	0.005
Density:Species	7.3	3	<i>0.063</i>
Date:Species	3.2	3	0.362
<i>Lipid content model</i>			
Lipid content	0.8	1	0.374
Species	1.9	2	0.394
Date	7.3	1	0.007
Body size:Species	1.2	2	0.545
Date:Species	5.4	2	<i>0.067</i>

Results of logistic regression models testing the effects body condition predictors (body size, body density and lipid content), collection date (in the body density and lipid content models, a quadratic term was used for collection date) and lady beetle species on the presence of eggs in female beetles. Test statistics are based on type II Wald chi-square tests at $\alpha = 0.05$. *P* values <0.05 are reported in bold numbers and *P* <0.10 in italics. The corresponding coefficients of variation, standard errors, and *P* values for taxon contrasts are reported in the corresponding Online Supplement 1 Table S3. Abbreviations: *df* = degrees of freedom.

Table S3 Summary t-test statistics for models testing the relationship between body condition and egg load by species.

Response group	Value	SE	z-value	p-value
<i>Body size model</i>				
All species	0.0	0.1	-0.7	0.456
C. maculata	0.2	0.2	0.7	0.471
H. axyridis	0.0	0.0	0.1	0.888
C. munda	0.0	0.5	0.1	0.943
C. septempunctata	-0.1	0.1	-0.6	0.555
<i>Body density model</i>				
All species	4.6	1.2	3.9	<0.001
C. maculata	8.0	3.5	2.3	0.024
H. axyridis	-1.9	1.3	-1.9	0.056
C. munda	-2.5	7.5	-0.3	0.740
C. septempunctata	1.9	2.1	0.9	0.376
<i>Lipid content model</i>				
All species	1.3	1.5	0.9	0.374
C. maculata	1.9	2.8	0.7	0.500
H. axyridis	-0.1	0.9	-0.1	0.893
C. munda	-4.4	4.6	-1.0	0.340

Comparison of all-species and species-specific results of logistic regression models testing the effects of body condition predictors (body size, body density and lipid content) on the presence of eggs in female coccinellids. The summary t-test statistic is based on type III sums of squares at $\alpha = 0.05$ and allows us to obtain species-specific coefficients of variation, standard errors, and p-values for taxon contrasts. The corresponding Online Supplement 1 Table S2 shows p-values for all main effects calculated based on type II sum-of-squares Wald chi-square tests. These ignore higher order interactions of the individual terms and therefore provide more accurate p-values that may differ from those shown in this table. P-values <0.05 are reported in bold numbers and p-values <0.10 in italics. Abbreviations: SE=standard error.