

Supplementary materials: Citizen science involving farmers as a means to document temporal trends in farmland biodiversity and relate them to agricultural practices.

Note S1. Short description of the Farmland Biodiversity Observatory

The programme was initiated by the French ministry for Agriculture and is animated by the National Museum of Natural History. It relies on local agricultural development organisations to recruit farmers, to assist monitoring and to return feedback about observations to participants locally. Local organisations are for instance the “chambers of agriculture” (public structures representing all economic agents in agriculture), departmental hunting federations, environmental associations, association for agricultural development, etc., depending on the local context. This diversity in local animation produces diversity in the profiles of farmers involved in the programme. Participation is voluntary and is not rewarded financially. Each farmer chooses which taxonomic group(s) will be monitored on their farm, even though the person collecting the data is not always the farmer: sometimes a trainee or an employee of the local organisation does the field work. Although the programme is national, each local network has its own dynamics. Ongoing research in social science addresses how the programme contributes to change the way agricultural biodiversity is considered. The study assumes that the programme does not have the same impact and shape depending on the socio-professional environment (farmers, local organisations, ministry, etc.), on the local context but also on the different conceptions on the future of farming (high-tech agriculture vs. local knowledge for instance).

Ca. 20 % of farmers in FBO are organic, with a mean increase of 16% between 2011 and 2017. This proportion is higher than the 7.5% of agricultural land in France, but the growth rate is similar. More information is available (in French) on the FBO website (<http://observatoire-agricole-biodiversite.fr/>)

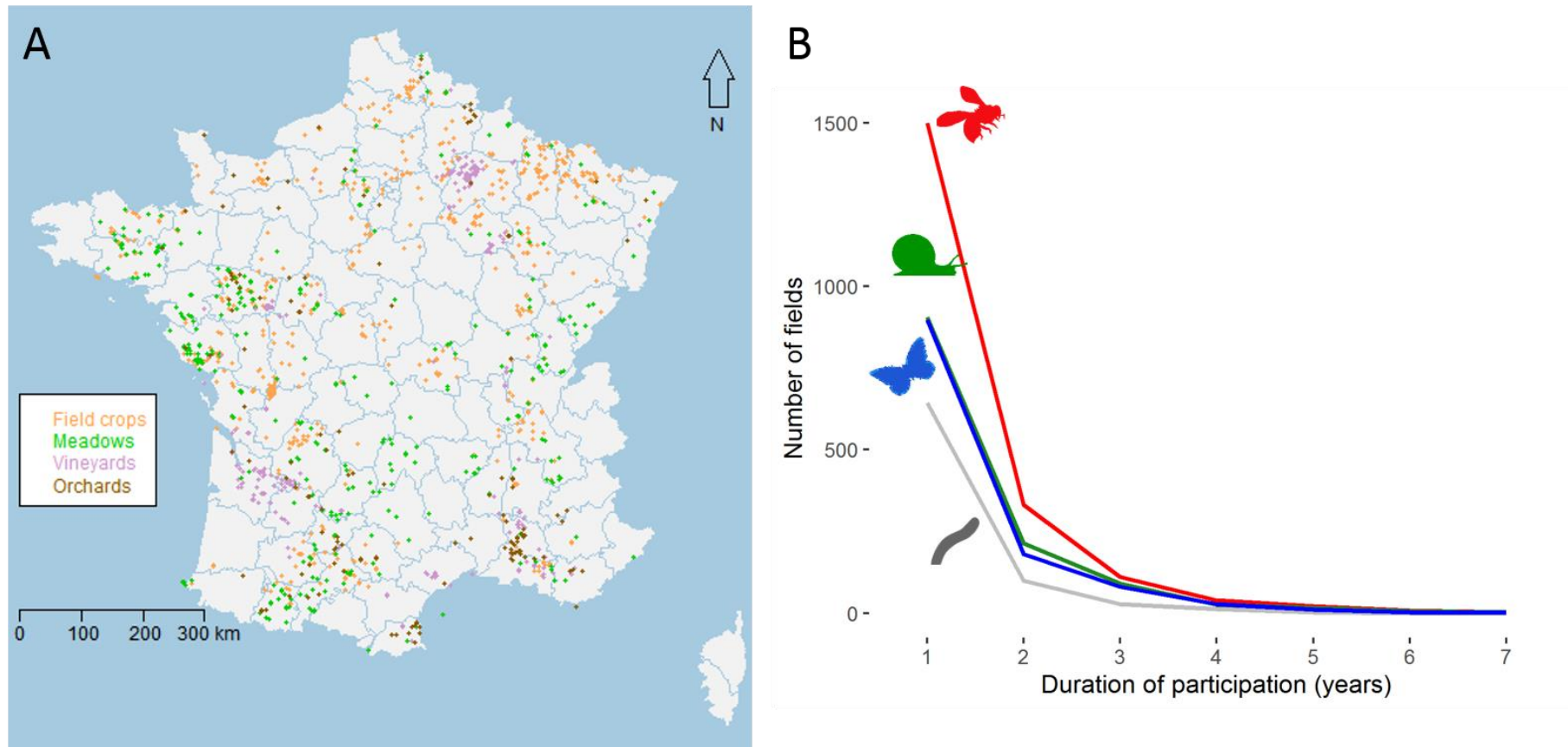


Figure S1. Participation in FBO. Figure A shows a map of the fields (and crop types indicated by different colors) where data were collected for at least one protocol. Figure B shows the high participant turnover, presenting the number of fields that have been part of FBO, as a function of duration of participation in years for the different protocols (solitary bees, earthworms, soil invertebrates (molluscs and beetles) and butterflies).

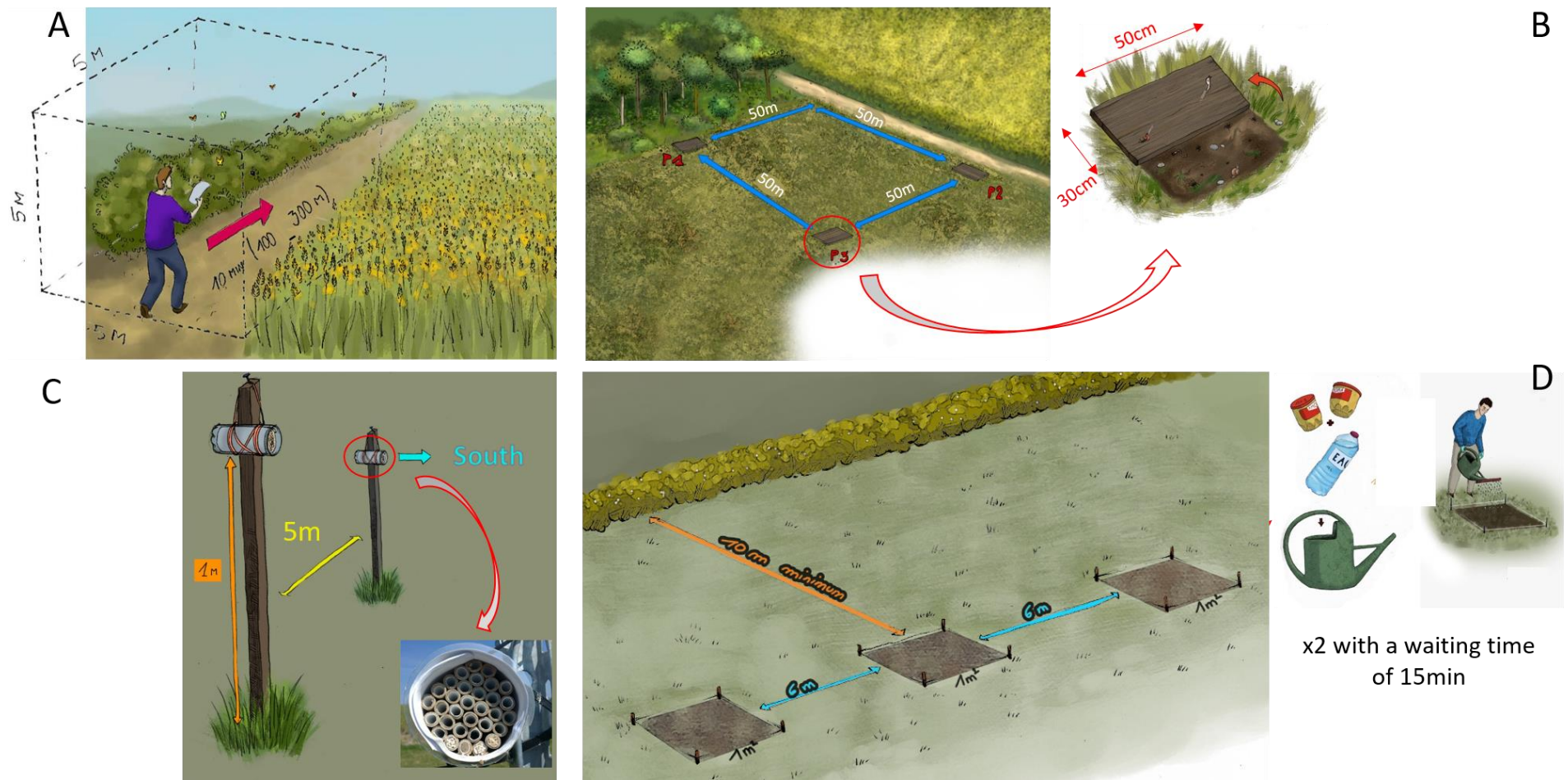


Figure S2. Pictures of the four protocols: 10min transect on a field edge for butterflies (A), three wooden cover boards on the ground for soil invertebrates (B), two trap nests for solitary bees (C) and three replicates watered twice with ten litres of a mustard solution for earthworms (D). Illustrations by Pauline Bouman.

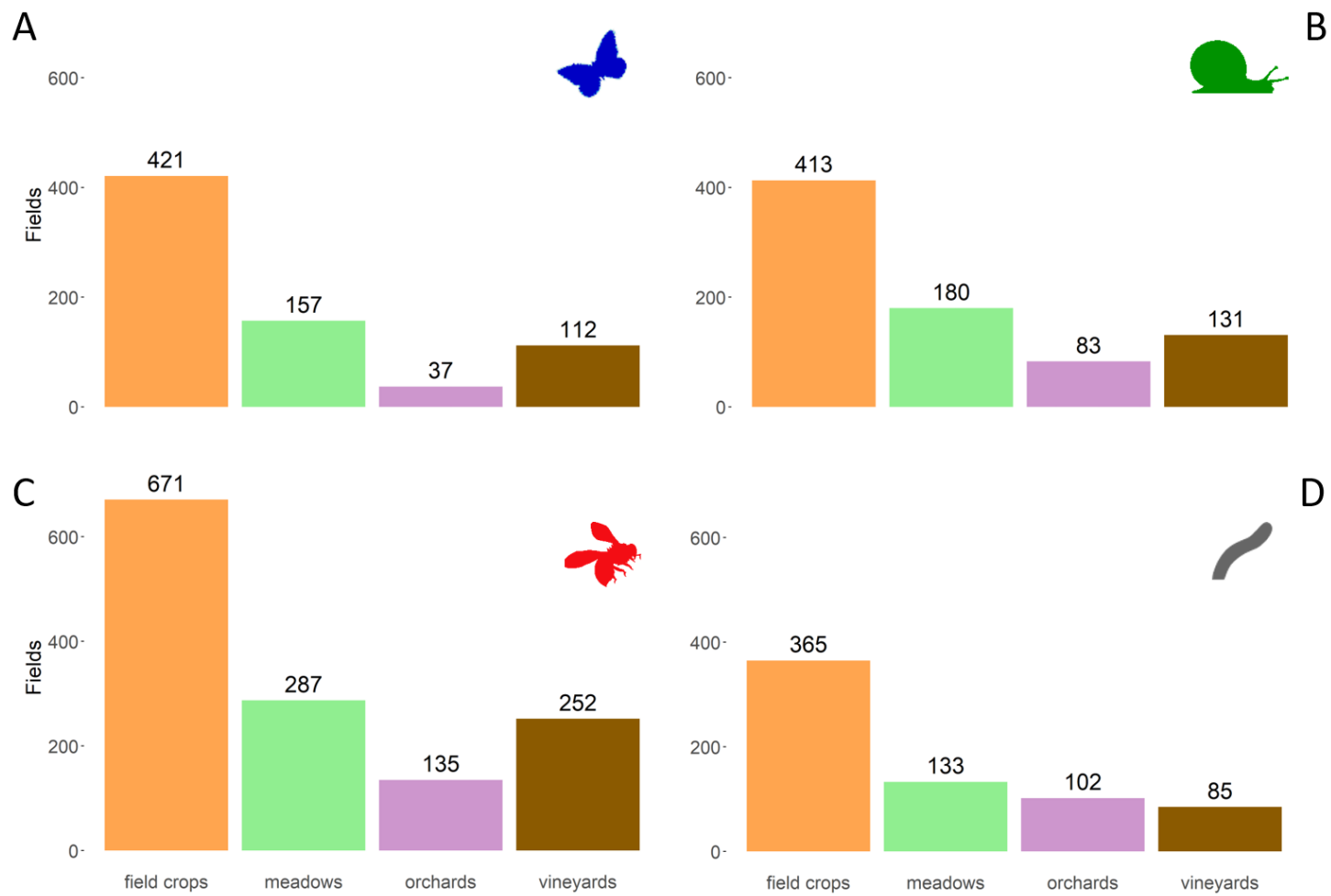


Figure S3. Distribution of number of fields in FBO across crop types, for the four protocols (A butterflies, B soil invertebrates (molluscs and beetles), C solitary bees, D earthworms).

Table S1. Variables used in the GLM(M), divided into five groups (landscape, practices, weather, soil, other). Levels for categorical variables are provided, as well as the protocols and crop types for which they are relevant. All variables were included in at least one model, except pesticide variables, edge and neighbouring areas that were summarized beforehand with multivariate analyses.

Group	Variables	Levels	Crop types or protocols
Landscape	Edge	Wood-fringe, Hedge, Grassy strip, Roadside, Ditch, Flower strip, Crop, Other	All
	Neighbouring land use	Meadow, Wood, Urban, Pond, Crop, Other	All
	Distance to the nearest tree	Numeric (meter)	Earthworms
	Vegetation height	Numeric (centimetre)	Bees
Practices	Insecticide	number of applications	All
	Herbicide	number of applications	All
	Fungicide	number of applications	All
	Molluscicide	number of applications	All
	Other pesticide	number of applications	All
	Organic Fertilization	number of applications	All
	Mineral Fertilization	number of applications	All
	Organic amendment	number of applications	All
	Calcium amendment	number of applications	All
	Tillage	Direct sowing, Shallow ploughing, Deep ploughing	Field's crop
	Inter-rows	Bare, Partly grassy, Grassy	Vineyards and Orchards
	Meadows' use	Mowing, Pasture, Mix	Meadows
	Meadows' type	Temporary, Permanent	Meadows
	Age	Numeric (year)	Meadows
	Rain	No, Light, Heavy	Earthworms and Butterflies

Weather	Wind	No, Light, Heavy	Earthworms and Butterflies
	Cloud cover	Sunny, Slightly cloudy, Thin overcast, Cloudy, Very cloudy, Complete coverage	Earthworms and Butterflies
	Soil humidity	Dry, Dried, Wet, Soggy, Waterlogged	Earthworms
	Date of last rain	Numeric (days from 01/01)	Earthworms and Invertebrates
	Date of last frost	Numeric (days from 01/01)	Earthworms
	Temperature	Numeric (°C)	Earthworms and Butterflies
Others	Board exposure	Sun, Semi-shade, Shade	Invertebrates
	Board humidity	Dry, Dried, Wet	Invertebrates
	Board place	Edge, Center	Invertebrates
	Board soil	Bare, Grassy	Invertebrates
	Latitude	numeric	All
	Longitude	numeric	All
	Installation date	Numeric (Days from 01/01)	Invertebrates and Bees
	Degree days	Numeric (GDD baseline 0°C)	All
	Distance of the transect	Numeric (meter)	Butterflies

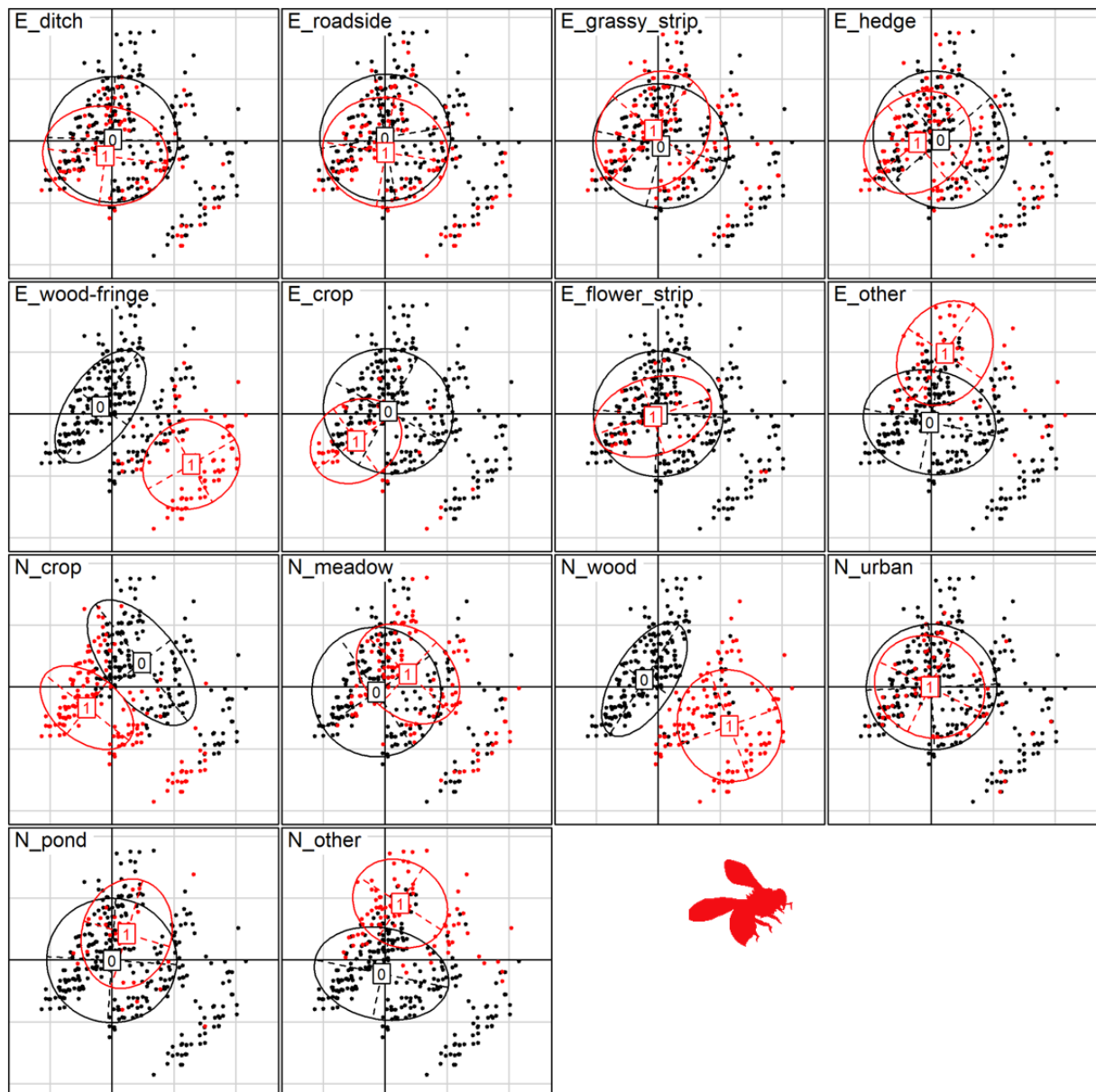


Figure S4. Importance of the landscape variables (E_ and N_ stand for respectively edges and neighbouring areas) in the axis of the MCA analysis for solitary bee data. Presence and absence of a given component in the surrounding landscape (close to the two trap nests) are coded with 1 and 0, respectively.

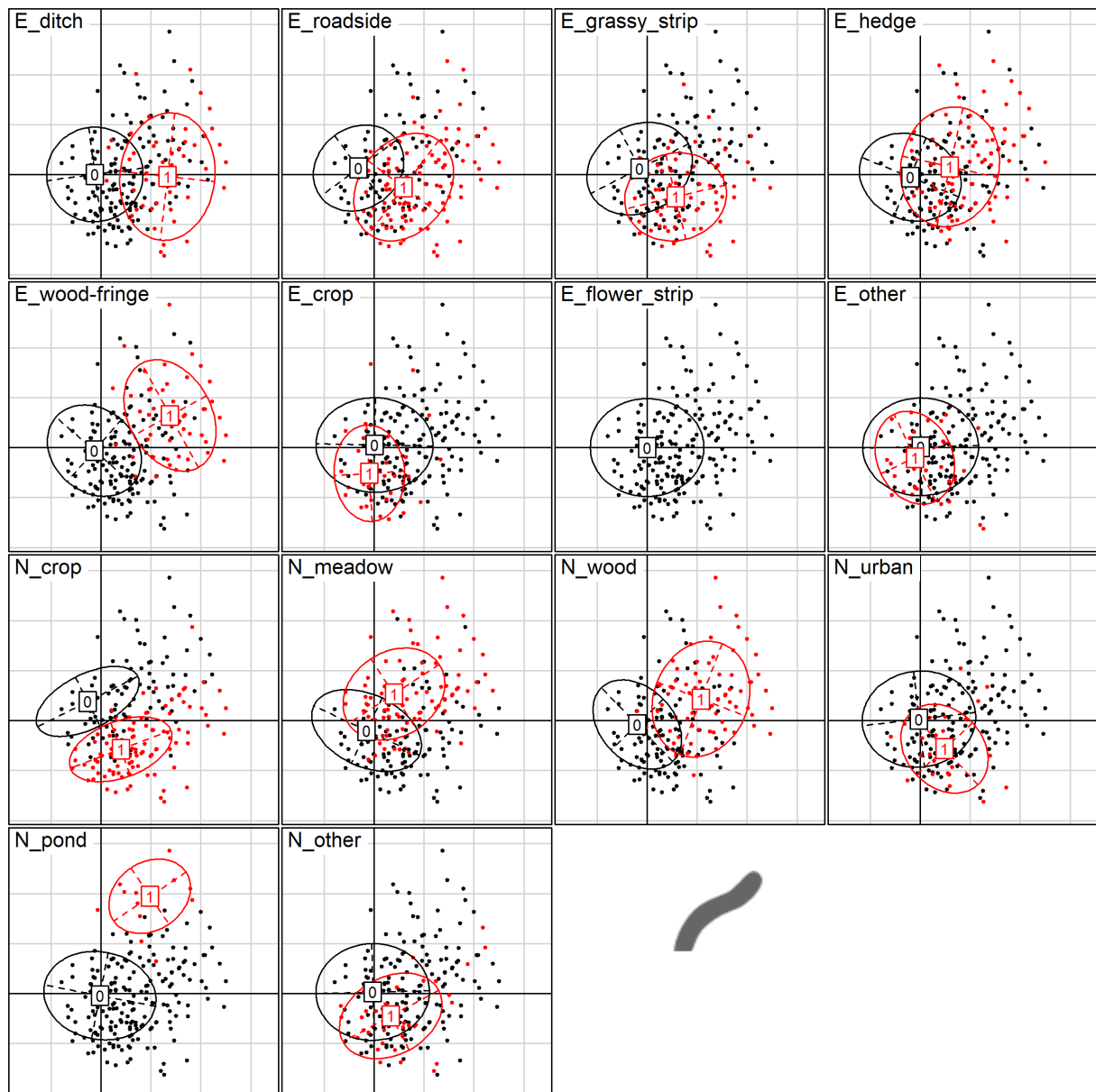


Figure S5. Importance of the landscape variables (E_ and N_ stand for respectively edges and neighbouring areas) in the axis of the MCA analysis for earthworm data. Presence and absence of a given component in the surrounding landscape (around the field) are coded with 1 and 0, respectively.

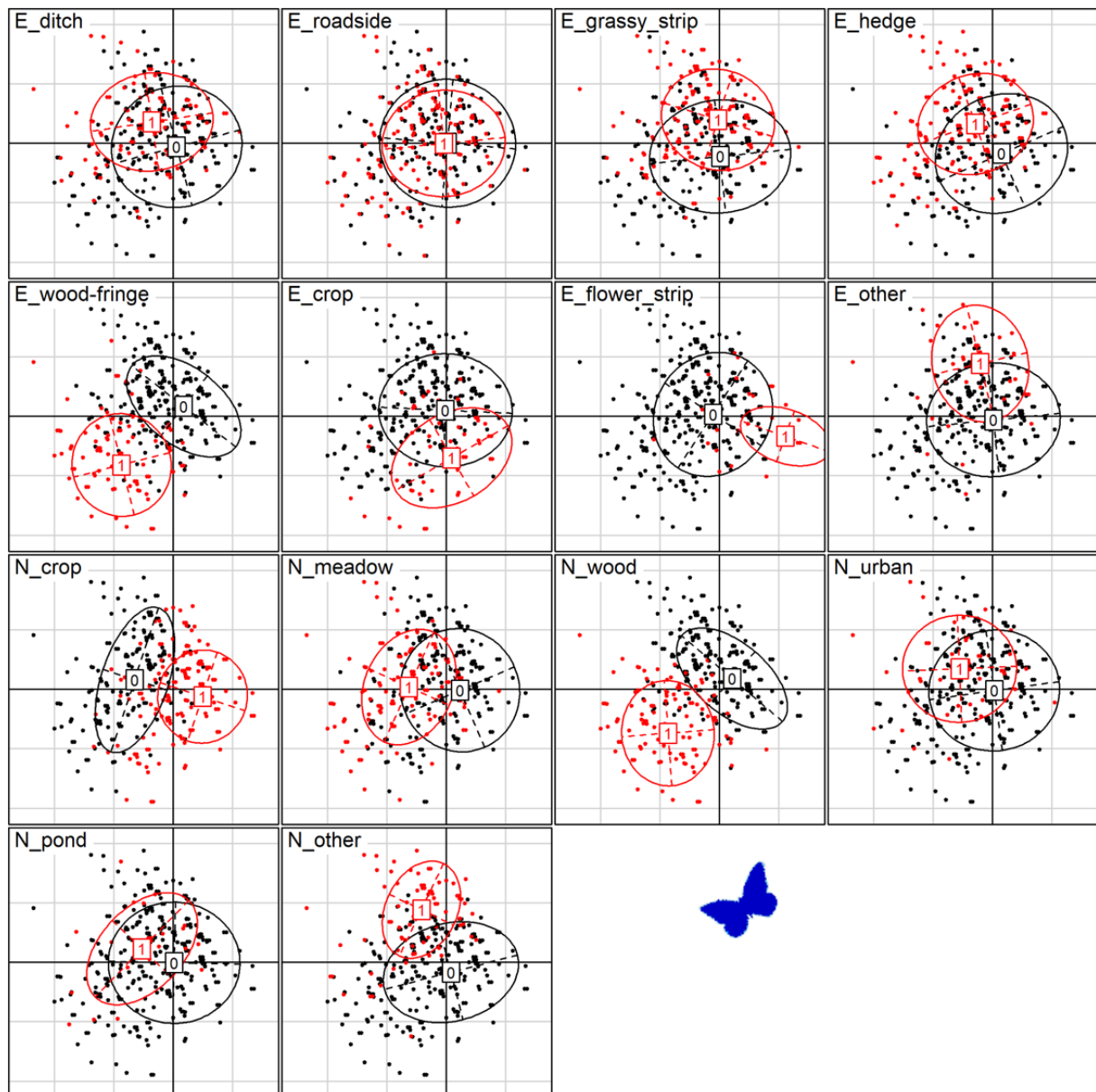


Figure S6. Importance of the landscape variables (E_ and N_ stand for respectively edges and neighbouring areas) in the axis of the MCA analysis for butterfly data. Presence and absence of a given component in the surrounding landscape (close to transect) are coded with 1 and 0, respectively.

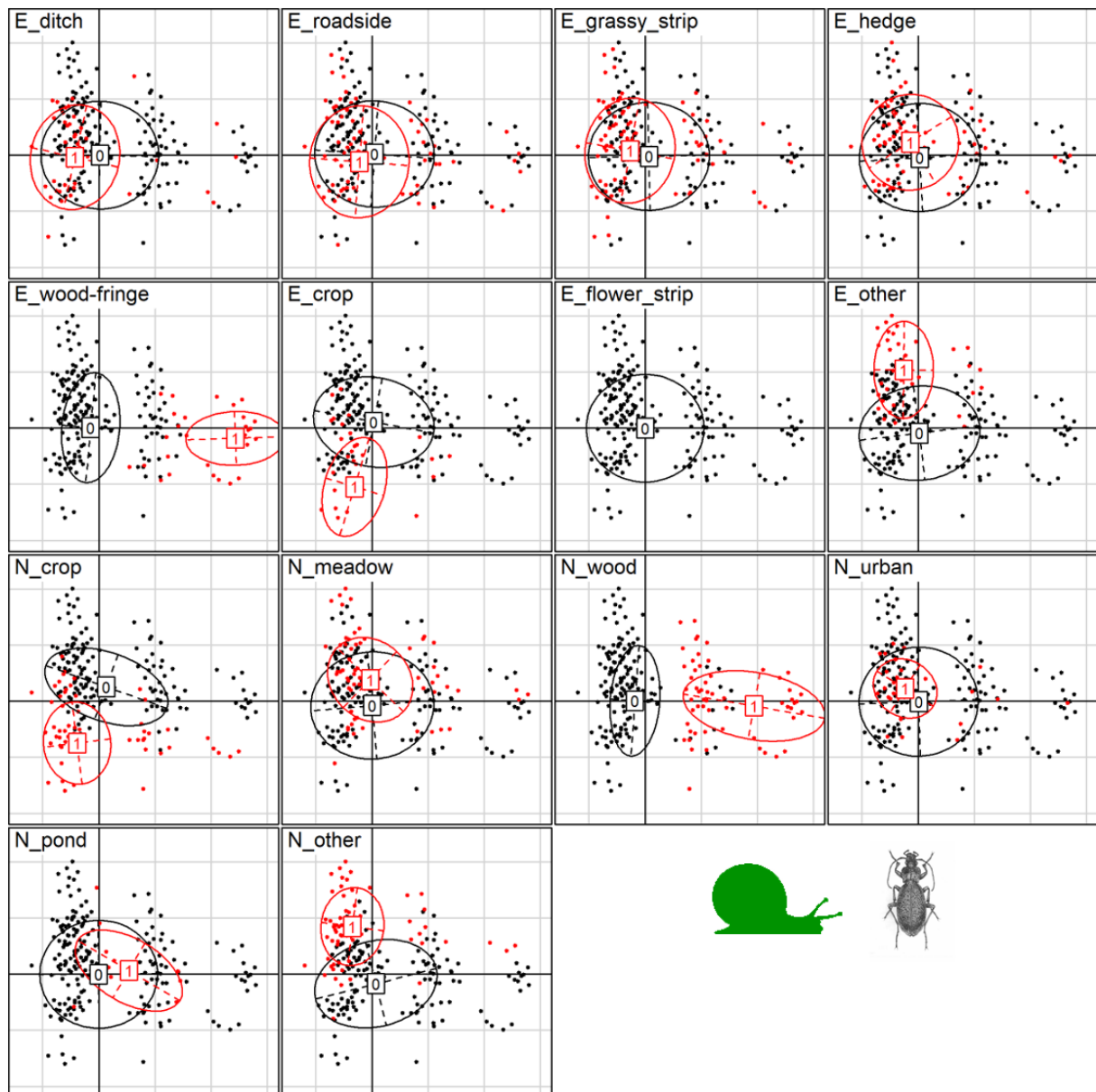


Figure S7. Importance of the landscape variables (E_ and N_ stand for respectively edges and neighbouring areas) in the axis of the MCA analysis for soil invertebrate data (molluscs and beetles). Presence and absence of a given component in the surrounding landscape (around the field) are coded with 1 and 0, respectively.

Table S2. Results of the GLMM models on abundance of solitary bees for each crop type, using the total number of applications as proxy for practices and the MCA coordinates as proxy for landscape characteristics. The first axis of MCA represents proximity to woodland; the interpretation of the second axis is more variable (see main text and Fig. S4-5-6-7). Values are log-coefficients, followed by their significance (stars). Marginal and conditional R^2 give the variance explained by the model with and without the random “field” effect of the model (with variance σ^2).

<i>Bees</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	-0.17 **	-0.08	0.08	-0.50 ***
MCA1	0.27 ***	0.17	0.07	n/a
MCA2	n/a	-0.35 ***	-0.23 *	0.15
Pesticides	0.15 *	n/a	0.23 *	n/a
Mineral fertilization	-0.48 ***	0.22 *	0.16	n/a
Organic fertilization	-0.18 **	-0.06	-0.08	-0.14
Meadows' use: Mix	n/a	0.40	n/a	n/a
Meadows' use: Pasture	n/a	-0.70 ***	n/a	n/a
Interactions				
Year * Mineral fertilization	-0.13 *	n/a	0.22 *	n/a
Year * Organic fertilization	0.25 ***	0.27 **	0.21 **	0.29 **
Year * MCA1	n/a	-0.18 *	0.24 **	n/a
Year * MCA2	n/a	n/a	-0.15 *	0.37 **
Covariates				
Degree days	2.07 ***	2.55 ***	2.50 ***	2.12 ***
Degree days ²	-1.28 ***	-1.75 ***	-1.64 ***	-1.56 ***
Latitude	-0.39 ***	-0.25 *	n/a	n/a
Longitude	0.44 ***	0.39 ***	0.39 **	0.63 ***
Vegetation height	0.27 ***	n/a	0.16 **	n/a
Installation date	-0.12 *	-0.30 ***	-0.20 *	n/a
σ^2	3.73	2.60	3.08	2.80
Marginal R^2 / Conditional R^2	0.234 / 0.843	0.295 / 0.825	0.230 / 0.816	0.249 / 0.801

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table S3. Results of the GLMM models on abundance of butterflies for each crop type, using the total number of applications as proxy for practices and the MCA coordinates as proxy for landscape characteristics. The first axis of MCA represents proximity to woodland; the interpretation of the second axis is more variable (see main text and Fig. S4-5-6-7). Values are log-coefficients, followed by their significance (stars). Marginal and conditional R^2 give the variance explained by the model with and without the random “field” effect of the model (with variance σ^2).

<i>Butterflies</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	-0.05	0.19 ***	-0.19 **	n/a
MCA1	n/a	-0.18 **	n/a	n/a
MCA2	n/a	-0.13	n/a	n/a
Pesticides	n/a	n/a	-0.1	n/a
Mineral fertilization	0.01	n/a	n/a	n/a
Inter-rows: Partly grassy	n/a	n/a	-0.18	n/a
Inter-rows: Bare	n/a	n/a	-0.60 **	n/a
Interactions				
Year * Pesticides	n/a	n/a	0.17 **	n/a
Year * Mineral fertilization	-0.08 *	n/a	n/a	n/a
Year * MCA2	n/a	0.14 **	n/a	n/a
Covariates				
Degree days	1.69 ***	1.31 ***	0.93 ***	1.80 ***
Degree days ²	-1.51 ***	-1.23 ***	-1.01 ***	-1.77 ***
Latitude	-0.18 ***	-0.29 ***	-0.37 ***	n/a
Longitude	n/a	n/a	0.23 *	n/a
Cloud cover: Sunny	0.60 ***	0.70 ***	0.42	n/a
Cloud cover: Slightly cloudy	0.53 ***	0.45 *	0.56	n/a
Cloud cover: Thin overcast	0.44 **	0.94 ***	0.63	n/a
Cloud cover: Cloudy	0.35 **	0.47 *	0.13	n/a
Cloud cover: Very cloudy	0.07	-0.18	-0.61	n/a
Wind: Light	0.56 ***	0.46 **	n/a	n/a
Wind: No	0.66 ***	0.26	n/a	n/a
σ^2	0.47	0.43	0.61	0.4
Marginal R^2 / Conditional R^2	0.260 / 0.601	0.252 / 0.566	0.279 / 0.705	0.188 / 0.529

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table S4. Results of the GLMM models on abundance of earthworms for each crop type, using the total number of applications as proxy for practices and the MCA coordinates as proxy for landscape characteristics. The first axis of MCA represents proximity to woodland; the interpretation of the second axis is more variable (see main text and Fig. S4-5-6-7). Values are log-coefficients, followed by their significance (stars).

<i>Earthworms</i>	<i>Field crops</i>	<i>Meadows</i>
Year, landscape, practices		
Year	n/a	-0.28 ***
Organic fertilization	n/a	0.15 *
Tillage: Deep ploughing	-0.28 *	n/a
Tillage: Direct sowing	0.81 ***	n/a
Meadow's age	n/a	0.27 ***
Covariates		
Degree days	-0.13 *	-0.14 *
Soil humidity: Waterlogged	0.56	-1.69 **
Soil humidity: Wet	-0.09	-0.79 *
Soil humidity: Dried	0.06	0.25
Soil humidity: Dry	-0.69 *	-0.36

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table S5. Results of the GLMM models on abundance of beetles for each crop type, using the total number of applications as proxy for practices and the MCA coordinates as proxy for landscape characteristics. The first axis of MCA represents proximity to woodland; the interpretation of the second axis is more variable (see main text and Fig. S4-5-6-7). Values are log-coefficients, followed by their significance (stars). Marginal and conditional R^2 give the variance explained by the model with and without the random “field” effect of the model (with variance σ^2).

<i>Beetles</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	0.30 ***	-0.20	0.30 ***	-1.00 ***
Pesticides	0.21 ***	0.45 *	n/a	0.53 *
Mineral fertilization	-0.06	0.31 **	0.22 *	0.19
Organic fertilization	n/a	0.26	n/a	0.05
Meadows' type: Permanent	n/a	-0.16	n/a	n/a
Interactions				
Year * Pesticides	n/a	0.69 ***	n/a	n/a
Year * Mineral fertilization	-0.08 *	-0.49 ***	0.18 *	-0.50 **
Year * Organic fertilization	n/a	-0.33 **	n/a	0.30 *
Year*(Meadows' type: Permanent)	n/a	0.70 ***	n/a	n/a
Covariates				
Degree days	n/a	-0.13 **	-0.25 ***	-0.18 **
Degree days ²	-0.10 ***	n/a	n/a	n/a
Latitude	0.21 **	n/a	0.63 ***	n/a
Installation date	n/a	-0.40 **	0.24 *	n/a
Board humidity: Dried	-0.36 ***	n/a	0.59 ***	-0.18
Board humidity: Dry	-0.41 ***	n/a	0.67 ***	0.53 *
σ^2	1.21	1.81	1.70	1.60
Marginal R^2 / Conditional R^2	0.068 / 0.597	0.151 / 0.764	0.127 / 0.486	0.177 / 0.778

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table S6. Results of the GLMM models on abundance of molluscs for each crop type, using the total number of applications as proxy for practices and the MCA coordinates as proxy for landscape characteristics. The first axis of MCA represents proximity to woodland; the interpretation of the second axis is more variable (see main text and Fig. S4-5-6-7). Values are log-coefficients, followed by their significance (stars). Marginal and conditional R^2 give the variance explained by the model with and without the random “field” effect of the model (with variance σ^2).

<i>Molluscs</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	0.43 ***	-0.32 **	0.15 **	-0.29 ***
MCA2	0.10 ***	n/a	n/a	n/a
Pesticides	n/a	0.10	0.26 **	n/a
Mineral fertilization	n/a	n/a	n/a	0.14
Organic fertilization	0.10 *	-0.01	n/a	-0.16
Tillage: Deep ploughing	-0.07	n/a	n/a	n/a
Tillage: Direct sowing	0.54 ***	n/a	n/a	n/a
Meadows' use: Mix	n/a	-0.46 **	n/a	n/a
Meadows' use: Pasture	n/a	0.26	n/a	n/a
Meadows' type: Permanent	n/a	0.16	n/a	n/a
Inter-rows: Partly grassy	n/a	n/a	0.30	-0.09
Inter-rows: Bare	n/a	n/a	-0.98 ***	-1.59 ***
Interactions				
Year * Pesticides	n/a	0.24 *	n/a	n/a
Year * Organic fertilization	n/a	-0.59 ***	n/a	0.16 *
Year * Mineral fertilization	n/a	n/a	n/a	-0.29 **
Year*(Meadows' type: Permanent)	n/a	0.94 ***	n/a	n/a
Year*(Meadows' use: Mix)	n/a	0.24	n/a	n/a
Year*(Meadows' use: Pasture)	n/a	-0.13	n/a	n/a
Covariates				
Degree days	-0.68 ***	-1.08 ***	-0.46 ***	-0.73 ***
Degree days ²	0.58 ***	0.86 ***	0.42 ***	0.51 ***
Longitude	n/a	n/a	0.35 **	n/a
Installation date	n/a	0.18 *	n/a	n/a
Board humidity: Dried	-0.07	-0.32 ***	0.15	n/a
Board humidity: Dry	-0.48 ***	-0.44 ***	-0.31 **	n/a
Board soil: Grass	0.19 **	n/a	0.28 **	n/a
σ^2	1.12	0.82	1.03	0.80
Marginal R^2 / Conditional R^2	0.142 / 0.623	0.217 / 0.779	0.114 / 0.725	0.139 / 0.773

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

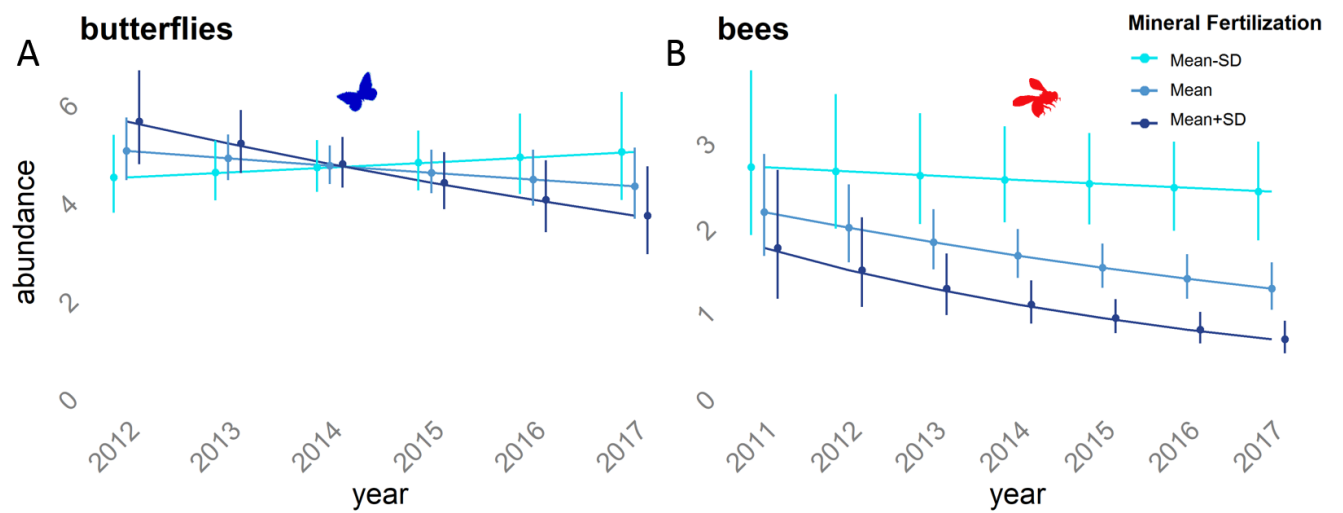


Figure S8. Relationship between mineral fertilization and temporal trends in butterfly and bee abundance in field crops. Mineral fertilization is characterized here by the number of applications, from high levels (dark blue line: mean plus one standard deviation), through medium levels (blue line: mean) to low values (light blue line: mean minus one standard deviation). Other variables are at their mean (quantitative terms) or representative levels (qualitative terms).

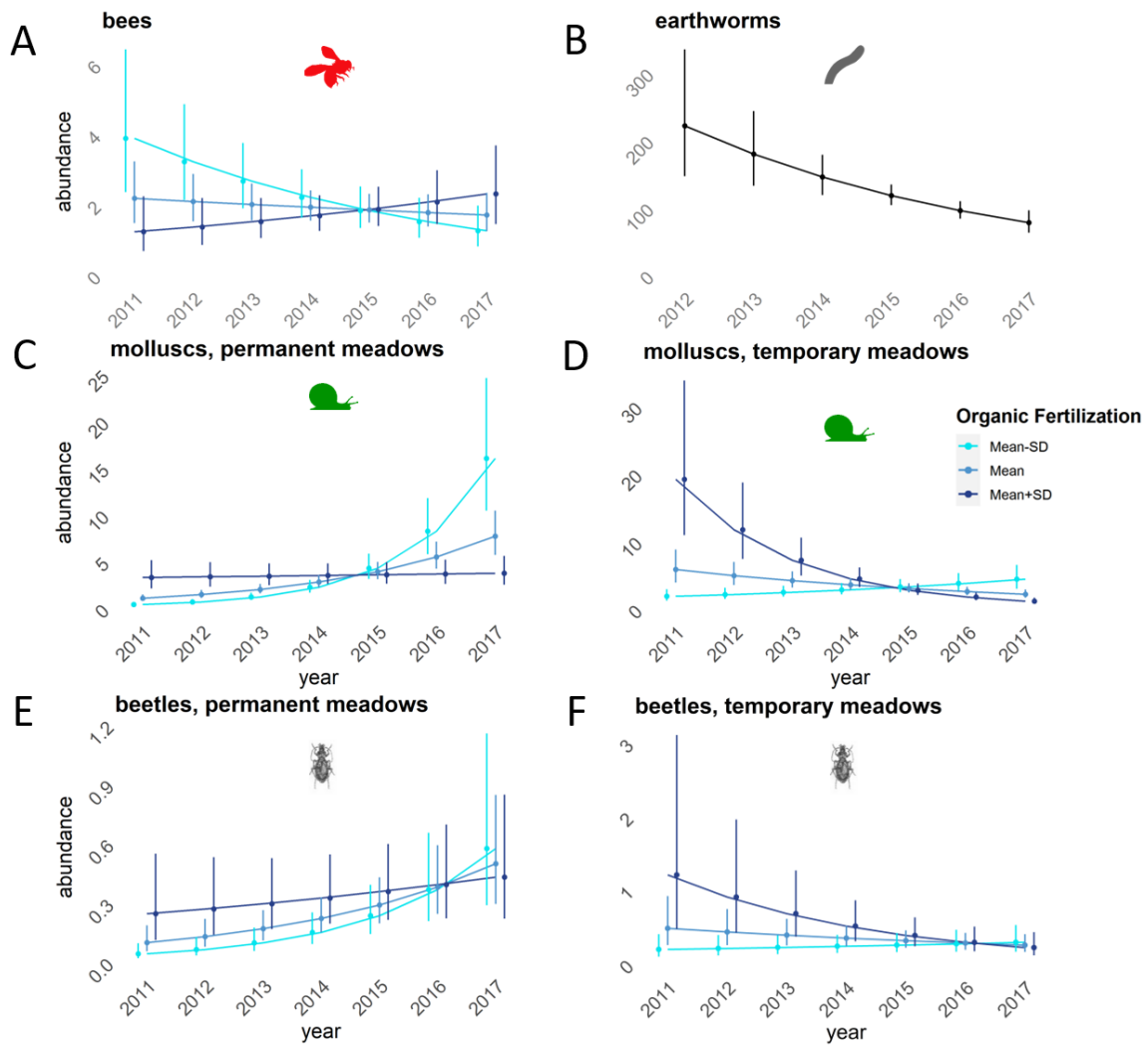


Figure S9. Relationship between organic fertilization and temporal trends in meadows. Organic fertilization is characterized here by the number of applications, from high levels (dark blue line: mean plus one standard deviation), through medium levels (blue line: mean) to low values (light blue line: mean minus one standard deviation). Other variables are at their mean (quantitative terms) or representative levels (qualitative terms). Beetle and mollusc abundance are predicted in permanent (C-E) and temporary meadows (D-F).

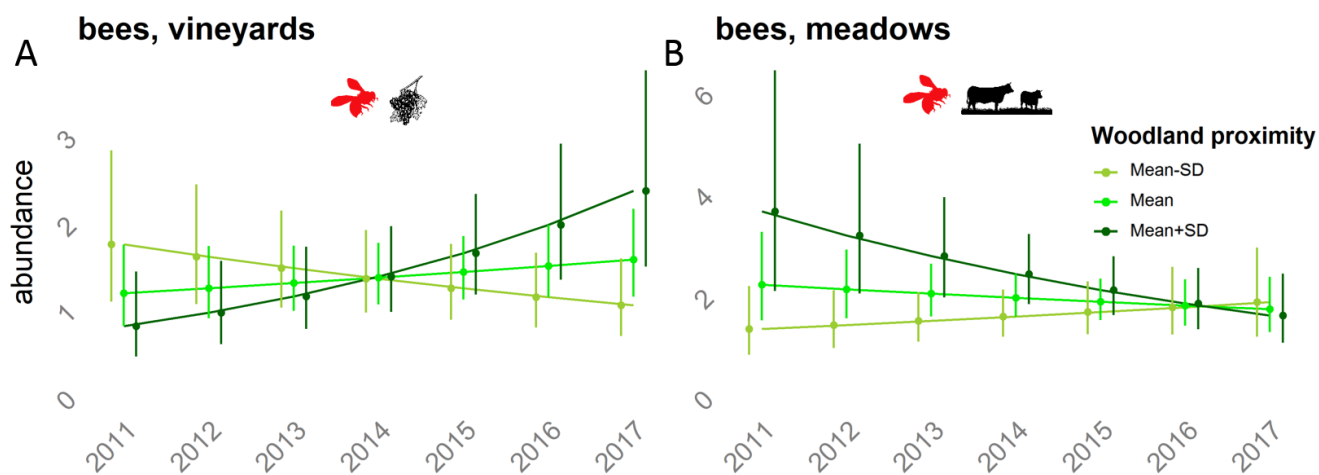


Figure S10. Relationship between landscape (woodland proximity) and temporal trends in bee abundance in vineyards (A) and meadows (B). Woodland proximity is characterized here by the coordinates of the first MCA axis (Fig. S4), from high levels (dark green line: mean plus one standard deviation), through medium levels (green line: mean) to low values (light green line: mean minus one standard deviation). Other variables are at their mean (quantitative terms) or representative levels (qualitative terms). Predicts are computed from models using the total number of applications as proxy for practices.

Table S7. Variance inflation factor for each variable of the GLMM models on abundance of solitary bees for each crop type, using PCA coordinates as proxy for farming practices.

<i>Bees</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	1.15	1.34	1.32	1.24
MCA1	1.01	1.06	1.20	1.19
MCA2	n/a	1.14	1.18	1.22
PCA1	1.07	1.08	1.06	1.14
PCA2	1.44	n/a	n/a	1.15
Meadows' use	n/a	1.18	n/a	n/a
Inter-rows	n/a	n/a	1.18	n/a
Interactions				
Year*PCA1	1.12	1.10	n/a	1.25
Year*PCA2	1.45	n/a	n/a	n/a
Year * MCA1	n/a	1.07	1.35	1.53
Year * MCA2	n/a	n/a	1.25	1.29
Covariates				
Degree days	15.96	16.62	13.82	14.74
Degree days ²	16.06	16.57	13.67	14.78
Longitude	1.11	1.09	1.18	1.05
Latitude	1.12	1.04	n/a	n/a
Vegetation height	1.05	n/a	1.10	n/a
Installation date	1.07	1.22	1.15	1.11

Table S8. Variance inflation factor for each variable of the GLMM models on abundance of solitary bees for each crop type, using the total number of applications as proxy for practices.

<i>Bees</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	1.17	1.37	1.42	1.02
MCA1	1.02	1.07	1.27	n/a
MCA2	n/a	1.13	1.19	1.05
Pesticides	1.36	n/a	1.18	n/a
Mineral fertilization	1.53	1.10	1.52	n/a
Organic fertilization	1.21	1.11	1.18	1.03
Meadows' use	n/a	1.23	n/a	n/a
Interactions				
Year * Mineral fertilization	1.20	n/a	1.48	n/a
Year * Organic fertilization	1.19	1.09	1.15	1.05
Year * MCA1	n/a	1.07	1.36	n/a
Year * MCA2	n/a	n/a	1.26	1.06
Covariates				
Degree days	16.10	16.59	13.93	14.51
Degree days ²	16.21	16.53	13.77	14.50
Latitude	1.11	1.06	n/a	n/a
Longitude	1.12	1.09	1.27	1.03
Vegetation height	1.05	n/a	1.18	n/a
Installation date	1.07	1.21	1.15	n/a

Table S9. Variance inflation factor for each variable of the GLMM models on abundance of butterflies for each crop type, using PCA coordinates as proxy for farming practices.

<i>Butterflies</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	1.11	1.15	1.17	n/a
MCA1	n/a	1.09	n/a	n/a
MCA2	n/a	1.09	n/a	n/a
PCA1	1.12	n/a	n/a	n/a
Inter-rows	n/a	n/a	1.18	n/a
Interactions				
Year*PCA1	1.04	n/a	n/a	n/a
Year *MCA2	n/a	1.05	n/a	n/a
Covariates				
Degree days	18.14	14.24	14.84	13.65
Degree days ²	18.05	14.31	14.93	13.65
Latitude	1.10	1.05	1.17	n/a
Longitude	n/a	n/a	1.14	n/a
Cloud cover	1.17	1.20	1.21	n/a
Wind	1.05	1.08	n/a	n/a

Table S10. Variance inflation factor for each variable of the GLMM models on abundance of butterflies for each crop type, using the total number of applications as proxy for practices

<i>Butterflies</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	1.09	1.15	1.33	n/a
MCA1	n/a	1.09	n/a	n/a
MCA2	n/a	1.09	n/a	n/a
Pesticides	n/a	n/a	1.30	n/a
Mineral fertilization	1.03	n/a	n/a	n/a
Inter-rows	n/a	n/a	1.37	n/a
Interactions				
Year * Pesticides	n/a	n/a	1.38	n/a
Year * Mineral fertilization	1.01	n/a	n/a	n/a
Year * MCA2	n/a	1.05	n/a	n/a
Covariates				
Degree days	18.12	14.24	15.02	13.65
Degree days ²	18.03	14.31	14.95	13.65
Latitude	1.05	1.05	1.25	n/a
Longitude	n/a	n/a	1.15	n/a
Cloud cover	1.16	1.20	1.24	n/a
Wind	1.05	1.08	n/a	n/a

Table S11. Variance inflation factor for each variable of the GLMM models on abundance of earthworms for each crop type, using PCA coordinates as proxy for farming practices.

<i>Earthworms</i>	<i>Field crops</i>	<i>Meadows</i>
Year, landscape, practices		
Year	n/a	1.51
Organic fertilization	n/a	1.25
Tillage	1.12	n/a
Meadow's age	n/a	1.13
Covariates		
Degree days	1.10	1.11
Soil humidity	1.08	1.84

Table S12. Variance inflation factor for each variable of the GLMM models on abundance of earthworms for each crop type, using the total number of applications as proxy for practices.

<i>Earthworms</i>	<i>Field crops</i>	<i>Meadows</i>
Year, landscape, practices		
Year	n/a	1.54
PCA1	n/a	1.22
Tillage	1.12	n/a
Meadow's age	n/a	1.10
Covariates		
Degree days	1.10	1.11
Soil humidity	1.08	1.82

Table S13. Variance inflation factor for each variable of the GLMM models on abundance of beetles for each crop type, using PCA coordinates as proxy for farming practices.

<i>Beetles</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	1,13	2,54	1,29	1,10
PCA1	1,09	1,13	1,08	1,09
PCA2	1,76	1,48	n/a	n/a
Meadows' type	n/a	1,12	n/a	n/a
Interactions				
Year*PCA1	n/a	1,32	n/a	1,12
Year*PCA2	1,72	1,28	n/a	n/a
Year*(Meadows' type)	n/a	2,07	n/a	n/a
Covariates				
Degree days	n/a	1,01	1,08	1,06
Degree days ²	1,01	n/a	n/a	n/a
Latitude	1,04	n/a	1,47	n/a
Installation date	n/a	1,12	1,29	n/a
Board humidity	1,08	n/a	1,03	1,06

Table S14. Variance inflation factor for each variable of the GLMM models on abundance of beetles for each crop type, using the total number of applications as proxy for practices.

<i>Beetles</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	1,18	2,53	1,29	1,36
Pesticides	1,35	1,65	n/a	1,11
Mineral fertilization	1,24	1,50	1,25	1,43
Organic fertilization	n/a	1,03	n/a	1,04
Meadows' type	n/a	1,13	n/a	n/a
Interactions				
Year * Pesticides	n/a	1,87	n/a	n/a
Year * Mineral fertilization	1,04	1,26	1,30	1,32
Year * Organic fertilization	n/a	1,49	n/a	1,05
Year*(Meadows' type)	n/a	2,23	n/a	n/a
Covariates				
Degree days	n/a	1,02	1,08	1,04
Degree days ²	1,01	n/a	n/a	n/a
Latitude	1,04	n/a	1,48	n/a
Installation date	n/a	1,17	1,30	n/a
Board humidity	1,08	n/a	1,03	1,09

Table S15. Variance inflation factor for each variable of the GLMM models on abundance of molluscs for each crop type, using PCA coordinates as proxy for farming practices.

<i>Molluscs</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	2,24	6,25	1,19	1,24
MCA2	1,03	n/a	n/a	n/a
PCA1	1,06	1,34	1,12	1,15
PCA2	1,72	1,52	1,11	1,44
Tillage	1,56	n/a	n/a	n/a
Inter-rows	n/a	n/a	1,40	1,31
Meadows' type	n/a	1,29	n/a	n/a
Meadows' use	n/a	1,35	n/a	n/a
Interactions				
Year*PCA1	1,05	1,73	1,43	1,24
Year*PCA2	1,73	1,34	1,26	n/a
Year*(Tillage)	3,22	n/a	n/a	n/a
Year*(Meadows' use)	n/a	5,41	n/a	n/a
Year*(Meadows' type)	n/a	2,84	n/a	n/a
Covariates				
Degree days	15,51	15,48	13,29	16,22
Degree days ²	15,41	15,39	13,25	16,02
Longitude	n/a	n/a	1,06	n/a
Board humidity	1,11	1,08	1,09	n/a
Board soil	1,07	n/a	1,03	n/a

Table S16. Variance inflation factor for each variable of the GLMM models on abundance of molluscs for each crop type, using the total number of applications as proxy for practices.

<i>Molluscs</i>	<i>Field crops</i>	<i>Meadows</i>	<i>Vineyards</i>	<i>Orchards</i>
Year, landscape, practices				
Year	1,17	6,62	1,14	1,53
MCA2	1,02	n/a	n/a	n/a
Pesticides	n/a	1,72	1,09	n/a
Mineral fertilization	n/a	n/a	n/a	1,50
Organic fertilization	1,02	1,14	n/a	1,22
Tillage	1,10	n/a	n/a	n/a
Meadows' use	n/a	1,40	n/a	n/a
Meadows' type	n/a	1,23	n/a	n/a
Inter-rows	n/a	n/a	1,11	1,43
Interactions				
Year * Pesticides	n/a	1,83	n/a	n/a
Year * Organic fertilization	n/a	1,75	n/a	1,20
Year * Mineral fertilization	n/a	n/a	n/a	1,67
Year*(Meadows' type)	n/a	3,00	n/a	n/a
Year*(Meadows' use)	n/a	6,26	n/a	n/a
Covariates				
Degree days	15,29	15,62	13,04	16,49
Degree days ²	15,22	15,49	12,97	16,24
Longitude	n/a	n/a	1,04	n/a
Installation date	n/a	1,33	n/a	n/a
Board humidity	1,07	1,07	1,06	n/a
Board soil	1,06	n/a	1,03	n/a

Table S17. Moran's indices describing spatial autocorrelation in the residuals of GLMM models on abundance for each taxonomic group, crop type and proxy for farming practices. Moran's I can vary between -1 and 1: the values we observed are generally close to 0.

Moran's I indices	P-values	Taxonomic groups	Crops	Practices proxy
0,03	0,01	Solitary bees	Field crops	PCA axis
0,06	0,07	Solitary bees	Meadows	PCA axis
0,04	0,13	Solitary bees	Vineyards	PCA axis
0,03	0,43	Solitary bees	Orchards	PCA axis
0,03	0,01	Solitary bees	Field crops	Number of applications
0,05	0,09	Solitary bees	Meadows	Number of applications
0,04	0,14	Solitary bees	Vineyards	Number of applications
0,02	0,56	Solitary bees	Orchards	Number of applications
0,13	1,24E-09	Butterflies	Field crops	PCA axis
0,21	1,73E-05	Butterflies	Meadows	PCA axis
0,28	6,01E-08	Butterflies	Vineyards	PCA axis
0,03	0,60	Butterflies	Orchards	PCA axis
0,13	1,23E-09	Butterflies	Field crops	Number of applications
0,21	3,29E-05	Butterflies	Meadows	Number of applications
0,24	1,69E-06	Butterflies	Vineyards	Number of applications
0,03	0,59	Butterflies	Orchards	Number of applications
0,03	0,17	Earthworms	Field crops	PCA axis
0,11	0,05	Earthworms	Meadows	PCA axis
0,03	0,18	Earthworms	Field crops	Number of applications
0,10	0,07	Earthworms	Meadows	Number of applications
0,09	1,75E-04	Beetles	Field crops	PCA axis
0,02	0,65	Beetles	Meadows	PCA axis
-0,06	0,30	Beetles	Vineyards	PCA axis
0,06	0,21	Beetles	Orchards	PCA axis
0,09	1,50E-04	Beetles	Field crops	Number of applications
0,02	0,54	Beetles	Meadows	Number of applications
-0,04	0,58	Beetles	Vineyards	Number of applications
0,02	0,54	Beetles	Orchards	Number of applications
0,05	0,02	Molluscs	Field crops	PCA axis
0,06	0,17	Molluscs	Meadows	PCA axis
0,13	3,25E-03	Molluscs	Vineyards	PCA axis
0,07	0,14	Molluscs	Orchards	PCA axis
0,05	0,02	Molluscs	Field crops	Number of applications
0,07	0,13	Molluscs	Meadows	Number of applications
0,12	0,01	Molluscs	Vineyards	Number of applications
0,04	0,34	Molluscs	Orchards	Number of applications



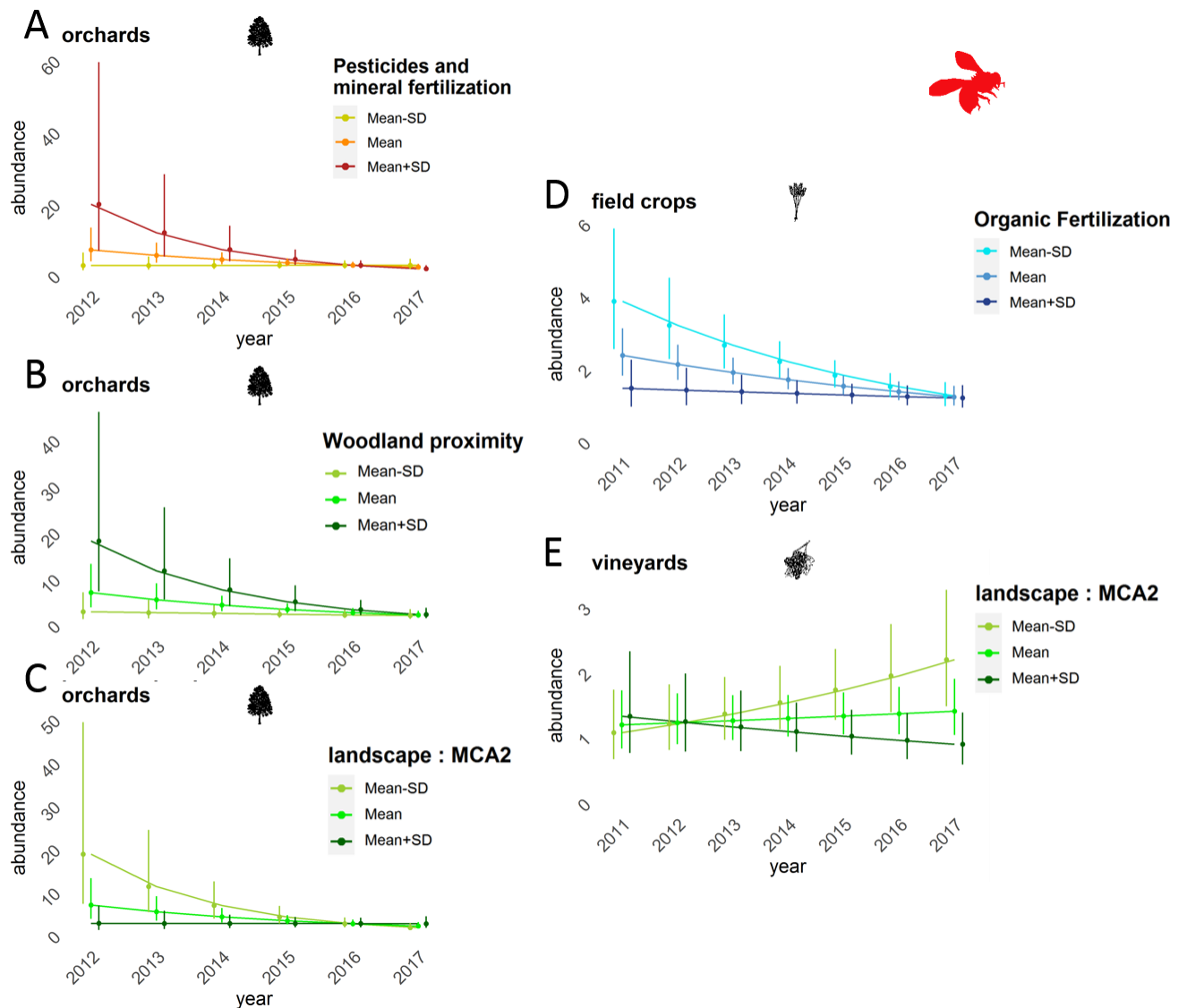


Figure S11-A. Illustration of significant interactions of landscape/practices (using PCA coordinates) variables with the year effect, for models of temporal trends in abundance of solitary bees. Trends are shown for three contrasting values of the practice/landscape variable, from fields with a high level of use or high proximity to a landscape structure (darker line: mean plus one standard deviation) to fields with an average (medium line: mean) or low level (lighter line: mean minus one standard deviation). Other terms are at their mean (quantitative terms) or representative levels (qualitative terms). Predicts are computed from models using PCA coordinates as proxy for farming practices.

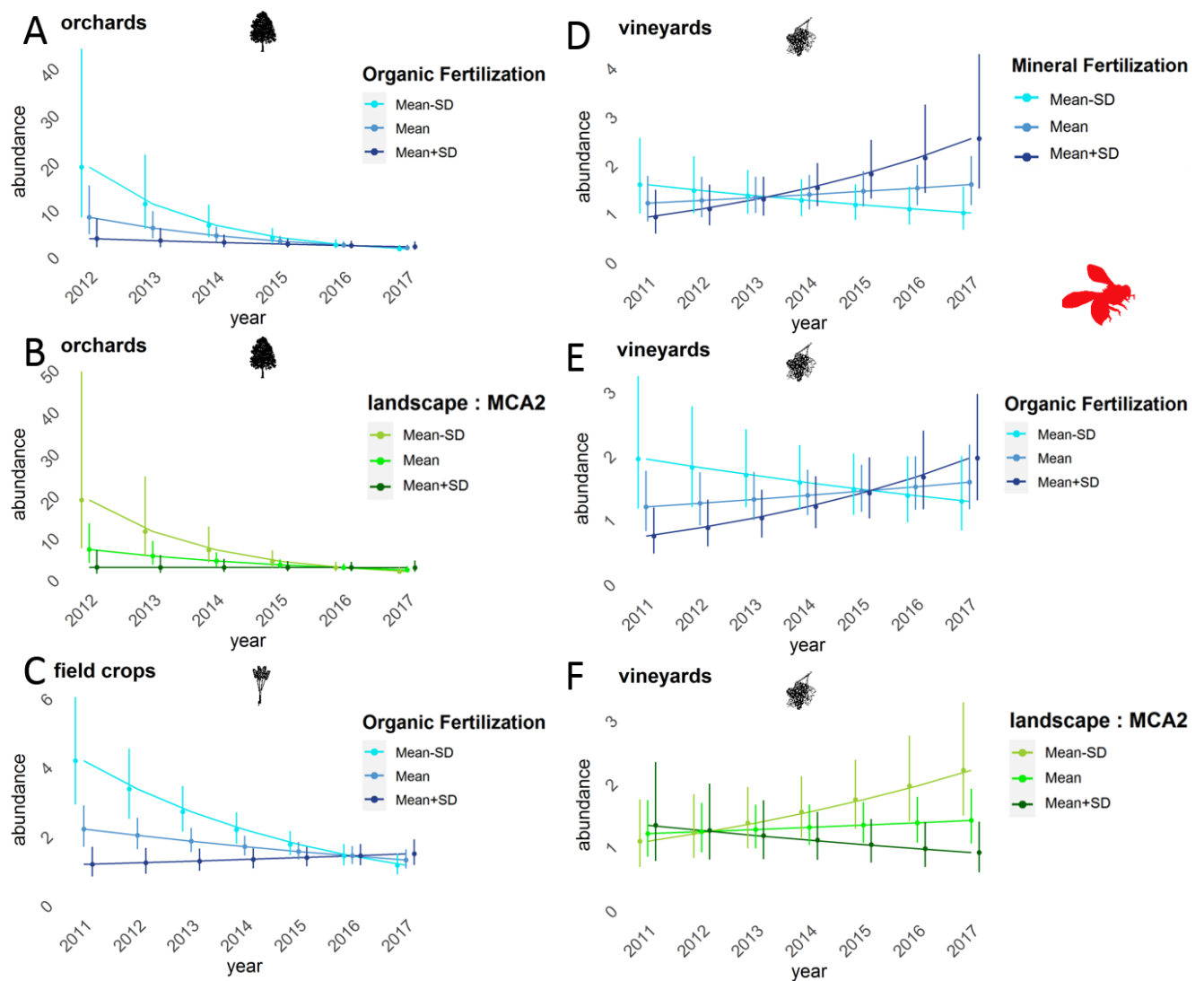


Figure S11-B. Illustration of significant interactions of landscape/practices (using the total number of applications) variables with the year effect, for models of temporal trends in abundance of solitary bees. Trends are shown for three contrasting values of the practice/landscape variable, from fields with a high level of use or high proximity to a landscape structure (darker line: mean plus one standard deviation) to fields with an average (medium line: mean) or low level (lighter line: mean minus one standard deviation). Other terms are at their mean (quantitative terms) or representative levels (qualitative terms). Predicts are computed from models using the total number of applications as proxy for practices.

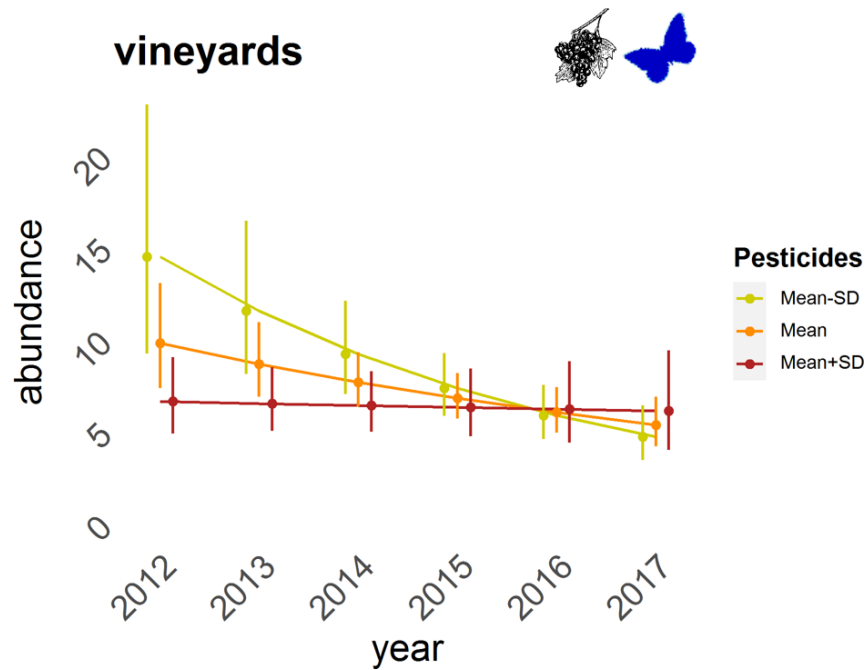


Figure S12. Relationship between pesticide use (total number of applications) and temporal trends of butterflies in vineyards. Trends are shown for three contrasting values of pesticide use, from high levels (red line: mean plus one standard deviation), through medium levels (orange line: mean) to low values (yellow line: mean minus one standard deviation). Other terms are at their mean (quantitative terms) or representative levels (qualitative terms). Predicts are computed from models using the total number of applications as proxy for practices.

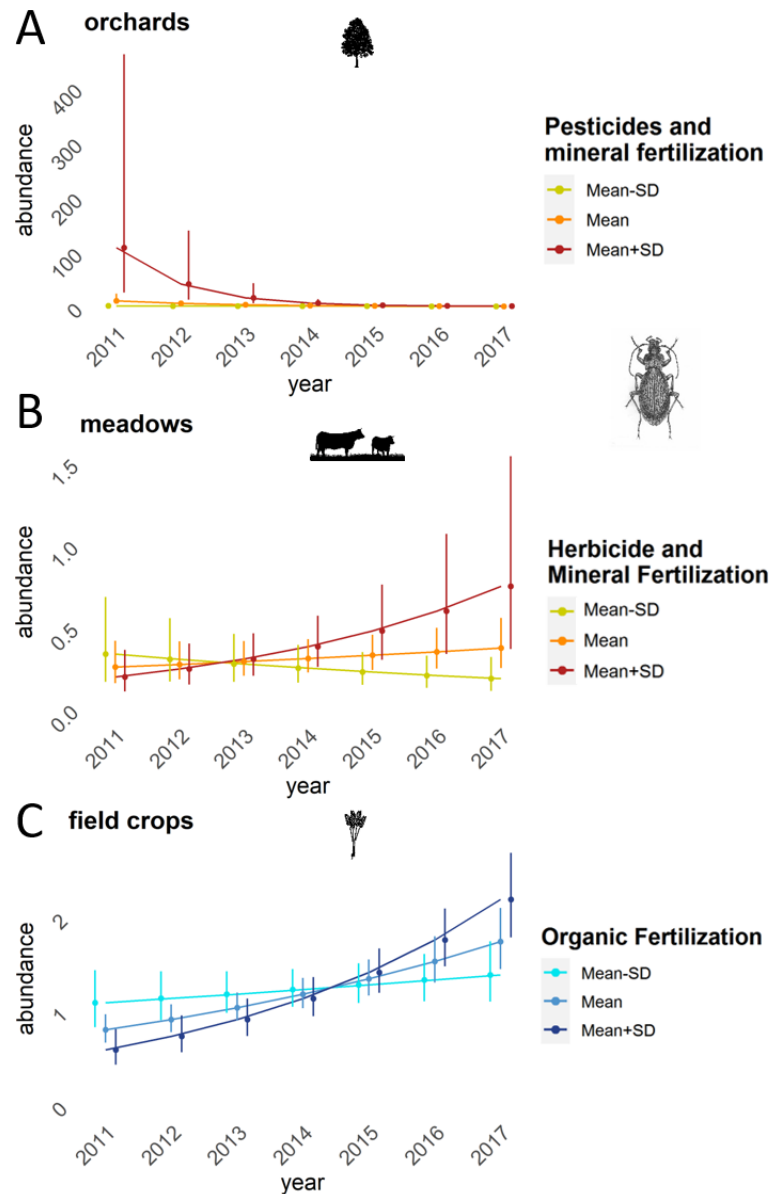


Figure S13-A. Illustration of significant interactions of landscape/practices (using PCA coordinates) variables with the year effect, for models of temporal trends in abundance of beetles. Trends are shown for three contrasting values of the practice/landscape variable, from fields with a high level of use or high proximity to a landscape structure (darker line: mean plus one standard deviation) to fields with an average (medium line: mean) or low level (lighter line: mean minus one standard deviation). Other terms are at their mean (quantitative terms) or representative levels (qualitative terms). Predicts are computed from models using PCA coordinates as proxy for practices.

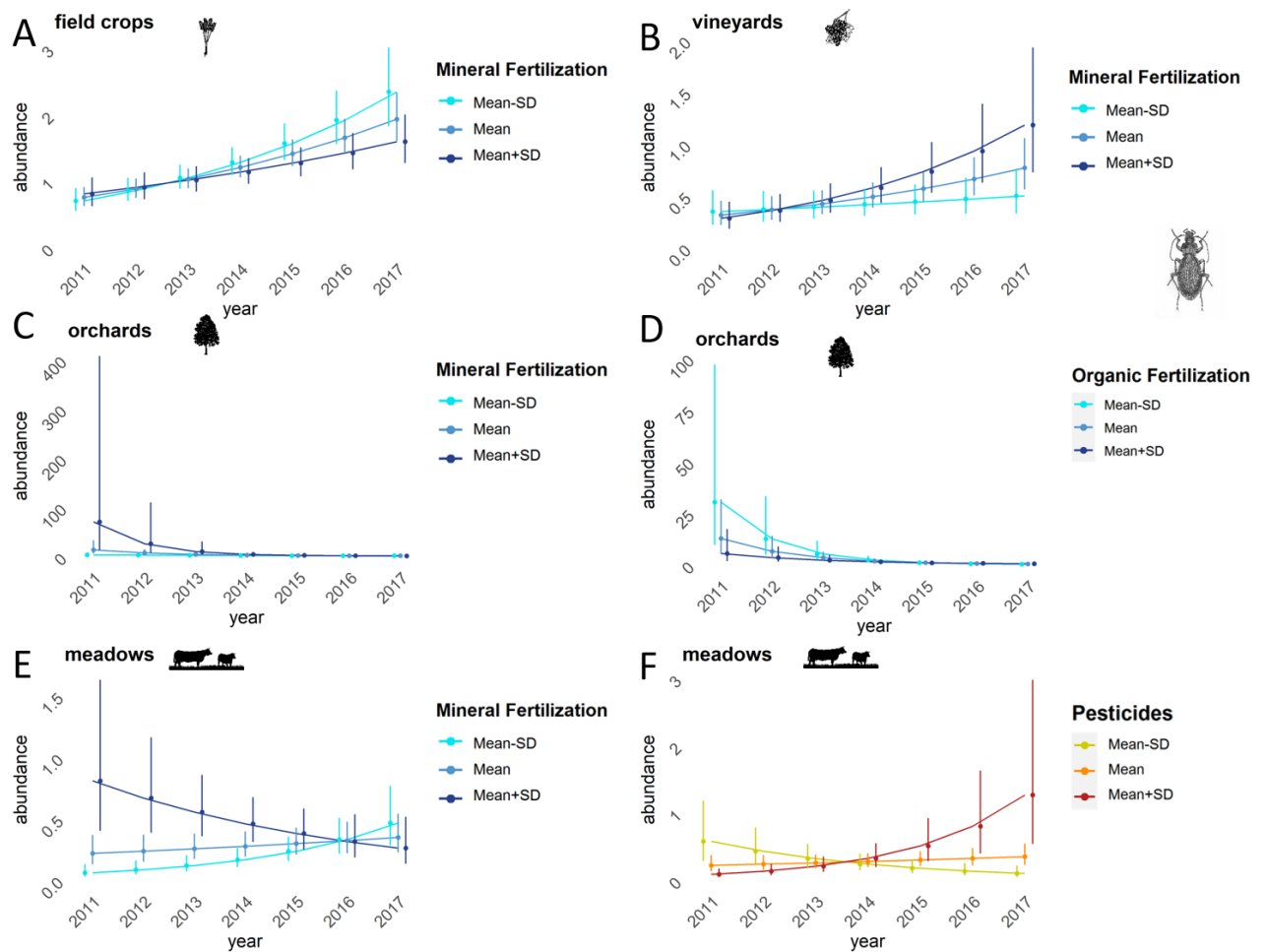


Figure S13-B. Illustration of significant interactions of landscape/practices (using the total number of applications) variables with the year effect, for models of temporal trends in abundance of beetles. Trends are shown for three contrasting values of the practice/landscape variable, from fields with a high level of use or high proximity to a landscape structure (darker line: mean plus one standard deviation) to fields with an average (medium line: mean) or low level (lighter line: mean minus one standard deviation). Other terms are at their mean (quantitative terms) or representative levels (qualitative terms). Predicts are computed from models using the total number of applications as proxy for practices.

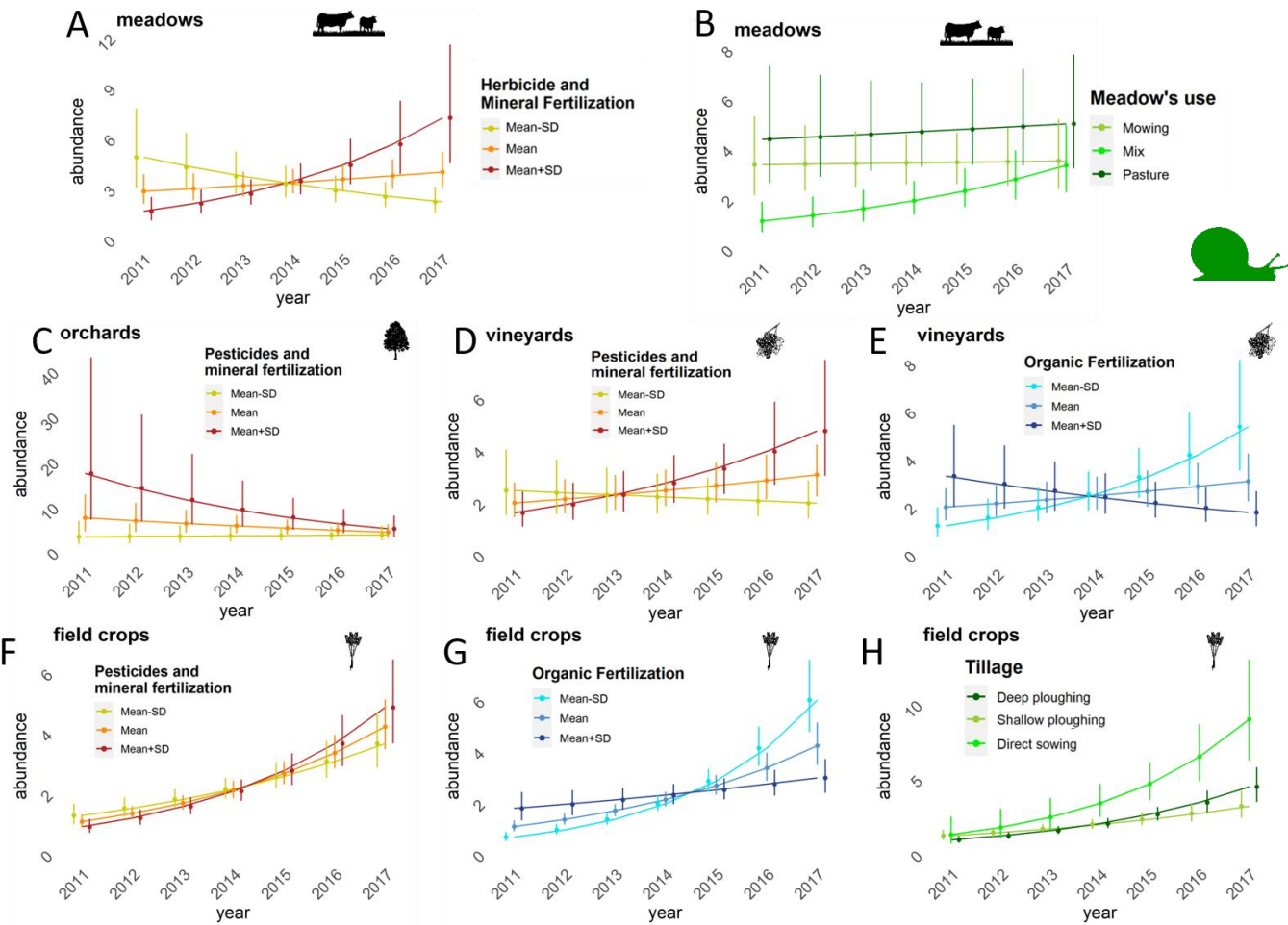


Figure S14-A. Illustration of significant interactions of landscape/practices (using PCA coordinates)

variables with the year effect, for models of temporal trends in abundance of molluscs. Trends are shown for three contrasting values of the practice/landscape variable, from fields with a high level of use or high proximity to a landscape structure (darker line: mean plus one standard deviation) to fields with an average (medium line: mean) or low level (lighter line: mean minus one standard deviation). Other terms are at their mean (quantitative terms) or representative levels (qualitative terms). Predicts are computed from models using PCA coordinates as proxy for practices.

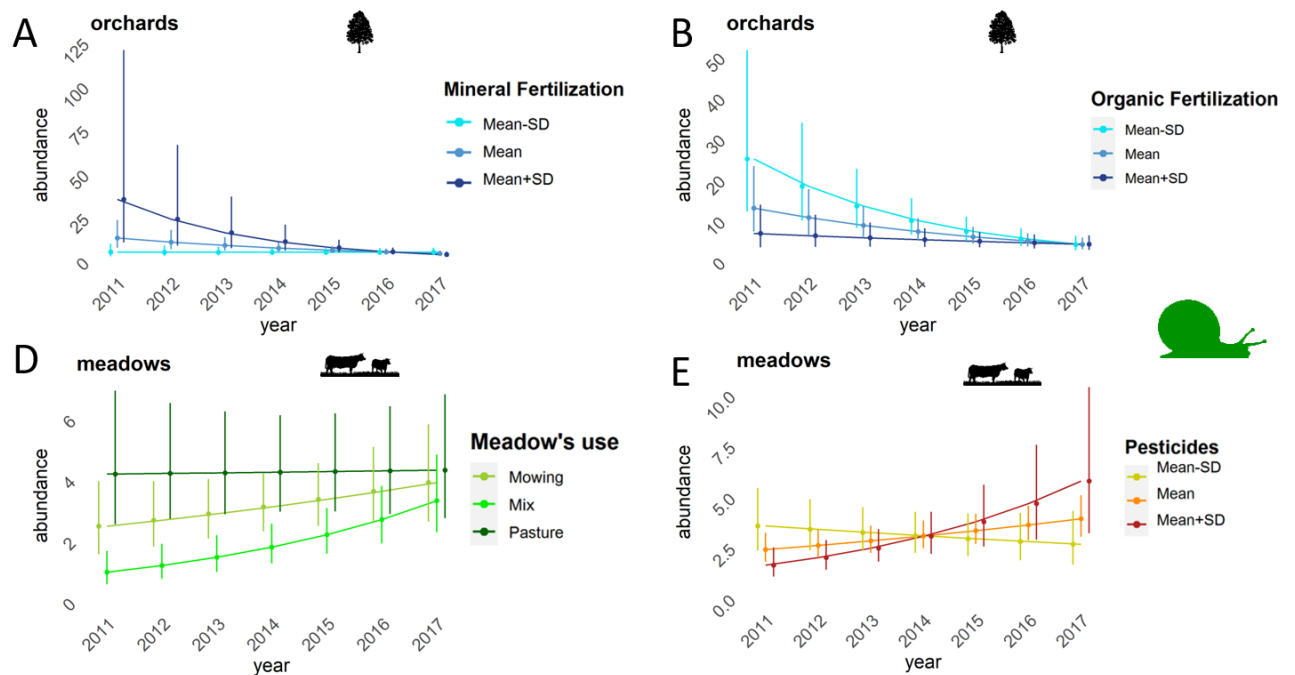


Figure S14-B. Illustration of significant interactions of landscape/practices (using the total number of applications) variables with the year effect, for models of temporal trends in abundance of molluscs. Trends are shown for three contrasting values of the practice/landscape variable, from fields with a high level of use or high proximity to a landscape structure (darker line: mean plus one standard deviation) to fields with an average (medium line: mean) or low level (lighter line: mean minus one standard deviation). Other terms are at their mean (quantitative terms) or representative levels (qualitative terms). Predicts are computed from models using the total number of applications as proxy for practices.