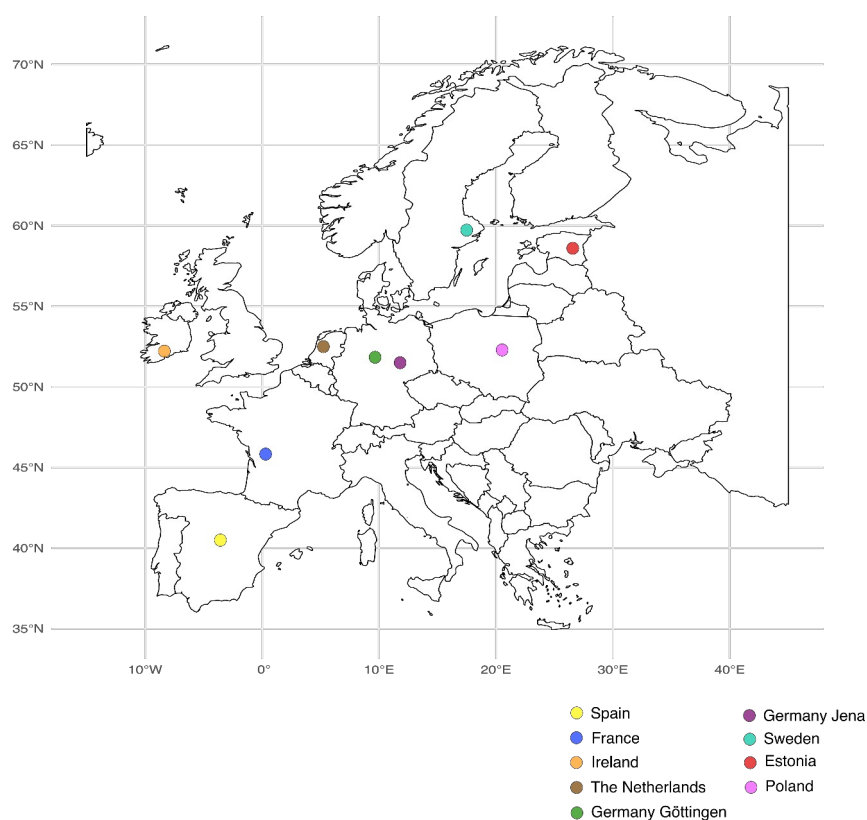


Supplementary information

Agricultural intensification degrades arable weed diversity into phylogenetically unstructured subsets of tolerant species

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Figure S1. Map showing the areas ($30 \times 30 \text{ km}^2$ or $50 \times 50 \text{ km}^2$) within European countries where the sampled farms are distributed.



b)

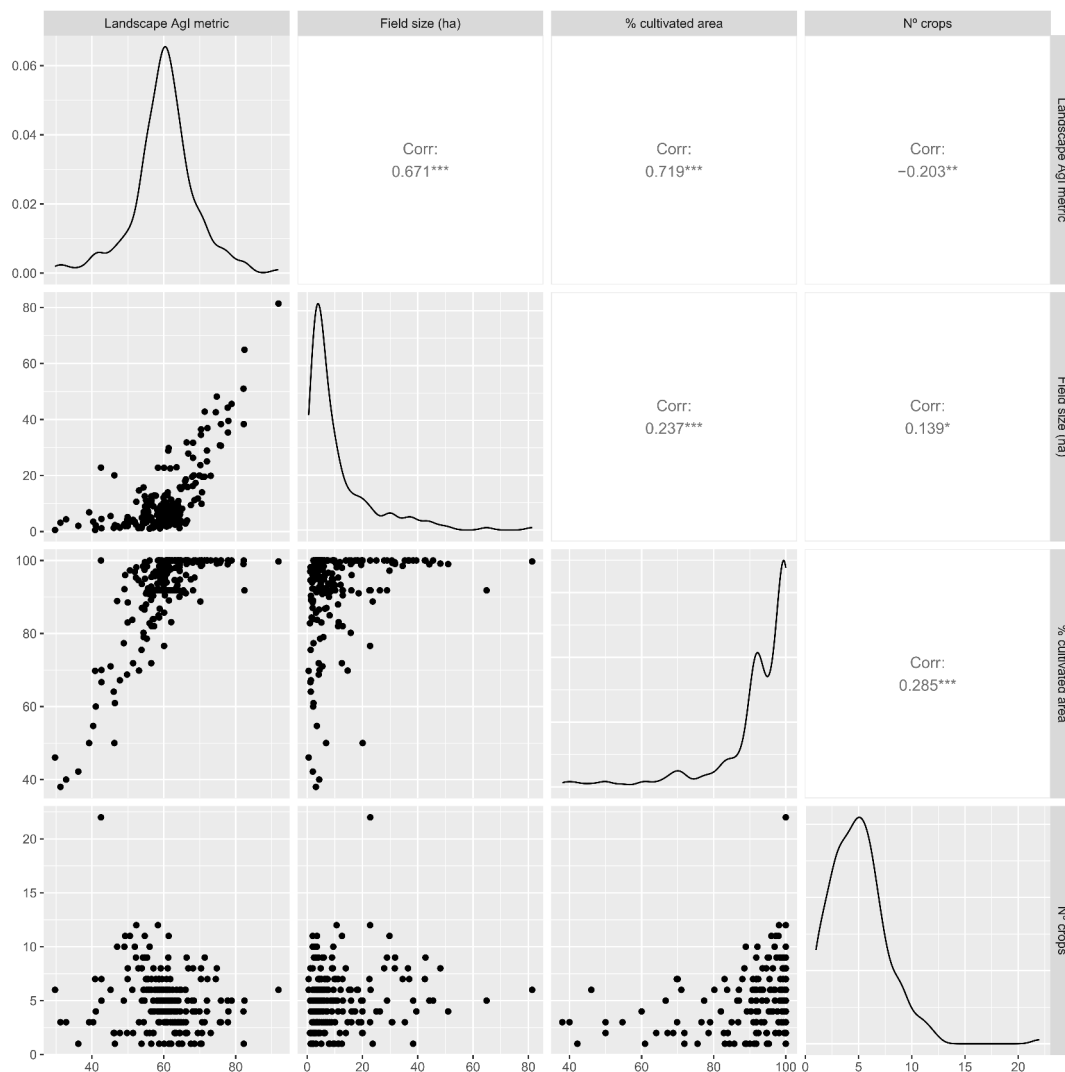


Table S2. Strength (Pearson r) of the positive relationships between taxonomic and phylogenetic beta diversity among arable weed assemblages in each region —turnover, nestedness, and their additive effect (total dissimilarity)— based on the 1 – Sørensen and 1 – PhyloSor dissimilarity indices, respectively. All tests were significant at the 0.1% nominal alpha ($p < 0.001$ for all cases).

	Pearson r		
	Turnover	Nestedness	Total dissimilarity
Estonia	0.791	0.906	0.825
France	0.702	0.838	0.741
Germany Göttingen	0.754	0.867	0.911
Germany Jena	0.727	0.826	0.826
Ireland	0.714	0.859	0.717
Netherlands	0.706	0.805	0.852
Poland	0.745	0.872	0.856
Spain	0.576	0.568	0.672
Sweden	0.580	0.749	0.552

Table S3. Mean pairwise taxonomic and phylogenetic beta diversity among arable weed assemblages in each region —turnover (β_{sim} , $\beta_{phy-sim}$), nestedness (β_{nes} , $\beta_{phy-nes}$), and their additive effect (β_{sor} , $\beta_{phy-sor}$)— based on the 1 – Sorensen and 1 – PhyloSor dissimilarity indices, respectively.

	Taxonomic beta diversity			Phylogenetic beta diversity		
	β_{sim}	β_{nes}	β_{sor}	$\beta_{phy-sim}$	$\beta_{phy-nes}$	$\beta_{phy-sor}$
Estonia	0.281	0.208	0.489	0.141	0.162	0.303
France	0.534	0.124	0.658	0.292	0.166	0.457
Germany Göttingen	0.340	0.181	0.522	0.156	0.158	0.314
Germany Jena	0.442	0.156	0.598	0.212	0.153	0.365
Ireland	0.457	0.128	0.585	0.295	0.122	0.418
Netherlands	0.316	0.139	0.454	0.13	0.104	0.233
Poland	0.390	0.161	0.551	0.194	0.168	0.362
Spain	0.420	0.117	0.538	0.263	0.113	0.376
Sweden	0.315	0.095	0.410	0.118	0.076	0.194

Table S4. Strength (Pearson r), direction (sign), and statistical significance (p-values) of the relationships between (i) standardized phylogenetic beta diversity (SES scores) among arable weed assemblages (farm-level) within each region —turnover ($\beta_{\text{phy-sim}}$), nestedness ($\beta_{\text{phy-nes}}$), and their additive effect ($\beta_{\text{phy-sor}}$)— and (ii) differences in agricultural intensification (AgI index) among farms, measured through both in-field and landscape indicators. Phylogenetic beta diversity was computed using the 1 – PhyloSor dissimilarity index, while Euclidean distance was used to compute differences in AgI. SES scores were derived from 999 randomizations of the phylogenetic relationships of the species in each region. Significant relationships at the 5% nominal alpha level are indicated in bold.

	In-field						Landscape					
	$\beta_{\text{phy-sim}}$		$\beta_{\text{phy-nes}}$		$\beta_{\text{phy-sor}}$		$\beta_{\text{phy-sim}}$		$\beta_{\text{phy-nes}}$		$\beta_{\text{phy-sor}}$	
	r	p-value	r	p-value	r	p-value	r	p-value	r	p-value	r	p-value
Estonia	0.037	0.287	-0.039	0.721	-0.008	0.567	0.190	0.017	-0.153	0.968	0.040	0.329
France	-0.078	0.789	0.166	0.033	0.102	0.161	0.211	0.012	-0.050	0.726	0.197	0.023
Germany Göttingen	0.157	0.089	-0.162	0.954	0.012	0.469	-0.067	0.706	0.022	0.388	-0.104	0.735
Germany Jena	-0.057	0.730	0.073	0.221	0.019	0.385	-0.070	0.712	0.210	0.088	0.183	0.051
Ireland	0.051	0.301	-0.129	0.913	-0.043	0.670	-0.116	0.747	-0.253	0.989	-0.314	0.959
Netherlands	-0.230	0.936	0.376	0.060	0.015	0.458	0.119	0.197	-0.019	0.461	0.099	0.269
Poland	-0.012	0.536	0.015	0.394	0.008	0.461	-0.167	0.923	0.141	0.104	-0.067	0.731
Spain	0.071	0.254	0.089	0.163	0.233	0.011	-0.064	0.742	-0.005	0.476	-0.091	0.843
Sweden	0.038	0.287	-0.04	0.685	0.003	0.461	0.048	0.257	0.078	0.236	0.115	0.190