

Table S2 Decomposition of marginal correlation (r_M) by genotypic (r_G), genotype $\times$ environment interaction ($r_{G \times E}$), environmental (r_E) and residual (r_{Res}) effects, where r_p is the Pearson sample correlation coefficient, sign its significance level, n number of total observations and n_G number of genotypes. Correlation coefficients are based on years 1995–2021. NUE for grain peas were not listed as they received no regular nitrogen fertilizer.

		WW	WWORG	WR		SW	SB	WOSR	Mean
				Hyb	Pop				
Observations	n	19089	842	4730	1564	3867	13318	21564	
Genotypes	n_G	682	31	212	40	108	543	797	
NYLD with NYLD _{NUE}	r_P	0.61	0.52	0.41	0.49	0.62	0.83	0.35	0.55
	sign	***	***	***	***	***	***	***	
	r_G	1.00	1.03	1.01	1.02	1.00	1.00	1.00	1.01
	$r_{G \times E}$	0.98	0.93	1.00	0.88	0.98	0.99	0.93	0.96
	r_E	0.59	0.48	0.42	0.44	0.68	0.83	0.33	0.54
	r_{Res}	0.98	0.93	0.89	0.96	0.98	0.99	0.92	0.95
	r_M	0.63	0.51	0.44	0.46	0.70	0.84	0.37	0.57
GYLD with GYLD _{NUE}	r_P	0.63	0.41	0.45	0.46	0.66	0.81	0.35	0.54
	sign	***	***	***	***	***	***	***	
	r_G	1.00	not est	0.99	not est	1.00	1.00	1.00	1.00
	$r_{G \times E}$	0.97	not est	0.96	not est	0.99	0.99	0.96	0.97
	r_E	0.61	not est	0.41	not est	0.71	0.80	0.30	0.57
	r_{Res}	0.98	not est	0.93	not est	0.98	0.99	0.92	0.96
	r_M	0.65	not est	0.44	not est	0.73	0.81	0.35	0.60
OYLD with OYLD _{NUE}	r_P							0.56	
	sign							***	
	r_G							0.99	
	$r_{G \times E}$							0.97	
	r_E							0.51	
	r_{Res}							0.96	
	r_M							0.56	

WW Winter wheat; WWORG Winter wheat under organic testing regimen; WR Winter rye; Hyb Hybrid varieties; Pop Population varieties; WOSR Winter oil seed rape; SW spring wheat; SB Spring barley; PEAS Grain peas; NYLD Nitrogen yield in grain; GPC Grain protein concentration; GYLD Grain yield; OYLD Oil yield; GOC Grain oil concentration; NYLD_{NUE} Nitrogen use efficiency for nitrogen yield in grain; GYLD_{NUE} Nitrogen use efficiency for grain yield; OYLD_{NUE} Nitrogen use efficiency for oil yield; *not est* not estimable; G Genotype; Y Year; L Location; Y $\times$ L $\times$ T Interaction of trials within Y $\times$ L; G $\times$ E Genotype $\times$ environment interaction (G $\times$ E= G $\times$ Y+G $\times$ L); E Environment (E=Y+L+Y $\times$ L $\times$ T); Res Residual;