

Table S5a. AICc values for each of the mixed effects models fitted between the glutenin to gliadin ratio and different measures of weed community structure (WCM): PCA3, axis from a principal component analysis on weed community composition; Biovolume, biovolume of the whole weed community; S, weed species richness; J, Pielou index; CWM community weighted mean of eight traits: height, specific leaf area (SLA), seed mass, growth form, functional type, life form, month of flowering onset and flowering duration. AICc values in bold show the model selected for parameter estimation in each case. Models compared have different complexity ranging from a pure abiotic model (only management and climatic variables) to models including a weed community structure measure and their interactions with abiotic factors.

							CWM	CWM	CWM	CWM	CWM	CWM
Models	df	Biovolume	S	J	CWM height	CWM SLA	seed mass	growth form	funct. type	life form	flw. onset	flw. durat.
M0: Abiotic factors	6	-278.3	-278.3	-278.3	-277.6	-276.9	-277.6	-278.3	-278.3	-278.3	-278.3	-278.3
M1: Abiotic factor (preceding crop) + PCA 3	7	-280.9	-280.9	-280.9	-280.4	-279.5	-280.4	-280.9	-280.9	-280.9	-280.9	-280.9
M2: Abiotic factors + weed community metric (WCM)	8	-278.9	-281.8	-279.4	-278.6	-278.0	-280.1	-279.7	-278.9	-280.0	-279.3	-279.0
M3: M2 + WCM x preceding crop	9	-277.0	-280.2	-277.4	-277.3	-276.4	-278.7	-277.9	-278.7	-278.6	-277.9	-277.2
M4: M2+ WCM x fertilization	9	-277.1	-279.8	-277.5	-277.3	-276.2	-278.1	-278.9	-277.3	-278.2	-277.5	-277.3
M5: M2 + WCM x preceding crop + WCM x fertilization	10	-275,5	-278.3	-275.6	-276.2	-275.3	-276.9	-277.0	-277.8	-276.8	-276.0	-275.4

Table S5b. AICc values for each of the mixed effects models fitted between the glutenin to gliadin ratio and different measures of weed community structure (WCM): PCA3, axis from a principal component analysis on weed community composition; FDis functional dispersion of eight traits: height, specific leaf area (SLA), seed mass, growth form, functional type, life form, month of flowering onset and flowering duration. AICc values in bold show the model selected for parameter estimation in each case. Models compared have different complexity ranging from a pure abiotic model (only management and climatic variables) to models including a weed community structure measure and their interactions with abiotic factors.

Models	df	FDis height	FDis SLA	FDis seed mass	FDis growth form	FDis funct. type	FDis life form	FDis flw. onset	FDis flw. durat.
M0: Abiotic factors	6	-277.6	-276.9	-277.6	-278.3	-278.3	-278.3	-278.3	-278.3
M1: Abiotic factor (preceding crop) + PCA 3	7	-280.4	-279.5	-280.4	-280.9	-280.9	-280.9	-280.9	-280.9
M2: Abiotic factors + weed community metric (WCM)	8	-278.4	-277.7	-278.7	-283.2	-278.9	-279.9	-280.5	-279.3
M3: M2 + WCM x preceding crop	9	-280.1	-276.6	-277.8	-281.4	-277.3	-278.0	-279.6	-278.7
M4: M2+ WCM x fertilization	9	-276.5	-276.1	-276.7	-285.5	-277.0	-278.1	-278.9	-277.4
M5: M2 + WCM x preceding crop + WCM x fertilization	10	-279.2	-274.6	-276.0	-283.9	-275.3	-276.2	-279.3	-278.5