

Table S1 Agronomic variables recorded in each accession

Variable	Class
Growth habit	Prostrate
	Intermediate
	Erect
Spike density	Lax
	Intermediate
	Dense
	Very dense
Glume hairiness	Hairless
	Low
	High
Seed colour	White
	Red
Days to heading	days
Days to maturity	days
Plant height	cm

Table S2 Ecogeographic variables considered in the characterization of the durum wheat accessions obtained from various sources compiled by CAPFITOGEN [36]

Ecogeographic component	Description	Abbreviation	Unit
Bioclimatic	Monthly precipitation (January to June)	prec_1 to 12	mm
	Monthly mean temperature (January to June)	tmean_1 to 12	°C
	Monthly minimum temperature (January to June)	tmin_1 to 12	°C
	Monthly maximum temperature (January to June)	tmax_1 to 12	°C
	Annual mean temperature	bio_1	°C
	Mean daily temperature range (Mean monthly (max temp - min temp))	bio_2	°C
	Isothermality (bio_2/bio_7) (* 100)	bio_3	-
	Temperature seasonality (standard deviation *100)	bio_4	-
	Maximum temperature of hottest month	bio_5	°C
	Minimum temperature of coldest month	bio_6	°C
	Annual temperature range (BIO5-BIO6)	bio_7	°C
	Mean temperature of wettest quarter	bio_8	°C
	Mean temperature of driest quarter	bio_9	°C
	Mean temperature of of hottest quarter	bio_10	°C
	Mean temperature of coldest quarter	bio_11	°C
	Annual precipitation	bio_12	mm
	Precipitation of wettest month	bio_13	mm
	Precipitation of driest month	bio_14	mm
	Precipitation seasonality (Coefficient of variation)	bio_15	mm
Geophysic	Precipitation of wettest quarter	bio_16	mm
	Precipitation of driest quarter	bio_17	mm
	Precipitation of hottest quarter	bio_18	mm
	Precipitation of coldest quarter	bio_19	mm
Geophysic	Northness (1 if it faces northwards, - 1 if it faces southwards)	northness	°
	Eastness (1 if it faces eastwards, - 1 if it faces westwards)	eastness	°
	Altitude	Meters above sea level	m
Edaphic	Topsoil clay fraction	t_clay	% weight
	Topsoil sand fraction	t_sand	% weight
	Subsoil clay content	s_clay	% weight
	Topsoil pH (H2O)	t_pH	-log(H+)
	Topsoil reference bulk density	t_ref_bulk	% weight

Table S4. Means of the ecogeographic variables (see Table S2) ordered according to their significant differences ($p < 0.05$) between resistant and susceptible accessions at the seedling stage for durum and rivet wheat and the durum wheat isolates CDJ13 and JD15.

	Variable	Resistant	Susceptible		Variable	Resistant	Susceptible
CDJ13	bio_3	39.81	38.06	JDJ15	bio_4	517.84	604.29
					bio_7 (°C)	24.74	28.65
					prec_10 (mm)	72.82	57.09
					prec_11 (mm)	84.98	58.08
					bio_13 (mm)	90.36	67.58
					bio_16 (mm)	240.66	183.34
					prec_12 (mm)	77.77	56.08
					bio_12 (mm)	666.87	515.08
					bio_2 (°C)	9.81	11.02
					prec_1 (mm)	66.89	48.38
					tmax_7 (°C)	28.14	31.1
					bio_19 (mm)	205.9	151.7
					bio_5 (°C)	28.34	31.14
					tmax_8 (°C)	28.15	30.67
					tmean_7 (°C)	22.09	23.99
					prec_2 (mm)	61.23	47.24

CDJ13 = Conil Don Jaime 13, JDJ15 = Jerez Don José 15

Table S5. The top 30 bioclimatic variables (see Table S2) selected according to the mean decrease accuracy of the random forest approach for durum and rivet wheat within each durum wheat isolate at seedling stage

CDJ13			JDJ15		
Rank	Variable	Mean Decrease Accuracy	Variable	Mean Decrease Accuracy	
1	bio_7	5.30233067	tmax_2	4.45490475	
2	tmax_4	5.17994035	tmean_6	4.16368382	
3	tmax_3	5.03425128	tmin_10	3.48247218	
4	tmax_2	4.38994382	bio_7	3.39956819	
5	tmin_2	4.15461625	bio_4	3.30975429	
6	tmean_12	3.92759112	tmean_12	3.23338353	
7	bio_6	3.76139364	bio_9	3.04426391	
8	tmean_7	3.69923181	tmean_7	2.87114511	
9	tmax_11	3.56377142	bio_6	2.72896835	
10	prec_5	3.54596173	tmin_11	2.72046668	
10	tmin_11	3.53319868	tmax_3	2.58608051	
12	bio_3	3.45237053	bio_11	2.56613457	
13	bio_1	3.44873951	bio_14	2.53392420	
14	bio_10	3.40607393	bio_10	2.50170070	
15	tmean_9	3.40515664	tmax_1	2.46955699	
16	tmin_3	3.34486632	tmean_2	2.42023781	
17	tmean_1	3.07005245	tmean_9	2.37305829	
18	tmin_5	3.0636663	tmean_10	2.24040721	
19	tmean_6	3.01543877	tmax_12	2.17069374	
20	tmean_3	2.94806925	tmin_12	2.15754949	
21	tmean_2	2.87234877	prec_8	2.09719666	
22	tmin_4	2.84632914	bio_3	1.96370300	
23	tmax_9	2.78232624	tmean_1	1.87249886	
24	tmean_11	2.74680487	tmin_1	1.71945734	
25	tmax_8	2.64620401	tmax_11	1.71006941	
26	tmax_10	2.56995017	tmin_2	1.70218733	
27	prec_10	2.5347136	tmean_4	1.70043699	
28	tmean_10	2.51797508	prec_11	1.69398532	
29	tmax_7	2.47562172	tmin_7	1.66690528	
30	tmean_4	2.41897386	tmax_4	1.62293943	

CDJ13 = Conil Don Jaime 13, JDJ15 = Jerez Don José 15

Table S7. Means of the ecogeographic variables (see Table S2) ordered according to their significant differences ($p < 0.05$) between resistant and susceptible accessions based on their Severity values at adult stage in field plots for durum and rivet wheat.

Ecogeographic variable	Resistant	Susceptible
bio_7 (°C)	24.77	28.86
bio_2 (°C)	9.94	11.12
prec_10 (mm)	71.07	57.46
bio_3	39.9	38.1

Table S9 Pearson's correlation ($p < 0.05$) between uredinium size (U_rS) and ecogeographic variables (see Table S2) in the tetraploid accessions (n = 40) evaluated for partial disease resistance to the CDJ13 isolate at seedling stage

variable	variable	r value	p-value
U _r S	bio_1	0.31	0.049
	tmean_4	0.33	0.040
	tmean_5	0.33	0.040
	tmean_6	0.32	0.043
	tmean_9	0.32	0.045
	tmax_4	0.32	0.047
	tmax_5	0.32	0.046
	tmin_3	0.32	0.046
	tmin_4	0.32	0.044
	tmin_5	0.31	0.049
	tmin_6	0.32	0.047
	tmin_9	0.32	0.041
	tmin_10	0.32	0.044
	tmin_11	0.32	0.045

CDJ13 = Conil Don Jaime 13

Table S10 Mean values and standard deviations for each subspecies of the most relevant ecogeographic variables (see Table S2) significantly different between resistant and susceptible groups

Variable	Subspecies	n	Mean	S.D.
bio_2 (°C)	domesticated emmer wheat	10	10.34	1.04
	rivet	18	10.48	1.53
	durum	56	11.22	1.05
bio_3	domesticated emmer wheat	10	40.60	2.01
	rivet	18	39.31	2.51
	durum	56	37.88	1.51
bio_4	domesticated emmer wheat	10	516.07	87.84
	rivet	18	553.79	88.6
	durum	56	615.98	51.16
bio_7 (°C)	domesticated emmer wheat	10	25.28	3.62
	rivet	18	26.46	4.07
	durum	56	29.27	2.61
prec_10 (mm)	domesticated emmer wheat	10	78.35	19.55
	rivet	18	63.09	17.96
	durum	56	56.87	12.65
prec_11 (mm)	domesticated emmer wheat	10	97.43	34.43
	rivet	18	66.53	30.47
	durum	56	60.4	20.85

Eliminado: domesticated emmer

Eliminado: domesticated emmer

Eliminado: domesticated emmer

Eliminado: domesticated emmer

Eliminado: domesticated emmer

Eliminado: domesticated emmer