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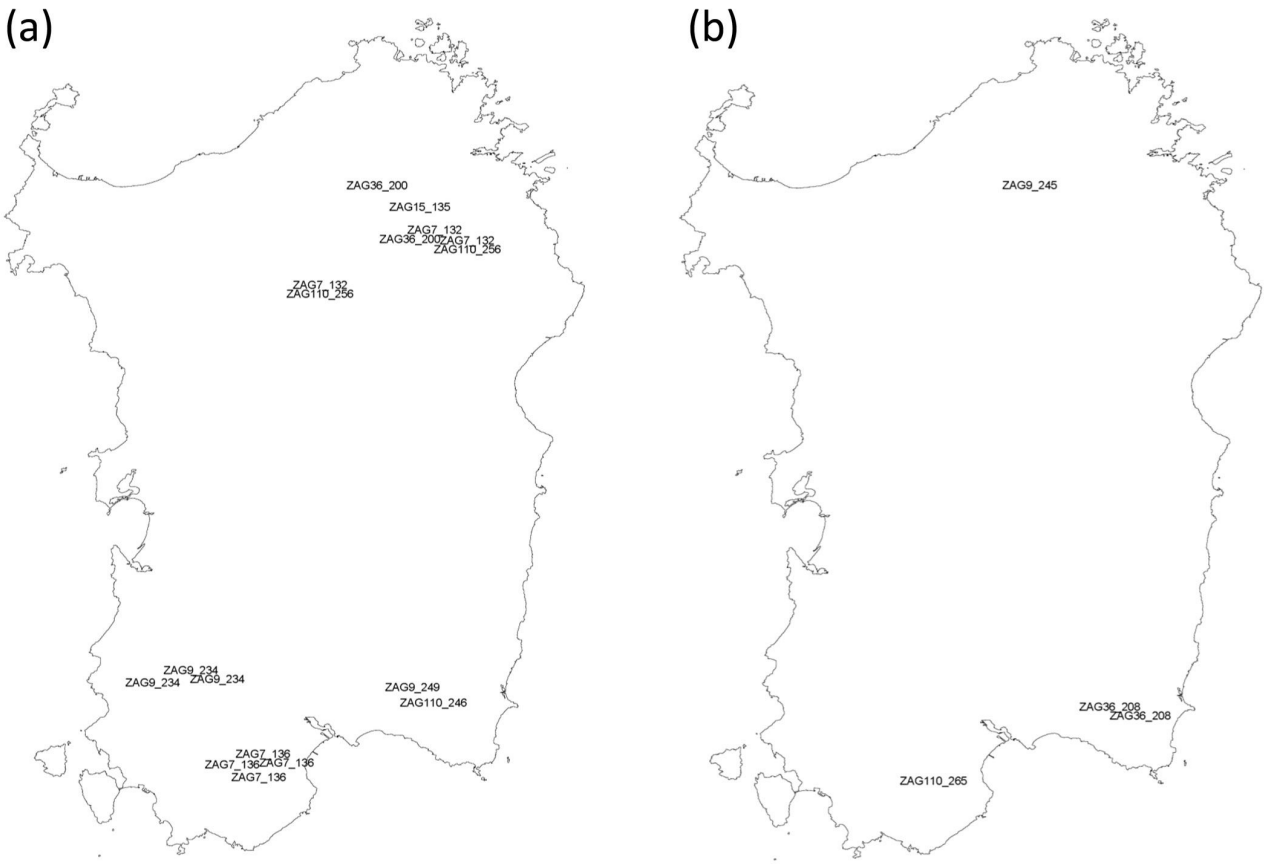
Supplementary Material

Fig. S1 - Map of the distribution of (a) frequent alleles with local distribution; (b) rare alleles with local distribution.



Tab. S1 - List of the 36 climatic variables used by the ClimateEU software.

Annual variables		
Directly calculated		
1	MAT	mean annual temperature (°C),
2	MWMT	mean warmest month temperature (°C),
3	MCMT	mean coldest month temperature (°C),
4	TD	temperature difference between MWMT and MCMT, or continentality (°C),
5	MAP	mean annual precipitation (mm),
6	MSP	mean summer (May to Sept.) precipitation (mm),
7	AHM	annual heat:moisture index (MAT+10)/(MAP/1000))
8	SHM	summer heat:moisture index ((MWMT)/(MSP/1000))
Derived		
9	DD<0	degree-days below 0 °C, chilling degree-days
10	DD>5	degree-days above 5 °C, growing degree-days
11	DD<18	degree-days below 18 °C, heating degree-days
12	DD>18	degree-days above 18 °C, cooling degree-days
13	NFFD	the number of frost-free days
14	bFFP	the Julian date on which FFP begins
15	eFFP	the Julian date on which FFP ends
16	FFP	frost-free period
17	PAS	precipitation as snow (mm) between August in previous year and July in current year
18	EMNT	extreme minimum temperature over 30 years
19	Eref	Hargreaves reference evaporation
20	CMD	Hargreaves climatic moisture deficit
Seasonal variables		
21	Tmax_wt	winter mean maximum temperature (°C)
22	Tmax_sp	spring mean maximum temperature (°C)
23	Tmax_sm	summer mean maximum temperature (°C)
24	Tmax_at	autumn mean maximum temperature (°C)
25	Tmin_wt	winter mean minimum temperature (°C)
26	Tmin_sp	spring mean minimum temperature (°C)
27	Tmin_sm	summer mean minimum temperature (°C)
28	Tmin_at	autumn mean minimum temperature (°C)
29	Tave_wt	winter (Dec.(prev. yr) - Feb.) mean temperature (°C)
30	Tave_sp	spring (Mar. - May) mean temperature (°C)
31	Tave_sm	summer (Jun. - Aug.) mean temperature (°C)
32	Tave_at	autumn (Sep. - Nov.) mean temperature (°C)
33	PPT_wt	winter precipitation (mm)
34	PPT_sp	spring precipitation (mm)
35	PPT_sm	summer precipitation (mm)
36	PPT_at	autumn precipitation (mm)

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Tab. S2 - Maximum, minimum, average and CV for all climatic variables for each region of provenance (RoP). Details of the labels are reported in Tab. S1.

Label	RoP1 North				RoP2 West				RoP3 South-east				RoP4 Central			
	max	min	mean	cv	max	min	mean	cv	max	min	mean	cv	max	min	mean	cv
Tmax_wt	14.6	12.4	8.9	10.2	15.0	9.7	12.6	9.8	15.5	10.2	13.4	9.1	11.6	3.2	9.0	12.5
Tmax_sp	19.2	17.4	14.6	5.7	19.7	15.6	18.1	4.9	19.9	15.5	18.4	5.7	17.0	9.0	14.7	7.8
Tmax_sm	29.2	27.5	25.0	2.9	29.9	26.8	28.7	2.0	31.0	26.6	29.2	2.7	28.3	21.4	26.3	3.9
Tmax_at	23.0	21.0	17.9	5.2	23.6	19.1	21.7	4.6	23.7	19.2	22.2	4.7	20.7	12.6	18.2	6.3
Tmin_wt	8.7	6.1	3.7	16.3	7.4	3.3	5.6	16.1	8.9	3.7	6.0	18.3	4.4	-2.2	2.9	32.7
Tmin_sp	11.4	9.7	7.4	9.1	10.8	6.9	9.2	8.9	11.7	7.4	9.5	9.7	8.2	1.6	6.7	13.8
Tmin_sm	19.9	18.3	16.2	3.9	19.3	15.8	17.8	4.1	20.8	16.4	18.4	5.1	17.2	11.4	15.9	4.7
Tmin_at	15.8	13.6	11.2	6.9	14.9	10.9	13.2	6.7	16.3	11.5	13.6	7.4	12.0	5.5	10.5	8.6
Tave_wt	11.2	9.3	6.3	11.9	11.0	6.7	9.1	11.5	12.2	7.1	9.7	11.1	7.7	0.5	5.9	17.2
Tave_sp	15.1	13.6	11.0	6.7	15.1	11.3	13.7	6.2	15.7	11.5	13.9	6.5	12.3	5.3	10.7	9.5
Tave_sm	24.5	22.9	20.6	3.0	24.4	21.3	23.3	2.7	25.1	21.8	23.8	2.8	22.6	16.4	21.1	4.0
Tave_at	19.0	17.3	14.6	5.7	19.2	15.1	17.4	5.3	20.0	15.4	17.9	5.2	16.1	9.1	14.4	7.0
PPT_wt	256	184	138	12.1	316	168	220	12.9	211	84	150	17.5	325	147	256	12.6
PPT_sp	195	133	93	13.4	224	105	151	12.9	149	53	105	19.5	260	100	190	14.7
PPT_sm	73	44	24	22.7	68	21	39	25.4	59	15	32	26.2	96	32	64	12.5
PPT_at	267	206	164	10.5	299	177	236	9.3	218	121	171	11.7	303	161	237	11.2
MAT	17.4	15.8	13.1	5.8	17.4	13.7	15.9	5.4	18.2	14.0	16.3	5.5	14.7	7.8	13.0	7.4
MWMT	25.7	24.0	21.7	2.8	25.6	22.5	24.5	2.5	26.5	23.1	25.1	2.7	23.9	17.8	22.3	3.7
MCMT	10.7	8.8	5.7	12.7	10.7	6.3	8.7	12.1	11.7	6.7	9.3	11.5	7.3	-0.1	5.5	19.2
TD	16.7	15.2	13.9	4.2	16.9	14.5	15.8	3.4	16.8	14.7	15.8	2.8	18.0	15.8	16.9	1.9
MAP	778	568	433	11.1	903	471	645	11.6	619	274	458	15.5	952	447	747	11.9
MSP	173	123	98	11.7	174	92	122	13.1	139	75	104	12.3	225	108	162	10.0
AHM	63	46	31	13.6	57	27	41	14.0	103	40	59	20.4	54	19	31	15.4
SHM	261	198	131	13.4	278	134	206	15.2	353	169	246	14.5	213	81	140	12.9
DD<0	9.0	1.7	0.0	109.3	7.0	0.0	2.0	87.0	6.0	0.0	1.2	127.2	169.0	4.0	14.5	88.6
DD>5	4587	4009	3061	8.1	4592	3260	4050	7.5	4892	3373	4212	7.6	3626	1690	3040	10.3
DD<18	2108	1443	1080	16.6	1996	1082	1450	15.0	1942	912	1353	16.2	3749	1776	2198	12.1
DD>18	878	657	383	14.0	883	470	721	12.3	1013	519	791	13.1	610	87	439	18.7
NFFD	365	359	344	1.4	365	340	357	1.4	365	344	358	1.3	350	250	335	3.6
bFFP	35	8	0	103.2	47	0	15	60.8	41	0	13	65.7	119	26	51	30.0
eFFP	361	356	345	1.0	360	343	355	1.0	361	346	356	0.9	349	299	339	2.1
FFP	361	348	310	3.6	360	296	339	3.8	361	305	343	3.4	323	180	288	7.8
PAS	6	2	0	62.5	7	1	2	57.8	3	0	1	64.8	126	3	10	83.4
EMNT	0.9	-5.3	-10.5	-38.5	-1.9	-10.9	-6.2	-31.9	1.7	-10.2	-5.4	-47.2	-8.4	-22.0	-11.8	-15.9
Eref	974	885	774	4.4	1051	872	974	3.2	1113	862	995	5.4	990	687	863	5.2
CMD	582	492	371	9.0	650	432	552	7.7	724	477	625	7.9	584	277	428	10.7

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Tab. S3 - Mean values of the climatic variables (Var) for the ten studied populations (Pop). Details of the labels are reported in Tab. S1. N and E: latitude and longitude; Alt is the altitude (m) as reported in Tab. 1.

Var/Pop	LIM	MOL	TER	LIT	FIO	BAR	MAN	MAR	SET	SUL
N	40.81	40.75	40.68	40.64	40.52	40.08	39.38	39.35	39.31	39.10
E	9.19	9.31	9.38	9.48	9.05	9.02	8.67	8.57	9.37	8.88
Alt	457	486	594	145	799	649	558	686	451	327
Tmax_wt	11.2	10.2	10.2	13.2	8.9	10.1	11.1	10.5	11.8	12.7
Tmax_sp	16.7	15.7	15.6	18.1	14.9	16.0	16.4	15.8	16.9	17.8
Tmax_sm	27.1	26.4	26.4	28.2	26.3	27.6	27.5	26.9	28.1	28.5
Tmax_at	20.0	19.0	18.9	21.6	18.2	19.4	20.3	19.7	20.8	21.6
Tmin_wt	5.3	4.4	4.3	6.3	3.1	3.6	3.8	3.4	5.2	5.2
Tmin_sp	9.1	8.2	8.1	10.1	6.9	7.4	7.4	6.9	8.6	8.6
Tmin_sm	17.8	17.1	17.0	18.6	16.0	16.4	16.3	15.8	17.7	17.5
Tmin_at	12.9	12.0	11.9	13.9	10.6	11.2	11.4	10.9	12.8	12.8
Tave_wt	8.3	7.3	7.2	9.8	6.0	6.8	7.4	6.9	8.5	8.8
Tave_sp	12.9	12.0	11.8	14.1	10.9	11.7	11.9	11.4	12.7	13.2
Tave_sm	22.4	21.7	21.7	23.4	21.1	22.0	21.9	21.4	22.9	23.0
Tave_at	16.4	15.5	15.4	17.7	14.4	15.3	15.9	15.3	16.8	17.2
PPT_wt	221	226	223	181	282	274	249	269	155	215.5
PPT_sp	163	167	164	127	210	195	174	183	105	142.5
PPT_sm	59	62	61	45	69	61	43	44	39	36.0
PPT_at	228	225	221	192	267	256	242.	254	167	209.5
MAT	15.0	14.1	14.0	16.3	13.1	13.9	14.3	13.7	15.2	15.5
MWMT	23.6	22.9	22.8	24.5	22.4	23.3	23.3	22.7	24.2	24.3
MCMT	7.8	6.8	6.7	9.3	5.5	6.4	7.1	6.6	8.1	8.5
TD	15.8	16.1	16.1	15.2	16.9	16.9	16.2	16.1	16.1	15.7
MAP	671	679	670	545	827	785	708	751	466	604
MSP	148	151	150	119	171	157	134	139	115	120
AHM	37	36	36	48	28	30	34	32	54	42
SHM	160	151	152	206	131	149	174	164	210	203
DD<0	3	5	5	1	11	7	5	6	3	3
DD>5	3743	3421	3391	4184	3061	3360	3480	3280	3820	3935.5
DD<18	1646	1876	1900	1324	2161	1966	1849	1982	1617	1521.5
DD>18	587	497	493	715	441	538	553	487	662	689.5
NFFD	356	350	349	361	338	343	345	340	355	354.5
bFFP	14	25	27	5	47	41	39	47	19	21.5
eFFP	354	349	348	357	340	344	347	343	354	354
FFP	340	324	321	352	293	303	308	296	335	332.5
PAS	3	4	4	1	9	6	4	6	2	2
EMNT	-6.8	-8.8	-8.9	-5.5	-11.3	-10.5	-9.9	-10.8	-6.7	-7.0

Var/Pop	LIM	MOL	TER	LIT	FIO	BAR	MAN	MAR	SET	SUL
Eref	865	841	843	920	855	922	953	932	940	992.5
CMD	443	422	426	523	411	467	508	486	572	566
soils	17	17	17	17	17	17	17	15	17	17