Ducci F., De Rogatis A., Proietti R., Curtu A.L., Marchi M., Belletti P., 2021. Establishing a baseline to monitor future climate-change-effects on peripheral populations of *Abies alba* in central Apennines. Ann. For. Res. 64(2): 33-66. https://doi.org/10.15287/afr.2021.2281

Figure S1. Linear regressions of genetic parameters A_{r10}, H_e, F_{st} and G_{st} with kilometric distances for BT from Alpine and Apennine populations.

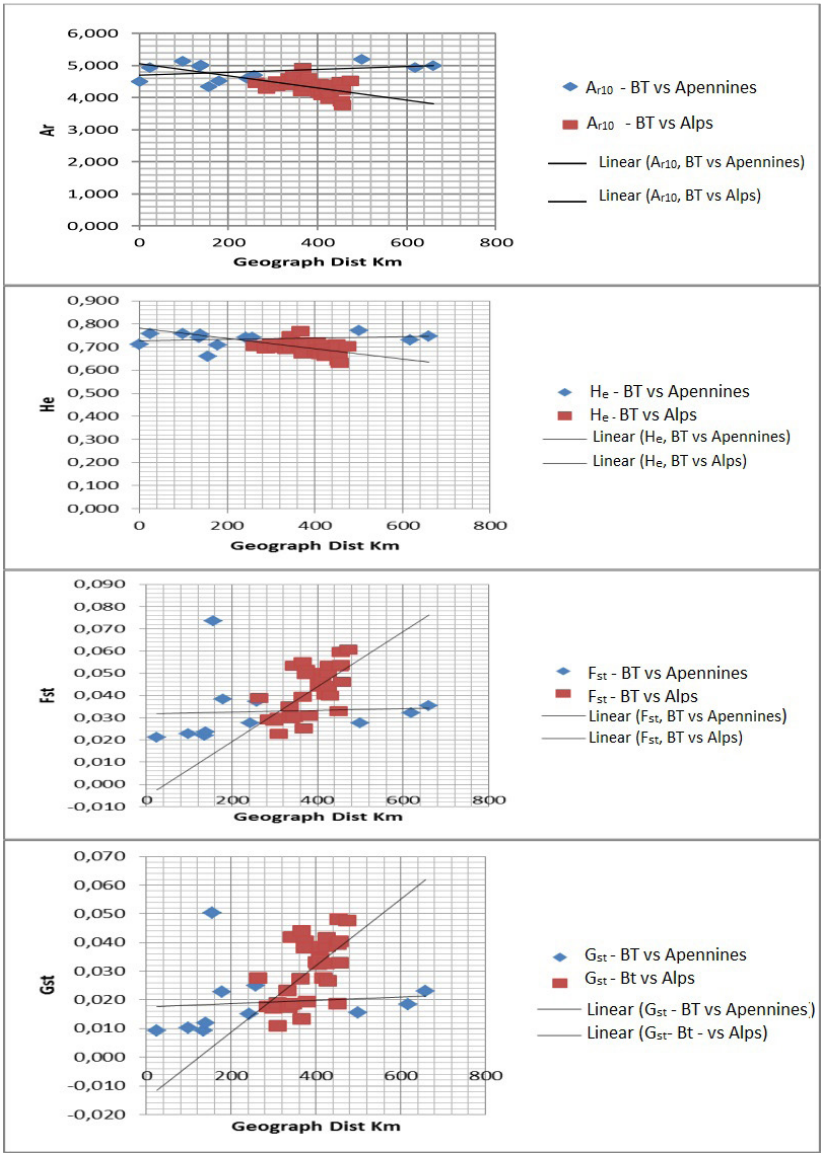

Figure S2. Linear regressions of genetic parameters A_{r10}, H_e, F_{st} and G_{st} with kilometric distances for LV from Alpine and Apennine populations.

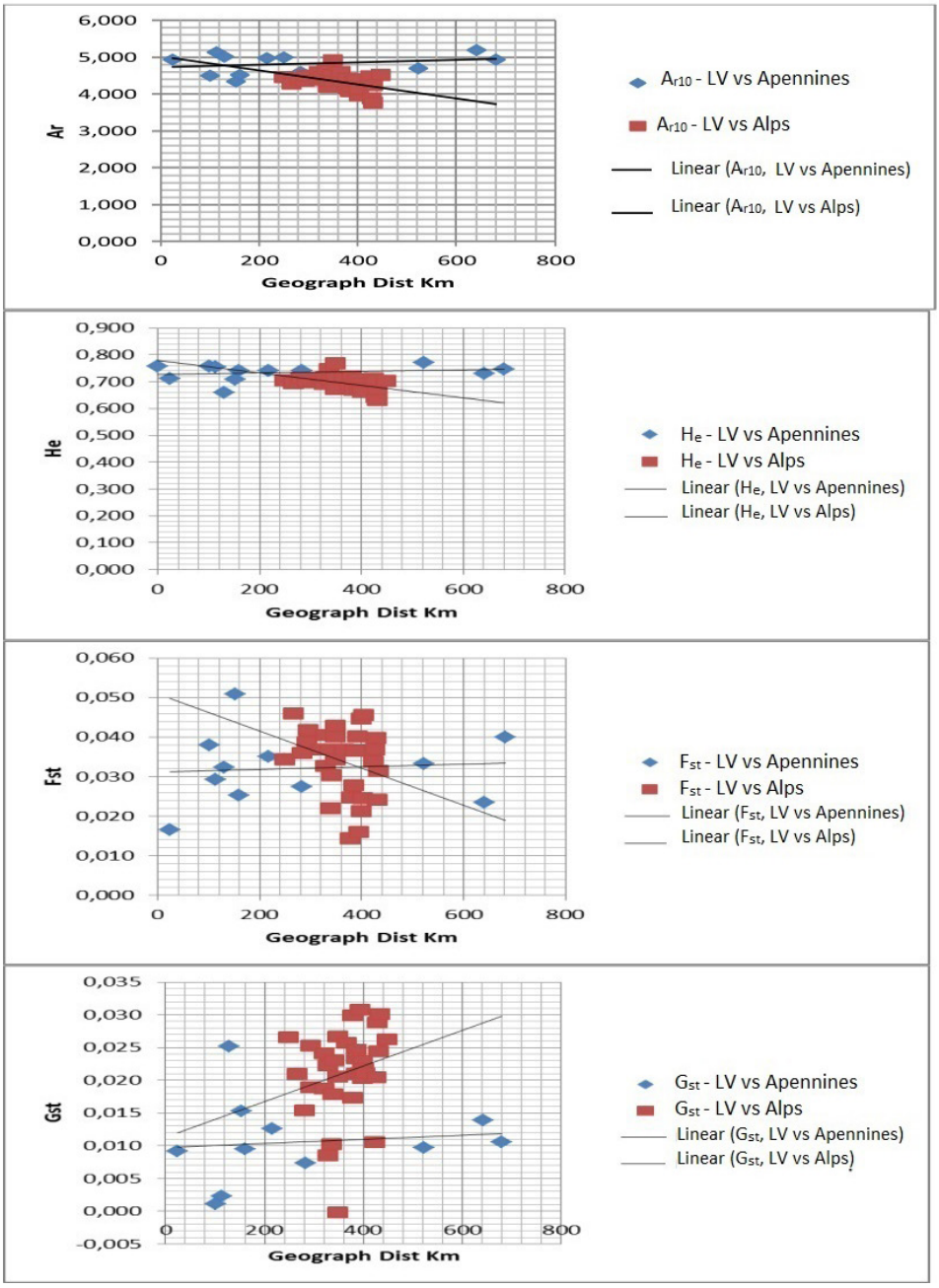

Figure S3. Linear regressions of genetic parameters A_{r10}, H_e, F_{st} and G_{st} with kilometric distances for PIG from Alpine and Apennine populations.

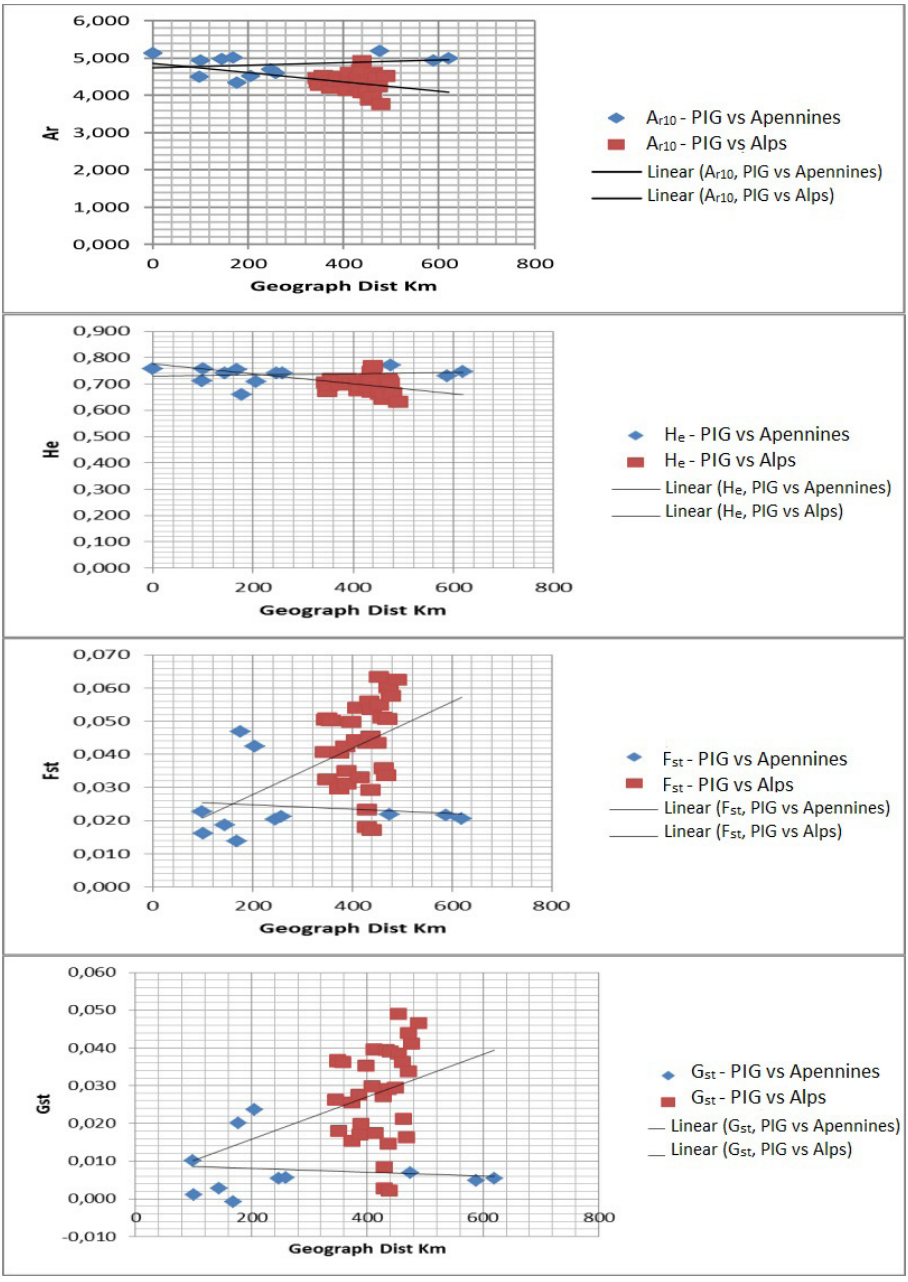

Figure S4. STRUCTURE clusters obtained for structural layers of populations at BT (nuSSR) and LV and PIG (nuSSR and cpSSR data). Legend, a: trees of layer (a), r: tree layer (r).

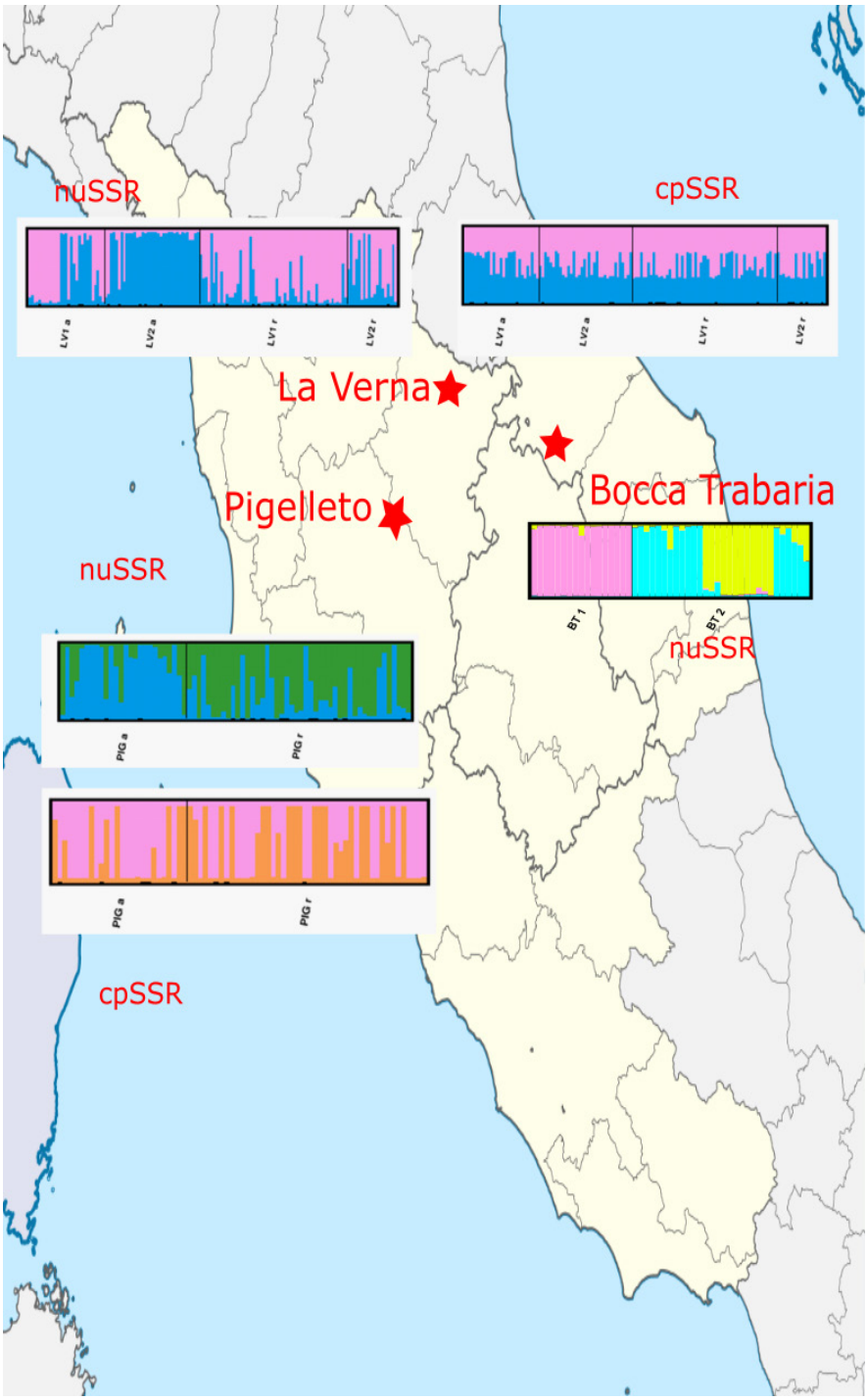

Figure S5. STRUCTURE clusters (a = nuSSR and b = cpSSR) obtained for age classes at La Verna. Legend, a: trees of layer (a), r: trees of layer (r).

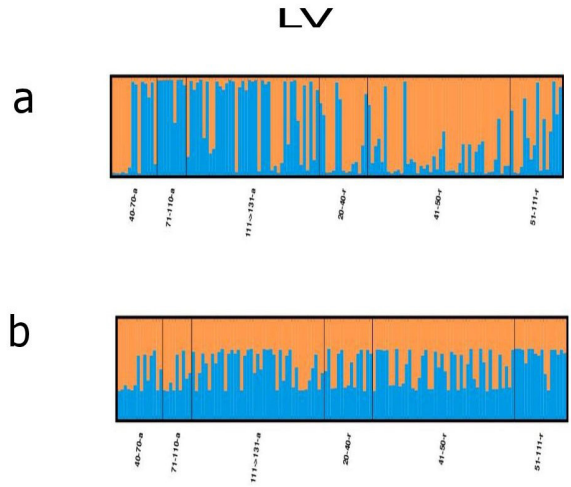

Figure S6. STRUCTURE clusters: (a = nuSSR and b = cpSSR) obtained for age classes at Pigelleto. Legend, a: trees of layer (a), r: trees of layer (r).

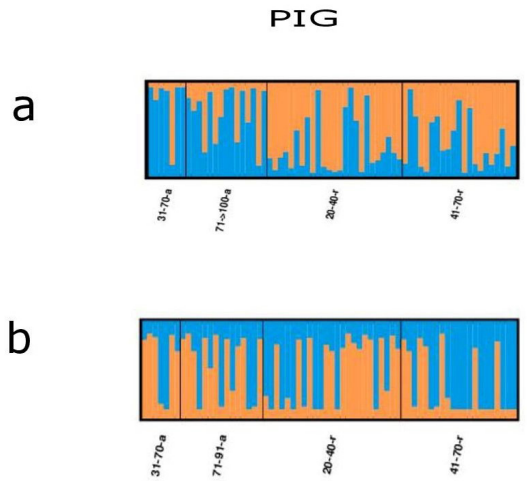

Figure S7. Timing of wood formation at LV and PIG in 2011 and 2012. Legend: bE: beginning of cell enlargement, bW: beginning of wall thickening in xylem cells, bM: first mature xylem cells, cE: cessation of cell enlargement, cW: cessation of cell wall formation and hardening.

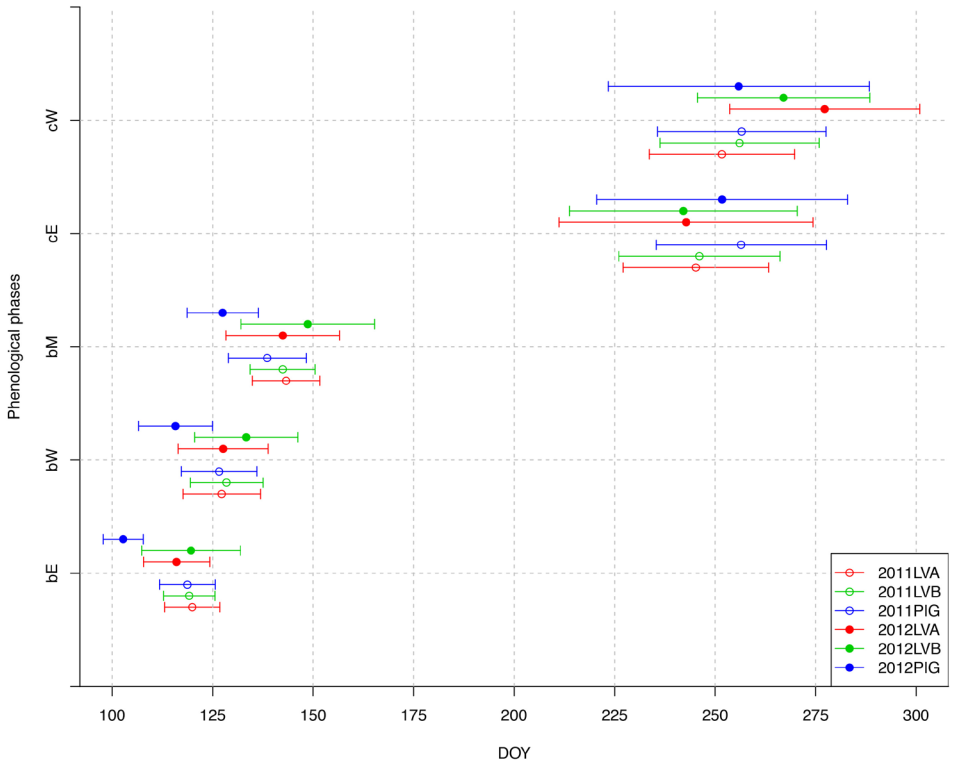

Figure S8. Graphic representation of the phenological phases duration across populations in 2011 and 2012. Legend: E: cell enlargement (including bE, bW and bM, shown in blue), W: cell wall thickening (cE, shown in red), X: xylogenesis (cW, shown in brown). Horizontal bars indicate the median values, horizontal lines and vertical ticks indicate the minimum, second quartile, third quartile and maximum values.

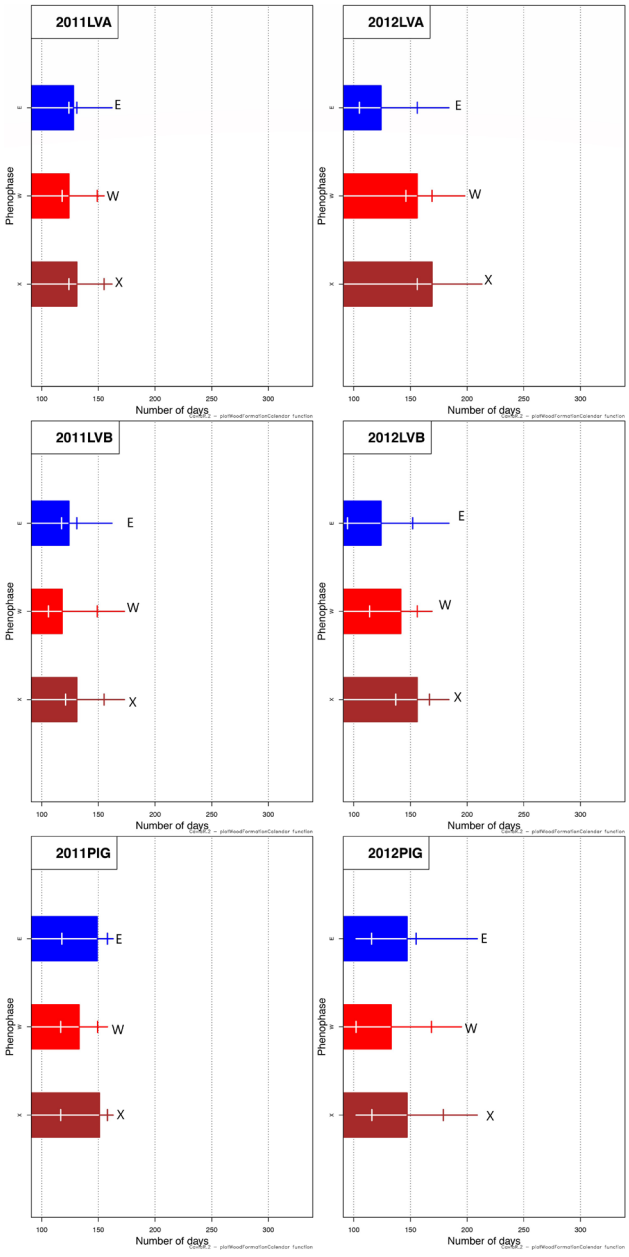

Table S1. Alpine and Apennine Italian silver fir populations studied by Belletti et al. (2017). These populations were used to assess the Central-Periphery Hypothesis (CPH). Details of site characteristics were reported. VER, BTR and PIG correspond to the populations of La Verna (LV), Pigelleto (PIG) and Bocca Trabaria (BT) analyzed in the present study.

Pop	Geographical region	Latit (°N)	Long (°E)	Def. Sectors	N_e	A_{r10}	H_e	F_{IS}
GOU	Western Alps	43°56'	7°36'	WC Alps	4.4	4.336	0.688	0.031
NAV	Western Alps	44°07'	7°43'	WC Alps	4.0	4.371	0.722	0.015
GOR	Western Alps	44°12'	7°39'	WC Alps	4.5	4.527	0.735	0.024
VAL	Western Alps	44°12'	7°16'	WC Alps	4.0	4.418	0.734	0.073
BAL	Western Alps	44°20'	7°02'	WC Alps	3.8	4.135	0.690	0.019
CHI	Western Alps	44°29'	7°05'	WC Alps	3.9	4.406	0.708	0.014
SAL	Western Alps	44°56'	7°03'	WC Alps	4.1	4.342	0.686	0.016
GRB	Western Alps	45°03'	6°54'	WC Alps	3.6	3.884	0.657	0.020
FON	Western Alps	45°31'	7°41'	W Alps	4.0	4.342	0.727	0.024
SES	Western Alps	45°41'	8°03'	W Alps	3.8	4.161	0.698	0.020
CER	Western Alps	45°53'	8°09'	W-WC Alps	3.7	4.084	0.700	0.021
ANZ	Western Alps	44°58'	8°04'	W-WC Alps	3.8	4.203	0.716	0.023
BOG	Western Alps	46°09'	8°12'	W-WC Alps	3.4	3.973	0.679	0.030
TOC	Western Alps	46°09'	8°28'	WC Alps	3.5	4.076	0.706	0.017
VAR	Western Alps	45°39'	7°54'	W Alps	3.7	4.207	0.689	0.080
CRX	Western Alps	45°47'	7°25'	W Alps	4.2	4.474	0.722	0.046
BON	Western Alps	45°43'	7°23'	W Alps	4.0	4.275	0.732	0.051
PEN	Western Alps	45°42'	7°17'	W Alps	3.9	4.234	0.683	0.037
CHA	Western Alps	45°44'	7°03'	W Alps	4.1	4.524	0.722	0.055
BEL	Western Alps	45°49'	7°21'	W Alps	3.0	3.772	0.649	0.065
GRE	Western Alps	45°50'	7°49'	W Alps	3.9	4.132	0.680	0.032
BAG	Central Alps	45°51'	10°26'	CE Alps	3.9	4.290	0.712	0.040
ALB	Central Alps	46°05'	9°37'	CE Alps	4.2	4.405	0.715	0.022
AND	Central Alps	46°09'	11°00'	CE Alps	4.6	4.405	0.729	0.014
VPT	Eastern Alps	46°58'	11°21'	CE Alps	4.6	4.600	0.735	0.020
LAU	Eastern Alps	46°41'	10°32'	CE Alps	5.5	4.907	0.786	0.030
TRO	Eastern Alps	46°19'	11°22'	CE Alps	4.5	4.492	0.719	0.040
FAV	Eastern Alps	46°17'	11°11'	CE Alps	4.4	4.354	0.713	0.030
SCA	Eastern Alps	46°43'	12°16'	CE Alps	5.3	4.688	0.763	0.036
TES	Eastern Alps	46°32'	11°10'	CE Alps	4.5	4.592	0.731	0.033
VIS	Eastern Alps	46°37'	12°39'	CE Alps	4.7	4.481	0.732	0.029
DOS	Eastern Alps	45°55'	11°30'	CE Alps	4.5	4.461	0.720	0.041

Pop	Geographical region	Latit (°N)	Long (°E)	Def. Sectors	N_e	A_{r10}	H_e	F_{IS}
PAU	Eastern Alps	46°32’	13°07’	CE Alps	4.7	4.396	0.709	0.017
MNR	Northern Apennines	44°34’	9°30’	Apennines	4.6	4.602	0.760	0.051
VEN	Northern Apennines	44°23’	10°16’	Apennines	4.6	4.520	0.737	0.040
APU	Northern Apennines	44°09’	10°26’	Apennines	3.8	4.333	0.707	0.035
ABE	Northern Apennines	44°09’	10°40’	Apennines	6.0	5.011	0.774	0.013
VER	**Central Apennines**	**43°42’**	**11°56’**	**Apennines**	**5.7**	**4.934**	**0.779**	**0.022**
BTR	**Central Apennines**	**43°34’**	**12°11’**	**Apennines**	**4.6**	**4.495**	**0.725**	**0.016**
PIG	**Central Italy**	**42°53’**	**11°38’**	**Apennines**	**6.5**	**5.139**	**0.778**	**0.022**
MAC	Central Apennines	42°44’	13°24’	Apennines	5.8	4.984	0.762	0.021
FVP	Central Apennines	41°53’	14°21’	Apennines	4.8	4.698	0.760	0.037
VAC	Southern Apennines	40°09’	16°05’	Apennines	6.4	5.197	0.791	0.014
GAR	Southern Apennines	39°08’	16°39’	Apennines	5.8	4.942	0.753	0.029
ARC	Southern Apennines	38°33’	16°21’	Apennines	5.4	4.990	0.768	0.014

Legend: Ne: effective number of alleles per locus; A_{r10}: allele richness; H_e: mean expected heterozygosity; F_{is}: mean inbreeding coefficient, considering null alleles. (GenAlEx v.6.5b4 software).

Table S2. Pearson’s r correlation among genetic parameters and distance in km of each population and the other Italian populations.

POP	A_r		H_e		F_{st}/F_{stmax}	G_{st}/G_{stmax}		
	r	P	r	P	r	P	r	P
LV	-0.192	0.2076	-0.211	0.1631	0.125	0.4137	0.361	0.0147*
PIG	-0.331	0.0279*	-0.294	0.0531	0.438	0.003**	0.407	0.0061**
BT	-0.263	0.0838	-0.274	0.0685	0.452	0.0018**	0.457	0.0016**

Note: * P<0.05, ** P<0.01, *** P<0.001.

Table S3. Welch’s t-test modified among mean values: A) for A_r, H_e, of

Apennine population vs Western Alpine populations, vs Western-Central Alpine populations and vs Central-Eastern Alpine populations; B) for F_{st} on F_{stmax} and G_{st} on G_{stmax} of each studied population, regards Apennine population vs Western Alpine populations, vs Western-Central Alpine populations and vs Central-Eastern Alpine populations.

(A)

All	**A_r**		**H_e**	
App pop	**t**	**P**	**t**	**P**
App vs WAlp	6,129	0.0000	4,749	0.0001
App vs WCAlp	5,958	0.0000	4,481	0.0002
App vs CEAlp	3,334	0.0036	1,903	0.0712

(B)

Pop		**F_{st} /F_{stmax}**		**G_{st}/G_{stmax}**	
		t	**P**	**t**	**P**
LV	App vs WAlp	-3,806	0.0012	-4,616	0.0001
	App vs WCAlp	-7,023	0.0000	-5,350	0.0000
	App vs CEalp	-4,102	0.0006	-2,195	0.0409
PIG	App vs Walp	-4,949	0.0001	-7,489	0.0000
	App vs WCAlp	-8,483	0.0000	-8,838	0.0000
	App vs CEalp	-3,891	0.0010	-2,735	0.0133
BT	App vs WAlp	-0,473	0.6446	-3,286	0.0042
	App vs WCAlp	-0,881	0.3947	-4,834	0.0001
	App vs CEalp	2,306	0.0387	-0,225	0.8248

Table S4. Welch's t-test modified for significant difference in mean values of genetic parameters among the age classes.

POP	**A_r**		**H_e**		**F_{is}**		**h**		**h_r**	
	t	**P**	**t**	**P**	**t**	**P**	**t**	**P**	**t**	**P**
LV	2.91	0.033*	3,62	0,015*	3,73	0,014*	3,58	0,016*	2,89	0,034*
PIG	3.23	0.048*	4,15	0,025*	4,32	0,023*	4,07	0,026*	3,29	0,046*

Note: * P<0.05, ** P<0.01, *** P<0.001