

Data accessibility

Microsatellites data are published on the DRYAD repository with sampling locations, the ecological niche models data and the TESS input used for analyses and ABCtoolbox inputs, doi: 10.5061/dryad.sn1 m7.

Supporting information

Additional supporting information may be found in the online version of this article.

Dataset S1 X/Y coordinates of presences of *Malus sylvestris* in Europe used for ENM.

Text S1 ENM methodology used to project paleodistribution of *Malus sylvestris*.

Fig. S1 Sampling of the different *Malus sylvestris* sites through Europe.

Fig. S2 Bayesian clustering results of *Malus sylvestris* in Europe ($N = 381$) using the program STRUCTURE from $K = 2$ to $K = 6$.

Fig. S3 Maps of mean membership probabilities per site from the STRUCTURE analysis for *Malus sylvestris* assuming 2 to 5 clusters.

Fig. S4 Estimated number of populations in *Malus sylvestris* from TESS analyses using the DIC.

Fig. S5 Estimated number of populations in *Malus sylvestris* from STRUCTURE analyses using the ΔK .

Fig. S6 PCA on 3,000 simulations for *Malus sylvestris*.

Fig. S7 Marginal posterior distributions of demographic and historical parameters estimated by Simcoal2.

Fig. S8 Ensemble forecast using *Malus sylvestris* presence records and pseudo-absences projected onto the map of Europe and Western Russia using 19 bioclimatic variables.

Table S1 Description of the *Malus sylvestris* accessions analysed with their geographical origins and providers, and acknowledgement.

Table S2 Prior distributions used in approximate Bayesian computations.

Table S3 Summary statistics for each *Malus sylvestris* sampling site with at least four individuals.

Table S4 Summary statistics for the 26 microsatellite loci in *Malus sylvestris*.

Table S5 Pairwise genetic differentiation (F_{ST}) among the 25 sites.

Table S6 AUC Index for ENM ran with eight and 19 bioclimatic variables for each of the six models and each repetition.