

ABSTRACT

The aim of this Thesis is to analyse the specific situation of an Italian alpine environment, interested by the retreat of the glaciers of Monte Rosa as result of climate change, through the study of populations of *Larix decidua* that characterize the area, especially under the aspect of the conservation of genetic diversity. *prima frase troppo lunga. The areas of study are the* Protected Areas of Sesia Valley, in Piemonte region, Italy. The threat that more than any other seems to interest the larch is the habitat fragmentation. In fact, this species has a typical alpine range which is not continuous, indeed it is naturally fragmented due to the morphology of the Alps, leading to the development of an highly fragmented range consisting of several subpopulations that are likely to become genetically differentiated over time; it may be needed to take action locally, safeguarding the individual populations that may present specific problems related to genetic drift or to the “founder effect”. For all these reasons, it seems appropriate to apply a dynamic approach of *in situ* genetic conservation for the European larch.

The first methodological phase consisted in the localization of the larch forests through the software *QuantumGIS*. Then, a total of 16 circular sampling plots were chosen in different valleys, for each plot the GPS coordinates, the stational data, and the main dendrometric measurements were taken. Moreover, the consistency of renewal was detected, and finally the length of cones and needles were measured. The data collected were processed using *Excel* software, in order to characterize each area with hypsometric curves, frequency distributions of plants in diameter classes, and the main dendrometric parameters. Then the data were processed with the software *PAST*, through a *Cluster Analysis*, analyzing the Mendelian variables sampled (length of needle and cones), in order to find possible signs of a genetic differentiation between the subpopulations, and through a *PCA (Principal Components Analysis)*, in order to highlight which variables contribute most to characterize the sampling plots. Finally, a non parametric statistical analysis (*Kruskal-Wallis Test*) with the software *SPSS* was performed on the density of natural regeneration in larch forests in relation to other variables studied, in order to understand whether the success of the regeneration is influenced by external variables. Only in case of significant differences was then applied a comparison test (*Mann-Whitney Test*) to highlight the differences between internal groups. Was also carried out an "historical analysis", comparing historical maps (dating back to 1759) and modern orthophotos taken by *Reggiano Re 200 Falco* aircraft, in order to highlight how human activity and past exploitation of mountains has influenced the distribution of larch in Sesia Valley.

The results of these analysis proved the necessity to intervene in two separate contexts: in the case of the protected areas afferent to the town of Alagna, it could be useful to establish a network of Conservative Breeding Units, in order to encourage the natural colonization of larch in this area, due to the retreat of the glaciers, and at the same time avoid the onset of the deleterious “founder effects” and processes of genetic drift. Conversely, in the area of Fobello, it is proposed to intervene by creating a Conservative Evolutionary Unit, in order to preserve the specific adaptive traits locally developed; in order of doing this, it is necessary to avoid the arrival of allochthonous genetic material, respect to this valley. Furthermore, for the other two areas investigated, the towns of Rima and Carcoforo, it is suggested to act by encouraging the renovation of larch, which locally is very difficult for a number of socio-environmental factors, through hole cuttings and soil scarification, but only above 1300 meters in altitude, which is the lower natural vegetational limit for the larch. Finally, it is proposed to deepen the possibility that the area of Carcoforo has been a refuge area for larch during the Ice Age, through genetic laboratory analysis. At the end, this work provides an example of a methodological approach for the genetic

conservation in protected forest areas, with particular attention towards the European disposals, in order to standardize this type of action in EU, and with the aim to propose some practical management actions to improve forest management under the aspect of genetic conservation.