

GENETIC CHARACTERIZATION OF AN ENDANGERED SPECIES OF SICILIAN INLAND WATERS: THE MEDITERRANEAN TROUT (*Salmo cettii*)

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Introduction

Mediterranean trout (*Salmo cetti*), is endemic species belonging to *Salmo trutta* group which is widespread exclusively in Sardinia, Sicily on a few areas of the Italian Tyrrhenian side. Following repopulation carried out with Atlantic trout, its presence on the Italian territory has undergone a strong contraction due to hybridization and introgression effects. At the moment, *Salmo cettii* is on the IUCN Red List, rated as Critically Endangered (CR). The selection of pure breeders with high genetic variability and the storage of their sperm in a cryobank become important tools to make the management of the conservation of endangered species more efficient. Recent pieces of evidence indicated the presence of a specific haplotype in the Iblei Mountains of Sicily suggesting the presence of some conserved areas with the endemic populations (Segherloo et al., 2021). The objective of the work was to genetically characterize a population of Mediterranean trout (*Salmo cettii*) caught in different waterways of the Iblei Mountains of Sicily in order to verify its level of introgression with the allochthonous Northern Atlantic haplotypes and evaluate the possibility to use this population as a precious resource for future restocking plans.

Materials and methods

57 wild Mediterranean fish were caught from different waterways of Sicily Iblei Mountains, in order to sample their genetic material. For the comparative genetic analysis, the samples from 41 *S. trutta* of Northern Atlantic lineage were collected (29 from Morgex Val d'Aosta and 12 trout from Fiumelatte –(Como) hatcheries). Genetic analyses were performed using: i) 16 autosomic STR microsatellite; ii) SDY E2S, a sex marker; iii) the Locus LDH-C1; iv) the mtDNA D-loop. Allele frequency-based analyses was detected by GenAlEx program (Peakall and Smouse 2012). Genetic structure and gene flow were analyzed by STRUCTURE 2.3.4 (Pritchard et al.2000). The combination of the results deriving from the analysis of the LDH-C1 and the mitochondrial D-loop were performed by the hybridization index (Penserini et al. 2006).

Results

The analysis of the SDY-ES2 locus revealed that, out of the total Sicily Mediterranean trout, 42 were males and 15 females. The expected and observed heterozygosity (He: 0,630 and Ho: 0,627, respectively) was quite low, as was the actual number of alleles (Ne:

2,70). A deviation from a Hardy-Weinberg equilibrium was found for 9 out of 16 loci ($p < 0.05$). STRUCTURE analysis clearly revealed the presence of 2 distinct populations, with few misassignments in the Northern Atlantic populations.

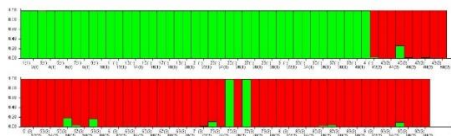


Figure 1. Barplots of individual, STR-based admixture as obtained through the Bayesian clustering analysis in STRUCTURE

The Locus D-loop mtDNA analysis showed that the Sicily Mediterranean population 100% matched with the haplotype sequence present in the database for *Salmo cetti* (GenBank MW251439.1, Segherloo et al., 2021), except for 3 individuals. The screening of the LDH-C1 Locus revealed the presence of 3 individuals with allele LDH-C1 * 90. The hybridization index indicated the 87% of individuals belonging to Class VI (zero potential of hybridization), 6% to Class V and only 8% to Class II (high potential of hybridization) (Pensierini et al., 2006).

Discussion and Conclusion

The results obtained in this study indicated that the Mediterranean trout population sampled in some waterways of Sicily Iblei Mountains showed a very low level of introgression with the Northern Atlantic lineage, despite the numerous releases of the allochthonous individuals occurred in the past. Probably, the extreme conditions of the waterways and the permanence to which they are forced make difficult the survival of the North Atlantic haplotype and the relative hybrids. At the same time, the geographic isolation of individuals, due to the characteristics of the waterways, represent a limit to the genetic variability of the population, which was found quite low. The genetic results obtained in this preliminary study suggests a potential use of the Sicily Iblei Mountains trout population as a precious resource for planning native fish restocking activities.

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