

POPULATION GENETIC STRUCTURE OF PERENNIAL RYEGRASS (*LOLIUM PERENNE*) IS HIGHLY CORRELATED WITH PLANT AVAILABLE COPPER

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Copper (Cu)-based fungicides have been widely used in viticulture to combat Downy Mildew. Copper, a non-degradable heavy metal, can accumulate in soil or leach into water sources. *In situ* phytoremediation strategies are practical remedial options for Cu-contaminated vineyard soils. A functional green cover with suitable plant species can provide not only an improved soil structure and a protection against erosion but also a potential phytoremediation of Cu. *Lolium perenne* (Perennial Ryegrass), a species of major agricultural importance, was investigated for this purpose.

Genetic variation was compared to Cu accumulation in vineyard populations of eight Seven populations growing on Cu contaminated vineyard soils and one from natural grassland were sampled in Friuli Venezia Giulia (NE Italy). Populations and soil fractions were environmentally and physico-chemically characterized. Their genetic variability was investigated by Amplified Fragment Length Polymorphism (AFLP) markers. The extent of genetic structure within and among populations was estimated using G and Φ statistics.

Individual variability within populations was found to be lower than that between populations. Populations were well separated in Neighbor-joining tree and the genetic distances were correlated with geographic ones.

The influence of each environmental and physico-chemical factor on the genetic distance was investigated when controlled for geographical distance by partial Mantel tests. It was found that Degree day and plant available Cu had a significant influence on the genetic distance between populations. Our results pointed out two populations from Pavia di Udine and Zugliano (UD) as the best performers for Cu-phytoremediation. Breeding programmes based on these local populations to develop improved plants for Cu phytoremediation are recommended.