



UNIVERSITÀ DEGLI STUDI DI ROMA "TOR VERGATA"

DOTTORATO DI RICERCA IN BIOLOGIA EVOLUZIONISTICA ED ECOLOGIA

PhD PROGRAM IN ECOLOGY AND EVOLUTIONARY BIOLOGY



RE-CONSTRUCTION OF *QUERCUS* L. GENUS PHYLOGENY BY A MULTIMETHOD RESEARCH

PhD Student: Selin Gül Ünsal/ *Supervisor:* Prof. Antonella Canini

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The genus *Quercus* L., which includes approximately 400 species, is one of the most abundant and economically important genera of woody plants of the Northern Hemisphere. It is a dominant element in a great variety of ecosystems. In particular, it provides high quality timber and firewood and represents a valuable source of fuel, tannins for leather production, natural dyes, food for animals (e.g. leaves, acorns) and bioactive compounds. The latter have shown therapeutic effects, such as anti-inflammatory, antiseptic, astringent, decongestant and haemostatic properties; indeed, they are widely used in wounds repairing, skin eruptions and genital inflammations. A decoction of the bark is useful for the treatment of chronic diarrhoea, dysentery, intermittent fevers and haemorrhages.

Like all other woodland species, oak trees are threatened by many biotic and abiotic environmental factors, such as pests, diseases, invasive plants, and human activities. In this context, the conservation status of more than half of the world's oak species is unknown, although the red list including the globally threatened oak species was published by IUCN, in 2017, to comprehensively assess their preservation level.

In order to provide a contribution to conservation studies, clarify the still doubtful phylogeny of *Quercus* and provide additional information about this genus, 147 different oak species and varieties were collected in the Botanical Garden of Rome "Tor Vergata" for the development of the present PhD project. In detail, the phylogenetic relationships existing among these plant species will be investigated by a multiple method research which will include: a) genetic approach (i.e. DNA barcoding; RAPDs; for the study of the molecular profiles); b) morphologic techniques (e.g. light microscopy; for the characterization of pollen and starch typologies); c) biochemical study (i.e. liquid and gas-chromatography and protein electrophoresis; for metabolomics and protein analysis). Beyond the taxonomic classification and the re-construction of the evolutionary history for the selected species, new data about the bioactive compounds and the intrageneric differences existing among these samples will be also supplied, as in literature a limited amount of scientific publications (even contradictory) exist on this topic. Finally, as last objective of the current project, a germplasm preservation activity focused to protect and propagate *ex-situ* the plant material of the most peculiar, rare, useful and endangered oak species will be carried out in the Botanical Garden of Rome "Tor Vergata".