

# Morphometric and agronomic traits multivariate analysis of sumac (*Rhus coriaria* L.) grown wild in Eastern Sicily

Formica V.<sup>a</sup>, Favara A.<sup>a</sup>, Zingale S.<sup>a\*</sup>, Infantino S.<sup>a</sup>, Fusicaro O.R.<sup>a</sup>, Di Giovanni C.<sup>a</sup>, Guarnaccia P.<sup>a</sup>

<sup>a</sup> Department of Agriculture, Food, and Environment, University of Catania, Via Santa Sofia 100, 95123 Catania, Italy.

valentina.formica@phd.unict.it; favara.antonio00@gmail.com; silvia.zingale@phd.unict.it; sebyinfa@gmail.com; oraziofusicaro@gmail.com; caroladigiovanni99@gmail.com; paolo.guarnaccia@unict.it;

**Keywords:** medicinal and aromatic plants, biodiversity, environment, ecotypes, conservation

## Abstract

Sumac (*Rhus coriaria* L.), belonging to the Anacardiaceae family, is a Medicinal and Aromatic Plant (MAPs) native to the Asian continent. Thanks to its wide adaptability, it has since spread to many Mediterranean countries, such as the Canary Islands, the Azores, Madeira, and other East Asian countries [1]. Despite its beneficial aromatic, medicinal, and anti-cancer properties due to several active ingredients in its leaves and drupes [3,4], sumac in Sicily is considered a naturalized plant that grows spontaneously in various areas, from arid to calcareous soils, potentially acquiring different properties. Indeed, from the interaction of genotype and environment, new phenotypes develop that vary in chemical profiles, morphometric, and agronomic traits [5,6,7]. This study investigates the morphometric and agronomic diversity within different wild samples collected in 17 locations in Eastern Sicily. The hypothesis was to verify the variability within the different ecotypes using multivariate analysis. In each site, five branches bearing infructescences were collected during the maturity stage in 5 sample areas during autumn 2022. Infructescences height above ground, number per unit area, length, diameter, and dry weight; leaves number and dry weight; branches length, diameter and dry weight; drupes number and dry weight were measured. StataSE 18 software was used for hierarchical cluster analysis, grouping samples based on morphometric and agronomic traits and geographic locations. Initially, 10 clusters have been found, which were later reduced to 7. A one-way ANOVA and Sidak's post-hoc test were performed to identify significant differences between the clusters for all parameters and locations. The results show a highly significant difference among the clusters for all parameters ( $p < 0.0001$ ); the clustering analysis also indicates a significant variability among the examined locations ( $p = 0.0062$ ) indicating a phenotypic difference of sumac growing spontaneously in Sicily. Deepening the analysis through genetic and chemical characterization could provide valuable insights into the adaptability of sumac in different environmental conditions, potentially offering new opportunities for its enhancement and cultivation.

## References

- [1] Lo Vecchio G. et al., 'Chemical Characterization, Antibacterial Activity, and Embryo Acute Toxicity of *Rhus coriaria* L. Genotype from Sicily (Italy)', *Foods*, vol. 11, fasc. 4, p. 538, (2022), doi:10.3390/foods11040538.
- [2] Inzenga G., 'Manuale Pratico Della Coltivazione di Sommacco in Sicilia', Luigi Pedone-Lauriel Editore, Palermo (1874).
- [3] Abu-Reidah I.M., Ali-Shtayeh M.S., Jamous R.M., Arráez-Román D., and Segura-Carretero A., 'HPLC–DAD–ESI-MS/MS screening of bioactive components from *Rhus coriaria* L. (Sumac) fruits,' *Food Chemistry*, vol. 166, pp. 179–191, (2015), doi: 10.1016/j.foodchem.2014.06.011.
- [4] Mazzara E., Caprodossi A., Mustafa A.M., Maggi F., and Caprioli G., 'Phytochemical Investigation of Sumac (*Rhus coriaria* L.) Fruits from Different Sicilian Accessions', *Foods*, vol. 12, no. 23, (2023). doi: 10.3390/foods12234359.
- [5] Punetha A., Kumar D., Suryavanshi P., Padalia R., and V. K.T., 'Environmental Abiotic Stress and Secondary Metabolites Production in Medicinal Plants: A Review', *J Agr Sci-Tarim Bili*, (2022). doi: 10.15832/ankutbd.999117.
- [6] Giovanelli S., Giusti G., Cioni P.L., Minissale P., Ciccarelli D., Pistelli L., 'Aroma Profile and Essential

Oil Composition of Rhus Coriaria Fruits from Four Sicilian Sites of Collection' in Proceedings of Industrial Crops and Products 97, 166-174, (2017).

- [7] Arena K., Trovato E., Cacciola F., Spagnuolo L., Pannucci E., Guarnaccia P., Santi L., Dugo P., Mondello L., Dugo L., 'Phytochemical Characterization of Rhus coriaria L. Extracts by Headspace Solid-Phase Micro Extraction Gas Chromatography, Comprehensive Two-Dimensional Liquid Chromatography, and Antioxidant Activity Evaluation' in Proceedings of Molecules, 27, 1727, (2022). <https://doi.org/10.3390/molecules27051727>.