Pharmacognostic study of the rare *Saponaria sicula* Raf. in relation to different pedo-climatic conditions

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Saponaria sicula (Caryophyllaceae) is a perennial wild plant that in Sicily grows exclusively on limestone cliffs on Madonie Mountains (SsM) and on volcanic sands on Mt Etna (SsE). The present study is aimed to investigate how the pedo-climatic conditions influence the micromorphological and phytochemical features, as well as the biological properties of the leaves of *S. sicula* growing in the two sites. The main differences were the amounts of $CaCO_3$, Ca, Mg, organic matter and C/N, very high in the Madonie soil, and low in the Etna soil. Micro-morphological investigations revealed that leaves from SsM had a higher amount of calcium oxalate druses in the mesophyll, and showed a more intense blue-green staining with Toluidine blue O, indicating a higher content of polyphenols. These data were confirmed by the phytochemical screening of the two hydroalcoholic extracts (HEs), which showed a higher content of total phenols (8.56 ± 0.57 g GAE/100 g DE) and flavonoids (6.09 ± 0.17 g RE/100 g DE) in SsM in comparison with SsE. Furthermore, the flavan-3-ols and proanthocyanidins content (polymerization index 0.65 and 0.25 for SsM and SsE, respectively) also highlighted a low presence of polymeric tannins in both HEs. Phytochemical profile showed 64 compounds, with propelargonidin dimer as the most abundant compound (10.49 % and 10.19 % in SsM and SsE, respectively), followed by 1-sinapoyl-2-feruloylgentiobiose (6.54 % and 7.43 % in SsM and SsE, respectively) and caffeoyl glucose (5.60 % and 4.33 % in SsM and SsE, respectively). The higher polyphenols content detected in SsM is in agreement with the biological activity recorded, since the SsM HEresults the strongest plant complex for both antioxidant and anti-inflammatory activity (IC_{50} 2.75- 477.30 µg/mL in SsM and 43.48-176.22 µg/mL in SsE). In conclusion, this study experimentally demonstrates that pedo-climatic differences can affect pharmacognostic features of this plant species.