

Vegetation Analysis and Productivity Assessment of Natural Pastures in Madonie Regional Park, Sicily

Grasslands are an essential component of Europe's land use, accounting for more than one-third of the continent's agricultural area. They provide food for herbivores and ruminants and deliver essential ecosystem services erosion control, water regulation, water purification, carbon storage, biodiversity enhancement, and wildfire prevention. Despite their significance, permanent grasslands in Europe have been declining for over 50 years, with regional variations. The mountainous area of Madonie in Central-Northern Sicily has experienced a decline in economic activities such as hospitality and agriculture over the past decade, primarily due to climate change. Concurrently, the increase in wild ungulates like wild boars and deer has significantly pressured grazing resources, challenging small and medium-sized livestock farms, that rely on the direct use of natural pasture resources. In light of these issues, a study was conducted at Madonie Natural Park to better understand the impact of uncontrolled intensive grazing by wild animals on the environment, agricultural activities, and ecosystem services. This study is focused on floristic, vegetation, phytopastoral, and productive characterization in order to deepen knowledge, to update and to have a precise overview of mountain pastures. This will enable subsequent analysis and potentially propose sustainable alternatives within the context of agroforestry. Research activities started in October 2023 in an area within the Madonie Park, ranging from 900 to 1635 meters above sea level. Therefore, five significant sites were identified that represent the physical and vegetational variability of the study area, and exclusion cages of 3×5 meters were installed in each of them. These areas were compared with adjacent areas subjected to direct use by wild animals. Various surveys were conducted, including vegetation analysis using the Braun-Blanquet method, vegetation structure and density examination via the Daget and Poissonet linear analysis method, and pastoral value calculation using specific indices. Potential load on pastures was assessed using fragility coefficients, indicating pasture sensitivity to environmental pressures. Preliminary results from the study have shown significant differences in floristic composition between grazed and ungrazed areas. Areas not grazed by ungulates showed a greater diversity of herbaceous species, with plant formation characterized by the presence of 4 — 5 dominant and indicative species. The previous different pastoral use has led to the creation of various units of vegetation. The findings suggest that more careful and deliberate grazing management can promote biodiversity recovery and restore the original structure of pastures. This has important implications for the conservation management of Madonie Park, suggesting the need to implement an integrate management aimed at creating synergistic interactions between agriculture, forestry, and breeding.