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Kitaibela vitifolia

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Kitaibela vitifolia

Analysis of the functional composition of sub-Mediterranean grasslands along a drought stress gradient

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Within the Mediterranean-type climates, semi-natural grasslands are considered priority habitats by the European Union. Moreover, they are cultural landscapes, resulting from a long history of human management. In spite of this, they are threatened by abandonment, inadequate management and climate change. Generally, trends in climate change are expected to cause greater aridity during summer, worsening the grassland production gap and forage quality, thus leading to the decrease of extensive livestock rearing sustainability. Thus, aware grassland management is essential to face the effect of climate change, and predictive models are needed. The functional approach proved a useful tool for this purpose. Our main aim was to understand how environmental constraints affect functional composition of plant communities along a water stress gradient. We laid 130 plots in central Apennines. In each plot we collected species cover-abundance values, altitude (m a.s.l.), slope aspect (azimuth degrees), and slope angle (vertical degrees). We used Ellenberg indicator values as a proxy to assess climate variability and drought stress gradient inside the study area. The considered traits were life form, growth form, clonality, belowground organs, leaf traits, plant height and seed mass.

We observed changes of traits related to reproductive, acquisitive and herbivory defence strategies along the considered gradient. We found: a shift from tolerance, in more productive environment, to avoidance strategies in harsh environment; a change in resource allocation strategies shifting from those ensuring to face competition in productive conditions through an efficient vertical growth (tall stature), resource acquisition (persistent green leaves), and a rapid horizontal spread by runner/runner-like rhizome, to those which enable plants to face drought stress storing nutrients in belowground structures (tuber, bulb, tap root) or large seeds, those which maximize exploitation of patchily distributed soil resource niches (caespitose and pleiocorm growth forms), and limiting water losses (scleromorphic and scleromorphic/mesomorphic leaves; erosulate upright forbs). In addition, we found that the increase of temperature and water scarcity also leads to the establishment of regeneration strategies (i.e. bulbils, roots with adventitious buds, light seeds) giving the ability to cope with the unpredictability of spatio-temporal changes in stress intensity and duration.