Changing from continuous to rotational grazing enhances alpine grassland composition and plant diversity: results of a five-year monitoring

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The paper reports the result of a five-year monitoring on botanical composition, plant diversity, Pastoral Value (PV) and soil nutrient content in an alpine pasture where Pastoral Plans (PP) were implemented after several years of continuous grazing (CGS). The PP are a policy and management tool aimed at enhancing farm productivity, while preserving plant diversity, soil and landscape. In the western Italian Alps, they are based on rotational grazing systems (RGS) with animal stocking rate adjustments, to keep it balanced with grassland carrying capacity. A total of 199 vegetation transects was carried out in summer 2011 and 2016. Vegetation ecological groups were identified by means of a Hierarchical Cluster Analysis and species richness and Shannon diversity (H' index) were computed. The mean soil nutrient content was estimated through Landolt N indicator values (N index) for each transect. Paired-sample statistical tests and PERMANOVA were perfomed on the whole vegetation dataset, on vegetation ecological groups and considering functional pools of species. Considering the whole dataset, species richness, H' index and N index significantly increased between 2011 and 2016. Species richness increased in almost all the ecological groups, with a peak in the mesotrophic one. A significant change in the botanical composition was measured in oligotrophic, mesotrophic and thermic groups. The number and cover of nitrogen-poor high-elevation species raised in all groups, likely boosted by livestock seed transportation and improved connectivity among different communities. The meso-eutrophic species number and cover increased in thermic, mesotrophic and pre-forest groups, suggesting a greater use of such areas by livestock under RGS than CGS. In addition, an increase of PV was detected in the pre-forest group. In conclusion, the PP implementation was an effective and a sustainable management tool to enhance botanical composition and plant diversity of alpine grasslands over five-year, and to improve their pastoral value as well.