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Responses of Communities Plant Functional Traits Along Grazing Gradients on South African Rangelands

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Abstract

Vegetation communities fulfill certain tasks in the ecosystem which can be expressed by their plant functional traits. By representing species of plant communities with their trait attributes rather than by species names, one can focus on the ecological functions and on the adopted plant strategies of communities which success under imposed conditions of the environment. In rangelands of South Africa we studied the response of Community Plant Functional Traits (CPFT) to grazing gradients on transects which started at the water point on grazing land. One transect per farm was established and along each transect, six plots (5 m × 5 m) were placed at equal distances.

We found that the trait-line sampling, a taxon-free method, was appropriate to record 15 CPFT in both standing biomass and on the regrowth. Close to water points grazing was more intense. Here, plant communities exhibited higher specific leaf area and higher leaf nitrogen content suggesting a higher photosynthetic capacity. Furthermore, communities close to water points exhibited less cell wall components (cellulose, hemicelluloses, and lignin) similarly favoring capture of photosynthetically active radiation. Communities exposed to intense and frequent grazing are successful by possessing quick-return strategy of nutrients invested into leaf tissues via higher rates of light capture.

We conclude that in these so-called “sacrifice areas” on livestock farms (or piosphere) there is an ecological niche for vegetation communities with quick-return strategies which are not only well adapted to intense and frequent grazing but also provide forage of high quality to the benefit of animal husbandry.

Keywords: Piosphere, plant strategies, taxon-free method, vegetation communities