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"Development on the margin"

Evaluating NDVI as a Tool to Monitor Grasslands' Encroachment in Corrientes, Argentina

Rubén Darío González[1], Ditmar Bernardo Kurtz[2], Maria Fabiana Navarro Rau[2]

[1] *University of Hohenheim, Germany*

[2] *National Institute of Agricultural Research, Corrientes Experimental Station, Argentina*

Abstract

Grasslands in the Province of Corrientes occupy around 50 percent of the total area and constitute the main source of energy, proteins and fiber for livestock. Livestock keeping is in turn the most important agricultural activity in the province.

Typical grassland management strategies in the region comprise: first, the regulation of grazing intensity and second, the use of fire to induce early sprouting of grasses and to control non edible plants. Fires, however, may not suppress weeds species having deep tap roots or tubers and indeed could help them to spread, once other fire-sensitive species disappear.

The goals of this study were to compare the density of *Vernonia chamaedrys* Less. in paddocks under different management and to evaluate the Normalized Difference Vegetation Index (NDVI) as a tool for grassland encroachment studies. NDVI measurements were obtained using a field radiometer. A two stage sampling design was established in two neighboring farms located in "El Sombrero", northeast region of Corrientes Province. Two treatments were evaluated: application of fire every two years *vs.* no fire application. Paddocks were located on same soils with similar vegetation and grazing intensities (0,94 to 1 animal units per hectare for the last three years). Neither herbicides nor fertilizers were applied

Dataset of the variable "Density of *Vernonia chamaedrys* plants" had to be transformed in order to adjust to a normal distribution. The results of the comparison of means using a T-test show that both, density of *V. chamaedrys* and NDVI were significantly different between treatments ($p < 0,0001$; $\alpha = 0{,}05$). However variation in NDVI values could not be attributed to variation in plant density, as indicated by the low correlation coefficient obtained: $R^2 = 0{,}18$.

These results suggest that for the conditions of this study even though NDVI was able to reflect changes, it would not be a highly sensitive tool to identify the encroachment with *V. chamaedrys*. More studies involving other species to find better responses on variation of NDVI values are considered necessary.

Keywords: Encroachment, grasslands, NDVI, *Vernonia chamaedrys*

Contact Address: Rubén Darío González, University of Hohenheim, Fruwirthstrasse 11 Zimmer-Nr.: 4603, 70599 Stuttgart, Germany, e-mail: gonzalezrd@yahoo.com