FOREST4EU

ITHub 5 - Agroforestry Systems

FOREST4EU partner: ANSUB
OG: OG Fósforo
OG's country: Portugal
Type of Innovation: Technological innovation

Spatiotemporal Patterns of Pasture Quality Based on NDVI Time-Series in Mediterranean Montado Ecosystem

Introduction

The evolution of dryland pasture quality is closely related to the seasonal and inter-annual variability characteristic of the Mediterranean climate. This variability introduces great unpredictability in the dynamic management of animal grazing. The aim of this study is to evaluate the potential of two complementary tools (satellite images, Sentinel-2 and proximal optical sensor, OptRx) for the calculation of the normalized difference vegetation index (NDVI), to monitor in a timely manner indicators of pasture quality (moisture content, crude protein, and neutral detergent fiber). In two consecutive years (2018/2019 and 2019/2020) these tools were evaluated in six fields representative of dryland pastures in the Alentejo region, in Portugal. Grasslands play a vital role in regulating the global carbon cycle, as well as supporting plant biodiversity and livestock production in Montado ecosystem. The real-time decision making that is made possible by the assessment of pasture quality ensures the resilience of these extensive systems, the estimation and adjustment of stocking rates, establishment of a sound scheduling of grazing or mowing, and the supplementary feeding or grassland improvements with legumes mixes, soil fertilization, or pH correction.

Despite the complexity of grassland ecosystems, characterized by mixed species composition and strong spatial and temporal variability, this work opens perspectives to explore new solutions in the field of Precision Agriculture technologies based on spectral reflectance to respond to the challenges of economic and environmental sustainability of extensive livestock production systems.

Lessons learned

The results show a significant correlation between pasture quality degradation index (PQDI) and NDVI measured by remote sensing (R^2 = 0.82) and measured by proximal optical sensor (R^2 = 0.83). These technological tools can potentially make an important contribution to decision making and to the management of livestock production. The complementarity of these two approaches makes it possible to overcome the limitations of satellite images that result (i) from the interference of clouds (which occurs frequently throughout the pasture vegetative cycle) and (ii) from the interference of tree canopy, an important layer of the Montado ecosystem.

This work opens perspectives to explore new solutions in the field of Precision Agriculture technologies based on spectral reflectance to respond to the challenges of economic and environmental sustainability of extensive livestock production systems.

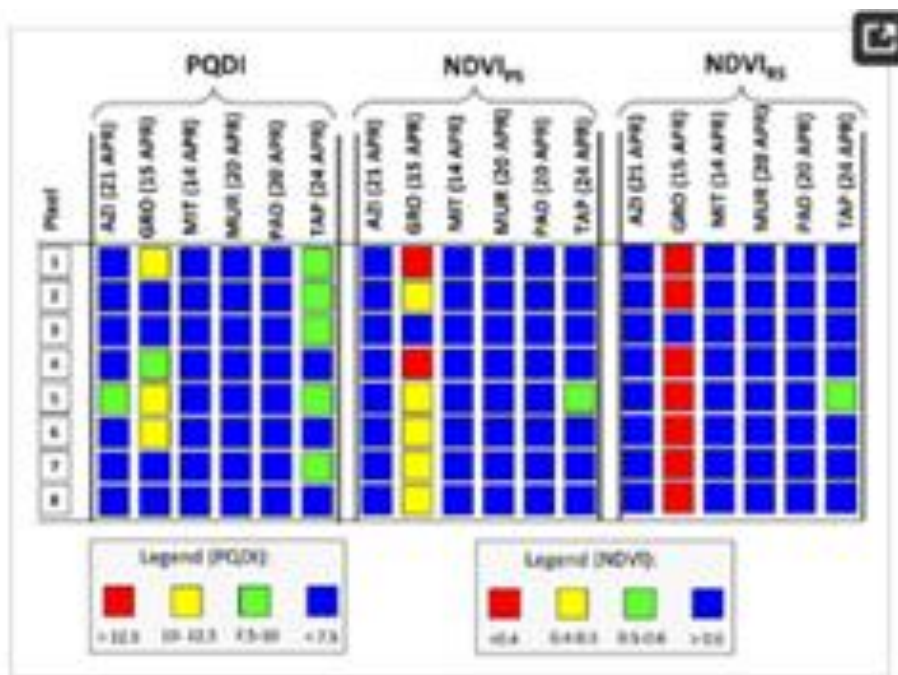## For more information contact

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Figure 15. Example of spatial variability of pasture quality degradation index (PQDI) and normalized difference vegetation index (NDVI) obtained by proximal and remote sensing (PS and RS, respectively) within each experimental field in April 2020.

Figure 1. Example of spatial variability of pasture quality degradation index (PQDI) and normalized difference vegetation index (NDVI) obtained by proximal and remote sensing (PS and RS, respectively) within each experimental field in April 2020.

The information presented in this factsheet was developed by the FOREST4EU partner, drawing on the innovations and knowledge generated by the indicated operational group with their explicit authorization.

Further information

https://eu-cap-network.ec.europa.eu/projects/increasing-viability-sown-biodiverse-pastures-through-optimization-phosphate-fertilization_en

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