USE OF SOIL APPARENT ELECTRICAL CONDUCTIVITY AS PREDICTOR OF SOIL PROPERTIES VARIABILITY IN PERMANENT PASTURES OF THE FLOODING PAMPAS (BUENOS AIRES, ARGENTINA)

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INTRODUCTION

The application of precision agriculture is currently being applied for cropping but not for pastures in livestock production. However, in the Flooding Pampas (Buenos Aires Province) spatial variability of soil types at farm and paddock scale is usually very high. Soil apparent electrical conductivity measurement (ECa) in one of the methods currently used to map soil variability due define homogenous areas for specific management technologies. Our objective was to examine ECa as a predictor to evaluate the variability of soil properties that might influence in pasture performance.

RESULTS

There were significant differences in pH between ECa classes (LOW, MEDIUM, HIGH) in both sites ($p<0.05$). Therefore, the data showed that significant ($p<0.05$) and positive correlation coefficients were found between these parameters (Fig. 3). Whereas no significant differences in soil gravimetric water content between ECa classes were observed in Haudini field (Fig 4a)($p>0.05$), values were singly higher in the HIGH than in the other two ECa classes in Del Maestro field (Fig. 4b) ($p<0.05$). The differences between sites in moisture content may be explained by the high heterogeneity in Del Maestro because of is composed of various soil series. For this showed higher perceptual variation coefficient in comparison to Haudini (33.3% and 20.1% respectively).

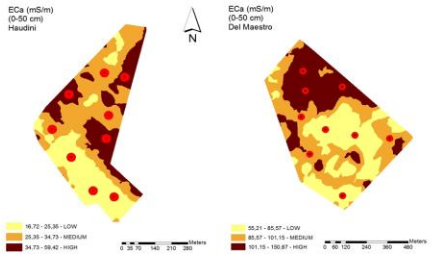

Figure 1 Apparent electrical conductivity (ECa_{50}) map for Haudini and Del Maestro fields with three electrical conductivity classes.

Figure 2. EM38. Apparent soil electrical conductivity sensor.

MATERIALS AND MÉTHODS

The study was performed in two fields located in General Madariaga, Buenos Aires Province, Argentina. Soil properties and ECa were measured at 0-50 cm soil depth. Soil ECa measurements were made using the EM38 (Fig. 2). Soil sampling was done by zones, based on three ECa classes. Soil ECa values and amplitude were classified by equal area quantiles using the Geostatistical Analyst in ArcGIS 9.3.1 (Fig. 1). Three representative geo-referenced soil-sampling points were selected within each ECa classes identified (Fig. 1). Soil samples were analized for soil gravimetric water content and for pH, in 1:2.5 (soil:water) suspension, by the electrometric method .

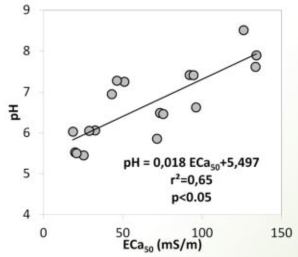

Figure 3. Relation between ECa_{50} and pH (measured at 0-50 cm soil depth) for Haudini and Del Maestro fields.

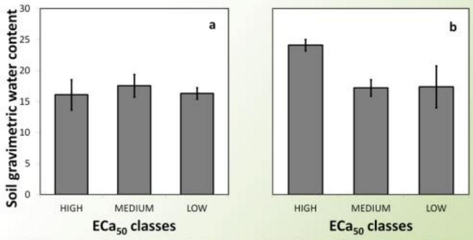

Figure 4. Soil gravimetric water content means within three classes means of apparent electrical conductivity (Eca_{50}) at (a) Haudini and (b) Del Maestro fields.

CONCLUSION

Our evaluation provide evidence that soil ECa is useful in identifying sites whit different pH in soils of the Flooding Pampas and showed potential for use in site-specific management of permanent pastures. However, further experimentation is necessary to confirm these findings.

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