RELATIONSHIP OF SOIL TO NATIVE PASTURE IN A FLOODING PAMPA AREA (ARGENTINE)

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ABSTRACT
The influence of the topography in soils found in the area surrounding the Chascomús lagoon is examined. The study of the profiles within the representative transect in each microenvironment reveals changes related to its traits. Its relationship with the vegetation present in each toposequence position was observed.

The worsening of the natural drainage conditions, are related to reduction of organic matter, increase in the values of pH and PSI, greater intensity of hydromorphic traces and appearance of groups of characteristic species.

KEYWORDS
Flooding Pampa, Soil, Rangeland, Hidromorphism, edaphic characteristics

INTRODUCTION
The Flooding Pampa constitutes a noteworthy example of low slope rangeland with a completely flat appearance. Nevertheless, irregularities in the terrain exist on a local scale which result in differences in runoff and produce surface accumulations in the concave sectors as well as on the flat which present particular features in the hydromorphic profiles which predominate in the region.

The water dynamic in the landscape has been recognised by authors that have studied its influence on soil variance (Hall et al., 1991).

In temporarily saturated soils, variations in the depth of the saturated stretch of the profile have been proved while the irregularities increase, effects that interact with the vegetation which covers them (Richardson et al., 1994).

The aim of the work is to deepen the knowledge of the interrelations between the topographic changes, the soils and the grassland which grow in the aforementioned environment.

MATERIALS AND METHODS
The soils were studied in a farm located in the borough of Chascomus to the east of the Lagoon of the same name. The photointerpretation of the soils by means of photographs was performed scale 1:20.000 and enlargement (1:10.000) allowing for the delimiting of the existing subscapes.

The topographic study of the lands of the establishment was performed to determine the direction of the superficial runoff and toposequence profiles. Levelling by transects with geodetic level was used, taking in positions ranging from normal to concave. The points fixed at a distance of 20 m apart covered a line extending to 1000 m.

The study of the morphology of the profiles and of analytic data of interest allowed for the initial characterisation of the soils located in each position of the toposequence. The taxonomic classification allows for the extrapolation of the results within the geomorphological area.

In spring and summer, species collection for herborization classification was carried out and censuses were performed utilizing the methodology of Braun Blanquet (1950), ten replications each position which allowed for the establishing of species groups.

RESULTS AND DISCUSSION
By studying soil profiles located along the transect the features, properties and link with the vegetation were defined.

The geomorphological area which it belongs to is that of the "Transition area with the Salado River" (Tricart, 1973).

The soils from the upland present a horizon A1 of 30 cm thickness and well supplied with organic matter, followed by a horizon of transition AC of variable thickness (15 to 30 cm) with mottled ferromanganesic commons. The epipedon in this position of the toposequence gains the greatest development. The solum stretches close to a metre in observations carried out. The reaction is in all the profile close to neutrality. The highest flood averages do not manage to cover these sectors. They belong to the subgroup Thapto Argic Hapludoll.

In the position of the half slope the soils found are similar although the differential feature is the absence of the horizon Ac and where the passage of the A towards the subjacent horizon is made by a abrupt smooth limit. The epipedon is dark in colour (10 YR 4/2), well supplied with organic matter and the complex of interchange is dominated by Ca and Mg. The solum stretches to a depth of one metre and frequently calcium carbonate is found in the horizon BC, from 65 cm depth onwards. The soils belong to Aquic Argiudoll . They show traces of hydromorphism with ferromanganesic concretions in the B horizon and mottled commons in the A. In all the profile the pH is close to 7 and does not show salinity traces.

In the upland and half slope the following have been found among the dominant species: *Paspalum dilatatum, Stenotaphrum secundatum, Botriochloa laguroides, Lotus tennuis, Cynodon dactylon;* and as accompanying species: *Setaria geniculata, Trifolium repens, Eringium ebracteum, Lolium multiflorum, Ambrosia tenuifolia, Hipochoeris radicata* and presence of isolated *Juncus* and *Cyperus*.

In the best-drained positions with Thapto Argic Hapludolls the following predominate *Stipa neesiana, Botriochloa laguroides, Piptochaetium bicolor, Piptochaetium montevidense, Bromus unioloides*, there is also the presence of *Glandularia peruviana, Glandularia disecta, Melica brasiliana, Ambrosia tenuifolia*. There are frequent associations of *Paspalum quadrifarium* in the upland and in the flat positions without swamping accompanied by species of the wet meadow and the alkaline meadow.

In the flat land, the soils are found in units of the type complexes of alkaline-hydromorphic characteristics, the slope in this sector at the transect being 0,2 %. The solum reaches approximately 80 cm depth and the water table close to 60 cm in winter. The soils are poorly drained, with abundant mottles and ferromanganesic concretions from 30 cm. There are profiles with high alkalinity from surface and with ocric epipedon (Typic Natraqualf) and others with molic epipedon, represented by Typics Natracuolls, with high PSI values in subsuperficial horizons (27 % PSI).

The species that dominate are as follow: *Panicum gouinii, Panicum milioides, Stenotaphrum secundatum, Lotus tennuis,* and as accompanying species: *Paspalum distichum, Menta puligeum, Adesmia bicolor, Hidrocotile bonariensis, Sida leprosa, Cyperus, Carex sp.; Juncus imbricatus, Eleocharis viridans, Dichondra microcalyx.*

In the alkaline soil the following predominate: *Distichlis spicata* and *Distichlis scoparia* and as accompanying species *Sporobolus indicus, Melilotus indicus* and *Plantago myosurus.*

In the position surrounding the depressions the soils present an A horizon with a high content of organic carbon followed by an E horizon deeply eluviated, clear in colour, with mottling. The hydromorphic features are intense in the Bt with abundant ferromanganesic concretions and gleyed coloration.

For much of the year the area is swamped and from April onwards the subsurface water table reaches inside the profile to 40 cm in depth and fluctuates throughout December. Salinity is not present in any horizon.

In the depressions and swamping areas the dominant species are *Solanum malacoxilon, Gliceria multiflora and Paspalidium paludivagum, Distichlis scoparia* and as accompanying species *Paspalum vaginatum, Alternanthera phyloxeroides, Marsilia concinna, Juncus sp* and *Cyperus.*

The results of the study of the profiles and the grassland emphasise the value of topography, which produces modifications in the genetic processes of the soil and in the hydrological features, influencing the appearance of plant species with different requirements. These influences are seen in this example where the irregularities of the terrain are small in size (0,37 m between edge of depression and flat land, Figure 1) .

It is clear that the topographic position, is a determiner in the variation of certain parameters amongst which are pH and percentage of organic matter and the distribution of organic matter within the profile.

The worsening of the natural drainage conditions are related to reduction of organic matter, increase in the values of pH and PSI, greater intensity of hydromorphic traces and appearance of groups of characteristic species. The depth of the solum reveals important changes throughout the transect (Figure 2). The vegetation accompanies the changes in the soil through specie group with hydromorphic, hydrohalomorphic or halomorphic characteristics.

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Figure 1
Localization of the profiles within the transect.

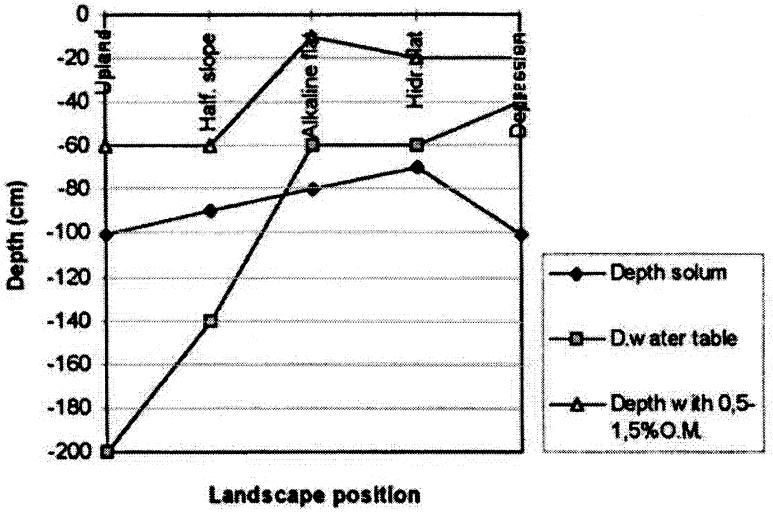

Figure 2
Relation between edaphics characteristics and topographic position