Research Note

SALINITY INCREASES WITH DEPTH AT THE CAÑO TIBURONES AREA IN NORTHERN PUERTO RICO[1]

The Caño Tiburones area is a narrow, rather long depression about 15 km long by 1.5 km wide, approximately 2200 hectares. It is located on the northern coast of Puerto Rico, between the municipalities of Arecibo and Barceloneta. It extends from the mouth of the Arecibo river, one of the largest of the Island, to a short distance west of the Manatí river. The area is separated from the sea, about 2 kilometers to the north, by gently rolling tertiary limestone hills and coastal plains. Its soils range from organic soils near sea level (comprising approximately 1500 has), to mineral soils, about 2 m above sea level along the border of the sea (comprising 730 has).

According to Roberts[2], the agricultural development of the Caño Tiburones area began in 1907 with partial reclamation of a few tracts for sugarcane production. At present, only 154 has of land in Finca Matos are planted in sugarcane. The rest has been abandoned.

In 1949 the Land Authority of Puerto Rico started to reclaim this large area for agricultural use. A 18.3 m-wide, 6.1 m-deep principal canal, 15.3 km long, which slopes from east to west, was built to take care of the excess water of the area itself and water coming from diversion canals which border the area on the south, east, and northeast. The principal drainage canal is supplemented by another larger canal in the central northern part of the area. There are about 132 supplementary canals.

These drainage canals are joined by submains every 200 to 300 m apart flowing in a north to south and south to north direction. These submain canals collect drainage waters from field laterals. Automatic tidal gates in the northeastern and northwestern corners of the area have been installed to prevent entry of sea water. A pumping station installed in the northwestern corner consists of 4 turbines with a capacity of about 300,000 gal/min, removing an average of 196 hectare-meter daily.

In 1957, the Soils Department of the P.R. Agricultural Experiment Station conducted a salinity survey of nearly two thirds of the Caño Tiburones area. Bulk samples were taken with a bucket type auger from 0 to 20, 20 to 60, 60 to 120 and 120 to 180 cm depths at about 75 points. The samples were air-dried, saturated with distilled water and extracted by means of a vacuum pump.

[1] Manuscript submitted to Editorial Board September 19, 1978.

[2] Roberts, R. C., Soil Survey of P.R., USDA Bur. Plant Ind. and Univ. P.R., 1942.

TABLE 1.—*Mean electrical conductivity of the saturation extracts; soluble Ca + Mg, and Na; exchangeable Na percentage, and soil pH at different soil depths*

Soil depth	Soil pH	Electrical conductivity	Ca + Mg	Na	Exchangeable sodium
Cm		*Mmhos/cm*	*Meq/l*	*Meq/l*	%
0–20	5.9	15.2	74.9	77.1	15
20–60	5.5	20.4	99.9	104.1	17
60–120	5.2	36.1	169.1	191.9	24
120–180	5.2	39.5	173.2	221.8	26

The conductivity of the saturation extract was measured by a standard Solu-bridge. Ca + Mg were measured by the Versenate method. Soluble sodium was estimated by substracting the Ca + Mg from the value obtained by multiplying electrical conductivity by 10. Exchangeable sodium was estimated with a nomogram which has soluble Ca + Mg and Na as variables.

Table 1 shows data on the mean electrical conductivity of the saturation extracts, soluble Ca + Mg, Na, exchangeable Na percentage and soil pH at indicated depths.

Salinity increases with depth from 15.2 to almost 40 mmhos/cm. So does sodium, which is 3, 4, 13 and 28% higher than Ca + Mg on the 0–20, 20–60, 60–120 and 120–180 layers, respectively. This indicates salt leaching but at this point it is difficult to point out the intensity of leaching and the outlook for a complete reclamation. A salt monitoring program should be established in selected stations to clarify this point in a matter of 2 or 3 years.

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