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CHANGES IN SOIL POTASSIUM CONCENTRATIONS IN THE TOP 6-INCH SOIL DEPTH IN COMMON AND COASTAL BERMUDAGRASS PASTURES DURING 35 YEARS OF STOCKING AND FERTILITY REGIMENS

M.L. Silveira, F.M. Rouquette, Jr., J.L. Kerby, G.H. Nimr, V.A. Haby, and G.R. Smith

Background. A detailed description of stocking rates and fertility regimens from 1969 through 2005 are presented in a companion 2006 Field Day Report by Rouquette et al. The objective of this study was to evaluate changes in potassium (K) distribution within the 0-6 inch soil profile in bermudagrass pastures.

Research Findings. Extractable soil K concentrations in the 0-6" soil depth were consistently low, and ranged from ~ 7 to 150 ppm (Figure 1). On average, soil K concentrations were rated as either very low (0-90 ppm) or low (91-130 ppm). The only exception occurred in 1994, when extractable soil K increased in high stocking rate common bermudagrass pastures overseeded with clover and no applied N. Potassium is utilized by forages in relatively large quantities, usually as great as N, therefore soil levels can be considerably depleted due to plant uptake. Because K is mobile in soils, residual K (not used by plants) can be leached to deeper soil depths.

Although larger K concentrations were usually observed in pastures that received no N, overseeded with clover, and received average annual K application rates of ~100 lbs K_2O/ac for 35 years (1969-2004), K concentrations in the top 0-6-in soil depth were not significantly greater than that in the bermudagrass pastures receiving only N and overseeded with ryegrass. Pastures fertilized with N and overseeded with ryegrass received no K for 13 years (1985-1997), and soil concentrations were relatively constant with time. From 1998-2004, all pastures received about 100lbs/ac K_2O (Rouquette et al 2006). Plant and animal wastes recycled K to maintain low soil levels. There was no clear effect of different stocking rates on soil K concentrations.

Applications. The surface horizon (0-6") of Coastal Plain soils may not supply adequate amounts of K for optimal forage growth. The large K requirements of forages rapidly depletes soil K concentrations in the surface soil depths. Because of the coarse texture and poor sorbing capacity of these soils, residual K eventually leaches to deeper soil depths. Nutrient recycling via plant and animal wastes in grazed pastures contribute to maintain low levels of K in soils, but K fertilization must be included in soil fertility management strategies in order to maintain sustainable bermudagrass production on Coastal Plain soils. Relatively low K fertilizer inputs may be feasible for bermudagrass under grazing systems. However bermudagrass used

exclusively for hay production removes significant amounts of K exported with forage; thus larger K fertilization rates are required to maintain adequate forage growth and sustained stands.

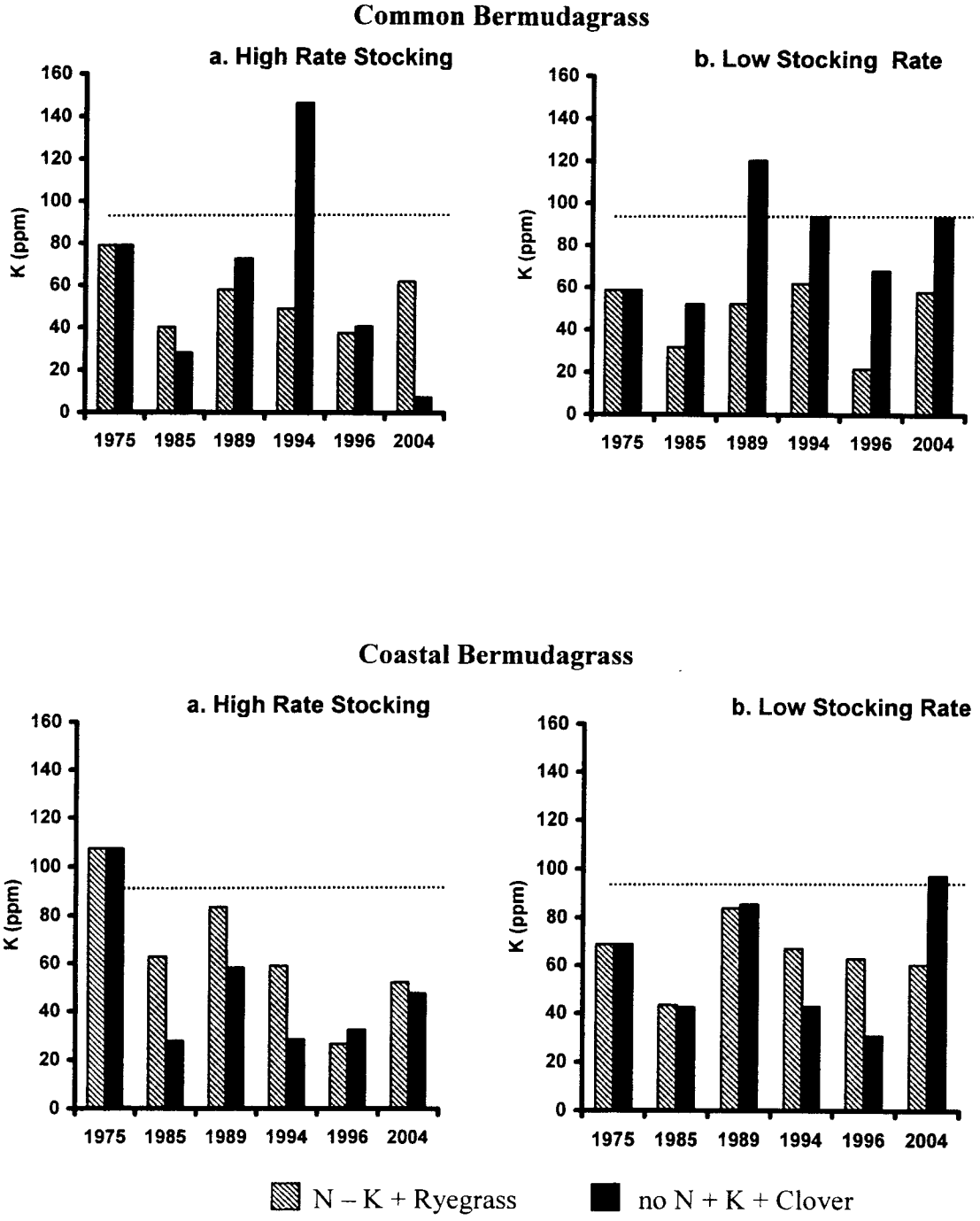

Figure 1. Changes in soil K concentrations (0-6") in bermudagrass pastures under different stocking rates and fertility regimens. Dashed lines represent limit between very low and low K concentrations in soils.