MAGNESIUM DISTRIBUTION AT VARIOUS SOIL DEPTHS IN BERMUDAGRASS PASTURES UNDER CONTINUOUS STOCKING FOR 35 YEARS

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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 long-term changes in soil magnesium (Mg) concentrations during 30 years (1975-2004) of continuous stocking.

Research Findings. Soil Mg concentrations were depleted in the top soil horizon (0-6") and tended to accumulate steadily with depth, especially under common bermudagrass (Figure 1). Smaller Mg concentrations in shallower horizons are consistent with the zone of high nutrient depletion by common and Coastal bermudagrass. Magnesium abundance in deeper depths also can be related to preferential retention of leached Mg by increasing clay content and Al minerals present in deeper soil depths. Dissolution of residual limestone applied to these pastures likely contributed to the exchangeable-Mg pool in the soil.

Soil Mg concentrations were ranked low (0-50 ppm) to medium (51-150 ppm) in the upper soil depths and medium to high (> 150 ppm) in the deeper horizons. Soils with common bermudagrass pastures, in general, showed greater Mg concentrations than soils with Coastal pastures, especially at deeper depths. This pattern was probably due to differences in root distribution, dry matter production and nutrient uptake efficiency. In addition, soil type differences could have been a contributor to difference between Mg in common and Coastal bermudagrass pastures. Although N fertilized, overseeded ryegrass treatments received more limestone (total of 2.75 tons/ac applied from 1991 to 2001) than overseedeed clover (no N fertilizer) pastures, there was no clear evidence that fertilization regimens affected overall soil Mg distributions. Similarly, different stocking rates showed no effect on Mg concentration and/or distribution. However, along with high-Mg limestone, continuous stocking may have contributed to increased Mg concentrations in soils over time. Soil Mg concentrations; in general, were greater in 2004 compared to that in 1975, which may be due in part to added Mg fertilization beginning in 1998 (Rouquette et al).

Applications. Improved bermudagrass pastures that are limed based on soil test recommendations can exhibit adequate soil Mg concentrations for forage growth. Because of pedogenic characteristics of the soils associated with favorable environmental conditions for nutrient leaching, Mg tended to be preferentially retained in deeper soil depths. This suggests that despite the low Mg concentration that upper horizons can exhibit, deep-rooting bermudagrasses can still absorb sufficient amounts of Mg from the lower soil profile. Nutrient recycling via animal wastes and plant cycling can play an important role in supplying Mg for sustainable bermudagrass production.

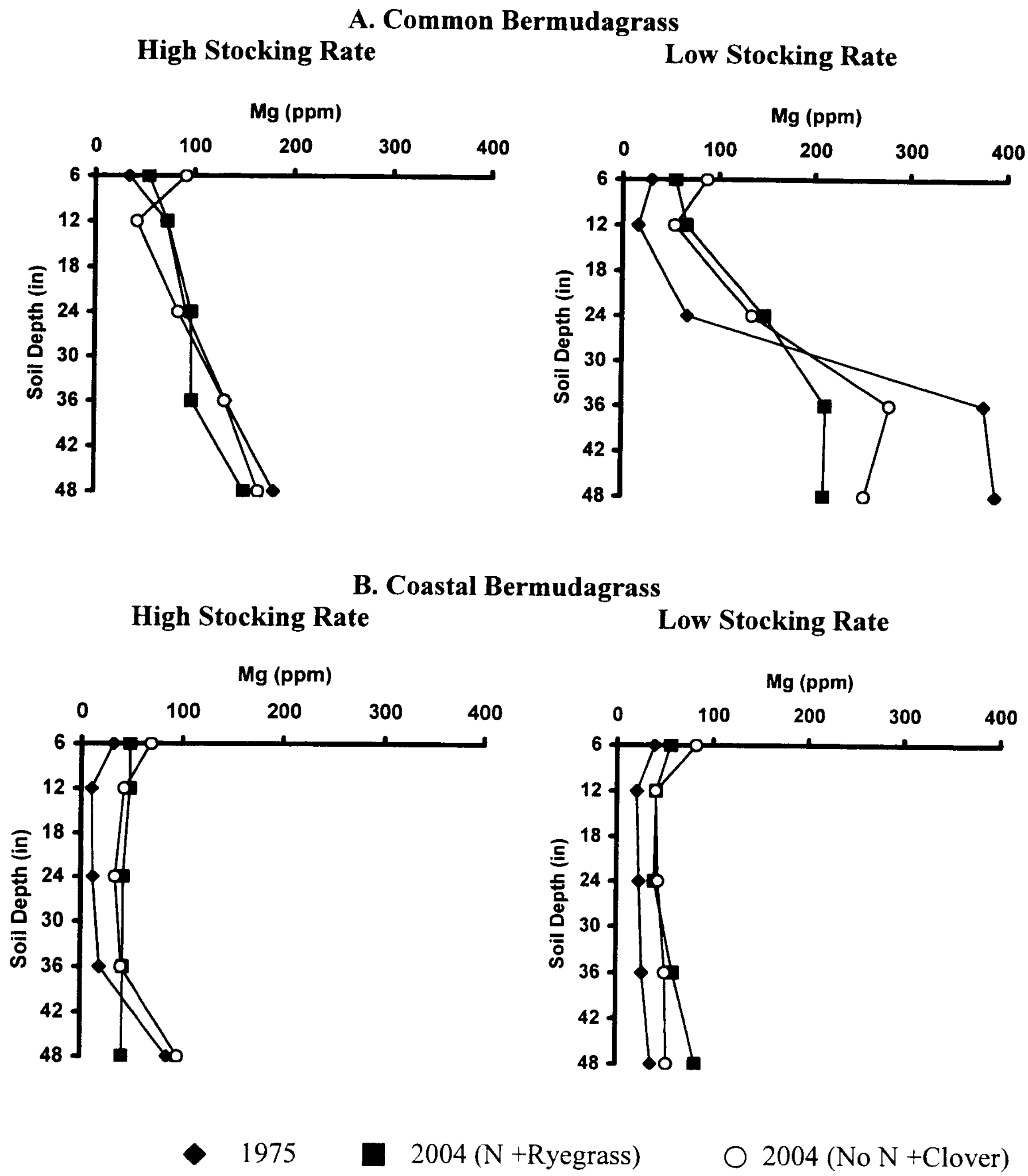

Figure 1. Soil Mg concentrations in Common and Coastal bermudagrass pastures under different stocking rates and fertility regimens.