

Liming Acid Soils for Ryegrass Production

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Annual ryegrass is an important cool-season forage crop that may be seeded into a prepared seedbed or overseeded into grass sods in the fall to extend grazing into late fall, winter, and spring in the southern and southwestern U.S. In the Coastal Plain area of Louisiana and Texas more than one million acres are planted to ryegrass each year.

Studies at the Texas A&M University Agricultural Research and Extension Center at Overton found that ryegrass is relatively intolerant to soil acidity. Strongly acid Coastal Plain soils, pH 4.0 to 5.0, normally have low levels of extractable calcium (Ca) and magnesium (Mg) and high levels of extractable aluminum (Al).

Annual ryegrass is relatively intolerant to soil acidity. Marshall ryegrass response to incorporation of 1.7 tons/A of 62 percent effective calcium carbonate equivalent (ECCE) aglime into an acid (pH 4.7) Lilbert loamy fine sand two years earlier is shown in the photo. Application of aglime at a rate of 0.3 ton/A on July 1 raised soil pH from 4.7 to 4.8 by fall (Table 1). It decreased extractable soil Al from 23.4 to 19.6 parts per million (ppm), and had no effect on soil extractable manganese

(Mn). Ryegrass forage production the following year was 4,523 lb/A due to this treatment. An application of 1.7 tons/A of aglime increased ryegrass forage yields to 5,379 lb/A. The unlimed soil produced only 2,783 lb of forage per acre.

Liming an acid soil for ryegrass production increased forage yields over a four-year period. The value of increased forage yield for the 1986 season was estimated to exceed \$400 per acre.

After three years of nitrogen (N) treatments totaling 1,214 lb/A for ryegrass and Coastal bermudagrass, pH in the soil treated with 1.7 tons of aglime/A had declined to 4.6, but ryegrass yield was still 5,415 lb/A. Extractable Al in soil

treated with 0.3 ton of aglime/A was 23.4 compared to 13.1 ppm at the 1.7 ton/A aglime rate. Extractable Ca was 296 ppm in soil treated with the high rate compared to 162 and 169 ppm for the control and 0.3 ton/A rate of aglime, respectively. The decreased extractable Al and increased level of extractable Ca appeared to relate better to ryegrass yield than did soil pH.

Figure 1 shows the greater neutralizing effect of aglime with ECCE 100 as compared to ECCE 62 aglime on a Darco

TABLE 1. Soil pH and Marshall ryegrass response to aglime incorporated into a Lilbert loamy fine sand.

Aglime rate, tons/A	Fall of application year, pH	Dry matter 1984, lb/A	pH, 1985	Dry matter 1986, lb/A	pH, 1987	Dry matter 1987, lb/A
0	4.7	2,783	4.5	3,434	4.5	633
0.3	4.8	4,523	4.7	4,576	4.5	981
1.7	5.7	5,379	6.2	7,422	4.6	5,415

Texas

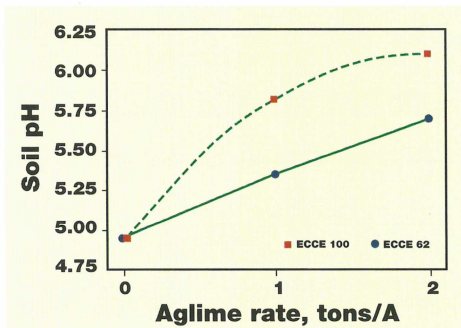


FIGURE 1. Impact of aglime rate and effective CaCO_3 equivalent (ECCE) on pH in the 0 to 6 inch soil depth two and a half years after treatment.

loamy sand. One ton of ECCE 100 aglime raised pH higher than did 2 tons/A of ECCE 62.

Economic estimates of the value of the ryegrass response to aglime applications projected that had the increased forage been grazed by stocker cattle weighing 450 lb each, the added monetary return over the cost of the lime in 1986, three years after application, could still exceed \$400/A. The response curve predicted that the marginal rate of return may have occurred beyond 2 tons of aglime per acre (**Table 2**).



APPLICATION of 1.7 tons of aglime per acre to a Lilbert soil with pH 4.7 increased forage yields an average of 3,785 lb/A over three production seasons in a Texas Agricultural Experiment Station study.

Summary

Recent Texas research on treatment of acid, Coastal Plain soils with aglime for ryegrass production emphasizes the improvement in forage yield that can be obtained. Producers need to think of aglime as an investment that provides excellent returns over multiple years from increased ryegrass production. **BC**

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TABLE 2. Economic evaluation of estimated livestock gains from increased yield of annual ryegrass in 1986 due to liming.

Aglime application, tons/A	Ryegrass yield, dry matter lb/A	Yield increase, dry matter lb/A	Added incremental cost ¹ , \$/A	Added return ² , \$/A
0	3,233	—	—	—
0.5	5,148	1,915	12	186.00
1.0	6,503	1,355	12	132.00
1.5	7,298	795	12	77.00
2.0	7,533	235	12	23.00

Marshall variety.

¹Aglime cost estimated at \$24/ton applied.

²Forage consumption and rates of gain estimated using a computerized simulation program. Based on \$85.00/cwt steers.