INFLUENCE OF NITROGEN FERTILIZATION ON FALL AND WINTER GROWTH OF ANNUAL RYEGRASS

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Background. Annual ryegrass is an important cool-season annual forage for our region because it is easy to establish, very productive, and later maturing than other cool-season annual grasses. The crude protein content is in excess of 20% until seedheads appear in May. The preferred planting time for maximum yield is from mid-September through mid-October in a prepared seedbed or lightly disked sod. However, if only spring grazing is desired it can be planted until mid-November. Nitrogen fertilization (N) is the most expensive component of ryegrass management in East Texas because of the low fertility soils. The amount of N applied should be based on a soil test. The recommended amount is split in two to four applications depending on if it is a pure ryegrass stand or mixtures with small grains to avoid N leaching and enhance utilization of nitrogen. Research is needed to understand N utilization by ryegrass and provide the most economical guidelines for producers. A 2 year study began in the fall of 2001 at the Texas A&M University Agricultural Research and Extension Center at Overton. TAM 90 annual ryegrass was seeded at 30 lb/acre in a prepared seedbed. The study was divided into three sectors for measuring fall, winter, and spring growth response to N fertilizer. In the fall sector, 0 50, 100, and 150 lb N/acre were applied at planting. Ryegrass sampling was initiated 3 weeks after planting and continued at two-week intervals up to 9 weeks. In the winter sector 50 lb N/acre was applied at planting for fall growth. On December 21, 2001, top growth was removed to a 2 in. height and the four N fertilizer treatments applied. The winter plots were sampled 2 weeks later and at two-week intervals up to 8 weeks.

Research Findings. In the fall there was a trend for ryegrass growth to increase as N rate increased at all sampling dates. The differences among N treatments at 3 weeks were very small. At the following three sampling dates yields at the 50 lb N/acre were never significantly higher than the no N treatment. When 100 lb N/acre was applied, ryegrass production was greater than the no N treatment. This implies that more than 50 lb N/acre is needed to increase fall ryegrass production. Applying more than 100 lb N/acre did not cause a significant yield increase. Table 2 depicts the yield response of annual ryegrass to nitrogen fertilizer applied in late December. In the winter treatments, N fertilizer did not produce a significant increase in growth until 8 weeks, which was mid-February. Low temperatures were limiting ryegrass growth more than N from late December to late January. At 6 weeks there was a trend for ryegrass growth to increase up to 100 lb N/acre although it was not significant. At 8 weeks yields of both the 100 lb N/acre and 150 lb

N/acre treatments were significantly higher than the 0 and 50 lb N/acre rates. Although there was little significant difference among N rates within sampling dates, there was a difference in growth accumulation over the sampling period within N treatments. At the 0 N rate growth increased about 50% from 2 to 8 weeks. When N was applied, growth increased 150% over the same period.

Application. Annual ryegrass response to N fertilizer was greater in fall than winter because lower temperatures during the winter limited growth. Maximum fall growth occurred when more than 50 lb N/acre were applied at planting. It would be best to delay the initial N application until the ryegrass has emerged and seedlings have at least two leaves. Nitrogen applied at planting could be lost if followed by a heavy rain before ryegrass seedlings are capable of taking up N. During the winter, ryegrass growth was limited more by low temperatures than N. If winter pasture production is needed, rye or wheat, which have greater cold tolerance than ryegrass, should be mixed with ryegrass.

Table 1. Yield response of annual ryegrass to nitrogen fertilizer applied at planting.

N rate	Week			
	3	5	7	9
lb/ac	lb DM/acre			
0	309 c†	818 b	1233 c	1727 c
50	406 b	988 b	1706 bc	2422 bc
100	434 b	1283 a	2062 ab	3042 ab
150	520 a	1322 a	2389 a	3710 a

†Yields within week followed by the same letter are not significantly different at 0.05 level.

Table 2. Yield response of annual ryegrass to nitrogen fertilizer applied in late December.

N rate	Week			
	2	4	6	8
lb/ac	lb DM/acre			
0	1190 a†	1340 a	1410 a	1770 b
50	910 a	1610 a	1830 a	2190 b
100	1110 a	1580 a	2170 a	2880 a
150	1220 a	1640 a	2070 a	2810 a

†Yields within week followed by the same letter are not significantly different at the 0.05 level.