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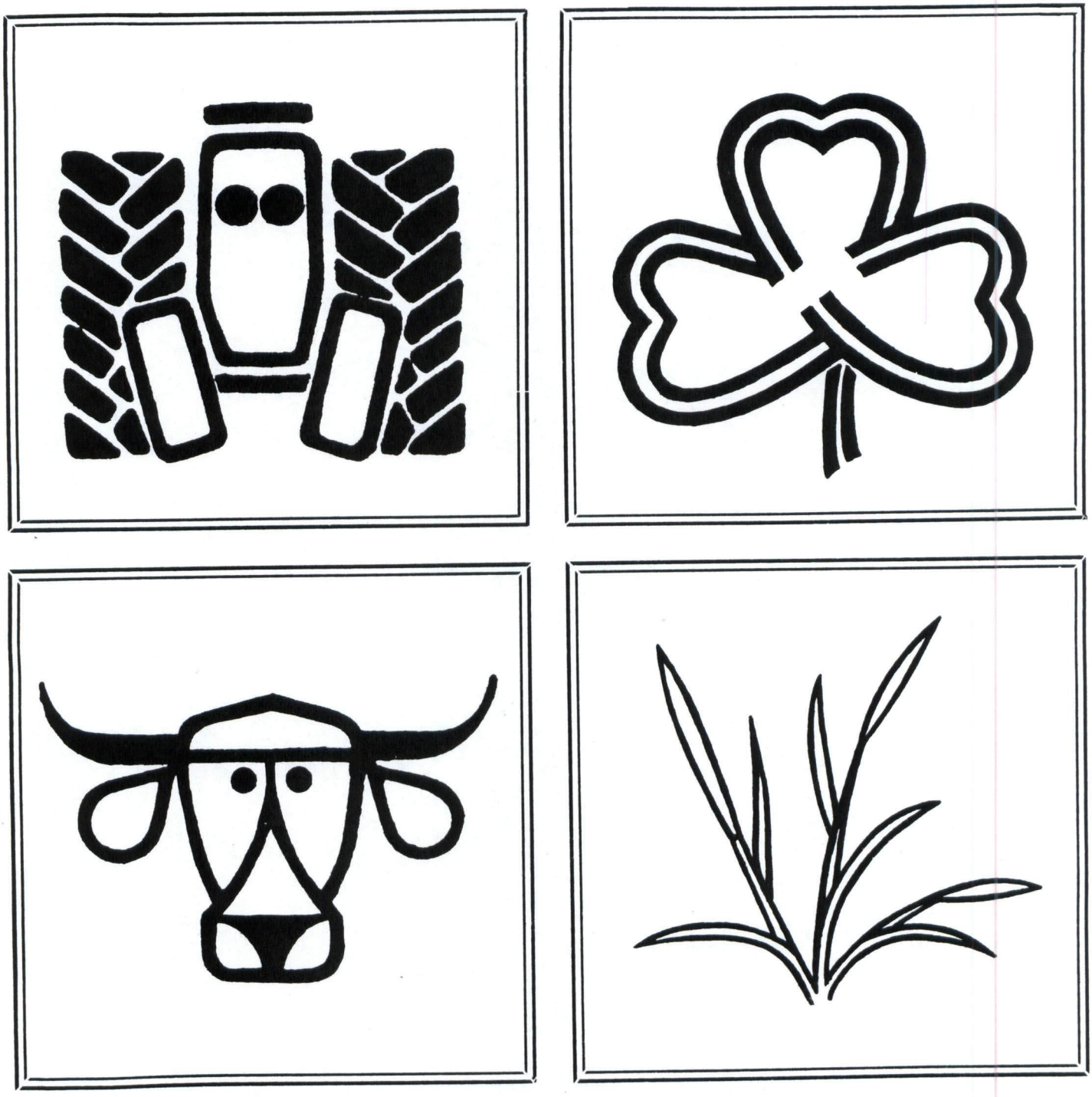

Forage Research in Texas

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Forage and Grain Yields for Small Grain as Affected by Phosphorus Sources

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SUMMARY

New TVA pilot plant urea phosphates (UP) were compared with fluid ammonium polyphosphate (APP). Response to nitrogen without phosphorus was minimal. Twenty pounds per acre of phosphorus increased wheat forage yields more than 80 lb/Ac of nitrogen when not accompanied by phosphorus. Urea cogranulated with UP materials was as effective a source of nitrogen and phosphorus as fluid APP and fluid nitrogen (32-0-0). Although ammonium volatilization loss of nitrogen from urea would normally not be a significant factor on cool season annuals, nitrogen response appeared better with a 40 percent increase from urea cogranulated with urea phosphate (UPP) than from urea applied separately with urea phosphate (UP). Simulated grazing in January reduced grain yields some 25 percent when compared to ungrazed conditions.

Introduction

Increasing fertilizer costs have subjected the small grain producer to a tighter production cost-return squeeze. A significant portion of the fertilizer costs budget has been the continued rise in costs of phosphorus fertilizer. An imbalance of phosphorus reduces nitrogen fertilizer efficiency and further increases production costs. Recent advances in phosphorus fertilizer technology have made available new sources of phosphorus that could be used in forage production. These high analyses materials could play a role in reducing phosphorus fertilizer costs. Small grain response data to these new phosphorus sources is not available for South Texas soils.

Materials

Nadadores wheat was grown in prepared seedbed systems at the Texas Agricultural Experiment Station at Beeville. The test site was located on a Clareville clay loam soil. Urea phosphate (17-44-0), urea cogranulated with urea phosphate (34-17-0) were evaluated at two levels of phosphorus application. Both the 20 and 40 lb P_2O_5/Ac rates of UP and APP were compared at 40 and 80 lb/Ac of nitrogen. All fertilizer materials were incorporated into the prepared seedbed approximately a week prior to small grain seeding. Forage was harvested from split plot sections of each plot in January while the remainder of the plot was left unharvested.

Discussion

Small grain response data in terms of forage and grain yields are presented in Table 1. In addition to treatment response from phosphorus and nitrogen sources the data also presented information on the effects of simulated grazing of wheat on grain production. Treatment averages across all 10 fertilizer treatments for the dry and fluid fertilizers

showed essentially no difference in forage yields due to fertilizer form. Similar averages for grain production for both grazed and ungrazed treatments showed the granular UP materials to be as effective as the fluid APP materials. However, the data indicate that nitrogen and phosphate source variation did exist. Within the dry materials, urea cogranulated with (UUP) at the 80-40-0 rate produced approximately 40 percent more forage than urea applied separately with UP. Nitrogen without phosphorus produced no forage yield response. Twenty pounds P_2O_5 per acre gave a 31 percent increase in forage yields while an additional similar increment produced a 59 percent yield increase.

With fluid APP and fluid urea, plant responses were even more dramatic. These responses were 36 and 129 percent greater than the phosphorus control, respectively, for the 20 and 40 lb/Ac P_2O_5 rates. However, a portion of this response may have been due to nitrogen source since the 40-0-0 treatment had urea as the source while the 40-20-0 and 40-40-0 had fluid 32-0-0 as the source. Addition of potassium (80-40-40) and incorporating the fertilizer prior to planting apparently had no effect on forage or grain yields.

Grain yields from ungrazed wheat generally change little with treatment except in the comparison of 80-0-0 with 80-20-0 rates. Approximately a 25 percent grain yield increase occurred with 20 lb P_2O_5/Ac. Increasing phosphorus to 40 lb/Ac resulted in no additional yield increase. The same treatment caused a severe grain yield reduction. No explanation is offered at this time for the deleterious effects from the last 20 lb/Ac increment of phosphorus.

These data generally indicate that the new UP materials compare favorably with older APP phosphorus sources. Furthermore the data show that removal of forage down to an approximate 3-inch height in January will cause an approximate 25 percent reduction in grain yield.

Table 1. Effect of urea phosphates, nitrogen source on forage yields and grain production from Nadadores wheat. Clareville clay loam, Beeville.

	Treatment	Fertilizer Source [1] (Liquid & Dry)	Forage (kg/ha) Dry	Forage (kg/ha) Liquid	Grain (bu/ha) Dry [2] Early	Grain (bu/ha) Liquid [2] Early	Grain (bu/ha) Dry [3] Late	Grain (bu/ha) Liquid [3] Late
1.	0-0-0		416	368	33.8	28.4	21.5	20.7
2.	40-20-0	17-44-0 + Urea (UP)	713	1198	27.7	35.1	21.5	19.3
3.	80-40-0	17-44-0 + Urea (UP)	1168	1586	35.8	33.8	24.7	24.9
4.	40-0-0	Urea	666	643	40.0	40.3	35.1	36.6
5.	40-20-0	34-17-0 (UUP)	875	873	32.4	34.3	21.5	21.5
6.	40-40-0	34-17-0 + 0-44-0 (UUP)	1061	1475	33.1	36.6	22.2	20.3
7.	80-0-0	Urea	629	642	36.1	32.9	30.6	30.1
8.	80-20-0	34-17-0 + Urea (UUP)	1499	1146	45.9	41.0	43.0	46.7
9.	80-40-0	34-17-0 (UUP)	1644	1344	40.5	37.5	26.7	27.2
10.	80-40-40	34-17-0 Mix (UUP)	1413	1587	41.5	39.0	27.2	23.2
		$LSD_{.05}$	323	369	-	-		
		$\bar{X}$	1008	1086	36.8	35.8	27.4	27.2

[1] All liquid treatments receiving P had APP as the source.

[2] Wheat was not clipped for forage.

[3] Wheat was clipped for forage in January.