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Forage Research in Texas

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RESPONSE TO PHOSPHORUS BY SMALL GRAINS GROWN
ON SOUTH TEXAS SOILS

OBJECTIVE:

To determine the response of wheat and oats to phosphorus rates as measured by forage and grain yields.

PROCEDURE:

Nadadores-61 wheat and TAM 312 oats were grown at phosphorus rates of 0, 20 and 40 lb P_2O_5/A on Clareville clay loam and Goliad sandy loam soils located at Beeville. On the Goliad soil, 40 lb/A of nitrogen was blanketed across all phosphorus treatments in 1978. Eighty lb/A of nitrogen was used in 1979 on the Clareville soil in order to eliminate nitrogen as a variable. Triple superphosphate (0-46-0) and ammonium nitrate were used as sources of phosphorus and nitrogen, respectively. All fertilizer materials were applied pre-plant and incorporated using a soil rotavator.

Plot sizes ranged from 8' x 20' on the Goliad soil to 10' x 20' on the Clareville soil. Harvest area for forage in each experiment involved 4 drill rows twenty feet in length (2.33' x 20') and 3 drill rows for grain yield.

In 1979 on the Clareville soil, grain harvest was made on plots that had been clipped for forage on February 14. In 1980 relatively poor growth of both oats and wheat occurred during the winter and thus it was decided to only harvest grain in the summer. No grain harvest of oats was possible in 1980 due to serious lodging and deterioration of grain caused by weather.

RESULTS AND DISCUSSION:

Data for oats and wheat grown on a Goliad sandy clay loam indicate that wheat responded significantly to 20 lb P_2O_5/A at the early, midseason and late season forage harvests (Table 1). The dry matter yield response was largest early in the season (December harvest) and about equal for the mid and late season harvests. The largest phosphorus response was associated

with the highest dry matter yields.

The first harvest of oats showed relatively low yields due to fairly uniform accidental grazing by cattle. Field ratings prior to the grazing showed the oats would have normally yielded dry matters about equal to those for wheat. However, oat harvest at mid season generally showed less dry matter production than from the wheat. Production from oats in the spring was only slightly less than from wheat.

Oats showed some response to phosphorus fertilization but the yield increase did not reach significance statistically.

Forage yields from wheat in 1979 were substantially higher than from oats (Table 2) primarily because a sudden January freeze desiccated the oats severely while the wheat suffered only slight damage. Without fertilizer wheat produced 2-3 times as much forage as oats. As was the case the previous year on the Goliad soil, oats failed to show a significant increase in forage yield from phosphorus fertilization. Wheat produced a significant yield increase from 20 lb P₂O₅/A but no additional benefits from high phosphorus rates. Grain yield data indicates no response to phosphorus by either species even though the wheat showed a definite need for supplemental phosphorus when forage yields were measured. At the same time grain yields were more than doubled by an application of 80 lb nitrogen/A.

Grain yields for oats in 1980 (Table 3) were not obtained due to destruction by storms but yields appeared excellent. Severe lodging of wheat occurred and is responsible for the low grain yields. The data indicate a slight response to nitrogen and the low phosphorus rate.

Table 1. Effect of phosphorus rates on dry matter yields (lb/A) of oats and wheat. Goliad scl. Beeville Station. 1978.

Treatment (lb/A) N - P ₂ O ₅ - K ₂ O	1		2		3		4	
	Oats	Wheat	Oats	Wheat	Oats	Wheat	Oats	Wheat
0 - 0 - 0	37	191	57	61	78	98	172	344
40 - 0 - 0	44	285	62	92	207	199	313	576
40 - 20 - 0	63	588	85	173	258	302	406	1063
40 - 40 - 0	95	778	115	216	225	274	435	1268
LSD .05	35	212	32	66	110	96		

Table 2. Effect of phosphorus rates on dry matter and grain yields of oats and wheat. Clareville cl. Beeville Station. 1979.

Treatment N - P ₂ O ₅ - K ₂ O	1b DM/A		Grain (bu/A)	
	Oats	Wheat	Oats	Wheat
0 - 0 - 0	246	314	21.9	14.2
80 - 0 - 0	268	538	45.0	27.5
80 - 20 - 0	376	1101	41.2	27.9
80 - 40 - 0	535	1074	49.1	25.6
LSD .05	186	306	9.1	4.6

Table 3. Effects of phosphorus rates on grain yields of wheat and oats. Clareville cl. Beeville Station. 1980.

N - P ₂ O ₅ - K ₂ O	Oats		Wheat	
	- - - - -bu/A - - - - -			
0 - 0 - 0	0	0	9.6	0
80 - 0 - 0	0	0	11.9	0
80 - 20 - 0	0	0	14.3	0
80 - 40 - 0	0	0	8.0	0