Effect of Phosphorus Fertilizer Application on Cotton Yields

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Summary

Cotton yield trials with phosphate fertilizers were conducted at Marana, Maricopa and Yuma Valley Agricultural Centers. Average yields obtained were 2.3, 2.9 and 3.0 bales per acre, respectively. Additions of phosphorus fertilizer had no significant effect on cotton yields at any of the three locations. The data suggest that many agricultural soils in Arizona maintain soil P levels that are adequate for the production of cotton.

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Fertilizer trials were conducted at Marana, Maricopa and Yuma Valley Agricultural Centers to evaluate the effect of phosphorus application on cotton yields. The varieties used and dates of planting are found in Tables 1 and 2. Cotton was planted in 40-inch rows.

Nitrate levels in cotton petioles were monitored at each location throughout the growing season. These levels indicated that adequate but not excessive supplies of nitrogen were available for the growth of cotton throughout the season.

Phosphorus fertilizer as triple super phosphate was broadcast prior to listing. Table 1 contains the amounts of phosphorus applied to each treatment and the yields obtained at the Marana and Maricopa locations. The average yields at Marana and Maricopa were 2.3 and 2.9 bales per acre respectively. The addition of phosphorus fertilizer had no significant effect on cotton yield at either location.

At the Yuma location, cotton was planted on plots in which different levels of phosphorus in the soil solution had been established in 1973 and maintained at these levels by subsequent additions of phosphorus fertilizer since that time. This was accomplished by using phosphorus isotherms. The level of P in soil solution are shown in Table 2. The amount of phosphorus fertilizer applied to each treatment to maintain these levels during the period from 1973 to 1983 are also shown in Table 2. During this 10-year period, six crops of lettuce, 4 crops of watermelons, 1 crop of cauliflower and 1 crop of wheat were grown on these plots. The phosphorus fertilizer was applied prior to each crop in order to maintain the appropriate soil P level. Table 2 also contains the amount of phosphorus fertilizer applied to each treatment in 1984 to maintain the appropriate soil P level for the 1984 cotton trial. The average cotton yield was 3.0 bales per acre at the Yuma location. The addition of phosphorus fertilizer had no effect on cotton yields. The cotton grown on plots that had not received any applications of phosphorus since 1972 yielded as much seed cotton as cotton grown on plots that had received over 4,000 pounds of P_2O_5 per acre during 1973 to 1984. These data indicate that cotton requires a very low level of soil P for adequate growth and that many agricultural soils in Arizona maintain soil P levels that are adequate for the growth of cotton.

Table 1. Cotton Yield Response To Phosphorus Fertilizer at the Marana and Maricopa Locations

	Treatment lbs P_2O_5 per acre	Seed cotton lbs/acre	Lint bales/ acre*
Location: Marana	0	3594	2.40
Variety : DPL-55	100	2965	1.98
Date of Planting: 5/17/84	200	3732	2.49
	400	3887	2.59
	800	3210	2.14
	1600	3185	2.12
	$\bar{s}_x$	N.S.	N.S.
Location: Maricopa	0	4455	2.97
Variety : DPL-62	30	4365	2.91
Date of Planting: 4/4/84	60	4275	2.85
	120	4425	2.95
	240	4410	2.94
	480	4215	2.81
	960	4365	2.91
	$\bar{s}_x$	N.S.	N.S.

Table 2. Cotton Yield Response to Phosphorus Fertilizer at the Yuma Location.

Treatment ppm P in soil solution	1973 to 1983 lbs P_2O_5 per acre	1984 lbs P_2O_5 per acre	Seed cotton lbs/acre	Lint bales/ acre*
0.025	0	0	4515	3.01
0.05	49	0	4380	2.92
0.1	172	0	4590	3.06
0.2	652	83	4425	2.95
0.4	1416	172	4575	3.05
0.8	2298	255	4530	3.02
1.6	3867	347	4410	2.94