COTTON FERTILITY RESEARCH

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In 1973, field experiments were conducted at the Cotton Research Farm to update information on petiole analysis recommendations, to study N effects applied with barley residue on subsequent N requirements, to study residual P treatments on phosphate fertilizer response, and to study the effect of micronutrient sprays on cotton yields.

Data in Table 1 show the yields for Deltapine 16 and Hopicala at two plant spacings and four N levels for each variety. Yield differences between varieties are not of primary concern but rather the petiole nitrate levels of the two varieties for different N treatments and yield response levels. Petiole nitrate values are not available at this time as analysis has not been completed. Original petiole recommendations were based on work with Acala varieties with later work on Deltapine smooth leaf. More updated information is needed for Deltapine 16 to ascertain the validity of past recommendations for this variety. Lower yields resulted from increasing the population of both varieties. Increasing yields from N application provides a basis for the evaluation of petiole nitrate levels desired.

Yields shown in Table 2 indicate that the application of 50 pounds of N per acre on barley residue at the time the straw was disked in did not affect the subsequent response to N fertilizer applied. The P content of cotton leaves in early June was higher than in plants from other experiments that did not have a residue addition. This supports previous findings wherein the return of crop residue increased or maintained a higher level of P in the following cotton crop. Preplant application of N on the residue did not affect the plant or soil content of P.

Yield data in Table 3 show that a response to phosphate fertilizer was obtained only where the soil had been cropped for eight years without P fertilization. This yield increase was about 8%. The soil P measured a low 3.5 ppm P (10.7 ppm PO_4) by the Olsen bicarbonate procedure and 0.77 ppm P (2.4 ppm PO_4) by the CO_2 extraction procedure. The other soils receiving 115- to 920-lbs P_2O_5 per acre in 1966 did not respond to P fertilization and contained from 3.8 to 7.5 ppm P (11.5 to 22.9 ppm PO_4) by the Olsen bicarbonate soil test. Comparisons between fields cannot be made directly because of a soil gradient, but the response to P fertilization at a given level of residual P can be evaluated.

Foliar sprays of micronutrients were applied on cotton in plots located on the borders treated with manure during the period, 1965 to 1968. Data from this experiment, Table 4, show yields were generally higher where manure had been applied. In previous experiments it was shown that manure applications of 10 tons or more would contribute to the P use by the crop for as long as five years. Where a total of 20 tons or more manure was applied, foliar sprays did not appear to improve yields. However, yields in the control (no manure) did appear higher when the zinc spray was applied. Contributions from manure are complex and are known to influence the availability of N and P. Positive evidence for the identity of the "XYZ" components of manure is more difficult to find. It is possible that micronutrients are a part of the unexplainable benefits of manure.

At the Marana Experiment Farm, DPL-16 was planted in double rows, with a plant population of 60,000 per acre. Table 5 summarizes the treatments and corresponding yields. Treble superphosphate was placed at the center of the bed 6 inches below

the bed surface in 5 of the treatments. A micronutrient foliar spray of zinc, iron and manganese mixture was applied 3 times at 2-week intervals for one treatment. The highest yield was for 100 lbs N/A alone. One- or two-hundred pounds of P_2O_5 per acre with 50 lbs N gave increases of 7 and 10%, respectively, over 50 lbs N/A alone. The micronutrient treatment did not affect yield. The P concentration in plant tissue in June was close to deficient for the cotton receiving N without P.

Table 1. Yields for 2 varieties, 2 plant spacings, 4 nitrogen levels.

Variety	Spacing	Nitrogen Level	Yield, Seed Cotton, Lbs./A.
DPL-16	6 in.	0	3270
		50	3840
		100	4290
		200	4640
	2 in.	0	3210
		50	4030
		100	4150
		200	4360
Hopicala	6 in.	0	2930
		50	3390
		100	3560
		200	3530
	2 in.	0	2930
		50	3310
		100	3360
		200	3170

Table 2. Yields and leaf tissue phosphorus concentrations for DPL-16 cotton following barley, with and without nitrogen applications.

Preplant Nitrogen Treatment	Side-dress Nitrogen, lbs./A	Yield Seed Cotton lbs./A	Total phosphorus concentration in leaves, per cent		
			6/12	7/1	8/1
None	0	3890	0.39	0.31	0.39
	50	4210	----	----	----
	100	4320	.40	.31	.38
	150	4720	----	----	----
50 lbs. N	0	3900	.40	.33	.38
	50	4130	----	----	----
	100	4380	.41	.31	.40
	150	4480	----	----	----

Table 3. Effects of commercial phosphate on cotton yields and tissue phosphorus concentration on soil of 5 levels of residual phosphorus from phosphate applied to 1966 grain crop.

Residual P level from 1966 application	TSP, lbs./A applied in 1972 & 1973	Nitrogen side-dressed, lbs./A	Yield seed cotton, lbs./A		Total Phosphorus Concentration in leaves, per cent: 6/1	7/1	8/1
lbs. P_2O_5 /A							
None	0	0	3720		....	....	....
		75	3810	Average:	0.22	0.42	0.34
				3920			
	100	0	4080		....	....	....
		75	4060		.23	.48	.35
115	0	0	4030		....	....	....
		75	4060		.23	.42	.36
				4050			
	100	0	4030		....	....	....
		75	4060		.23	.45	.41
230	0	0	4370		....	....	....
		75	4530		.23	.42	.34
				4490			
	100	0	4360		....	....	....
		75	4530		.24	.41	.36
460	0	0	4370		....	....	....
		75	4620		.25	.42	.42
				4560			
	100	0	4360		....	....	....
		75	4680		.24	.43	.35
920	0	0	4190		....	....	....
		75	4900		.25	.44	.40
				4570			
	100	0	4410		....	....	....
		75	4780		.26	.40	.42

Table 4. Effects of micronutrient sprays on yield of cotton planted on residual plots of 1965-68 manure study, and tissue phosphorus concentration on manure residual plots.

Manure Residual Treatment	Foliar Spray Treatment	Yield Seed Cotton Lbs./A	Yield, Manure Residual Average	Total Phosphorus Concentrations in Leaves, percent: 6/1	7/1	8/1
None (Control)	None	3860				
	Zn+Fe+Mn	3660	3920	0.19	0.36	0.31
	Zinc only	4240				
10 T./A Annually, 1965-68	None	4240				
	Zn+Fe+Mn	4450	4320	.18	.39	.38
	Zinc only	4250				
10 T./A in 1965 & 1967	None	4270				
	Zn+Fe+Mn	3940	4040	.19	.37	.32
	Zinc only	3920				
10 T./A in 1965 only	None	4090				
	Zn+Fe+Mn	4240	4200	.18	.36	.33
	Zinc only	4270				

Table 5. Effects of fertilizer and micronutrient treatments on high population DPL-16 cotton (Marana).

Treatment	Lbs. N/A	Lbs. P_2O_5 per A	Yield, Seed Cotton Lbs./A	Percent of Control	Total P Concentration in Leaves, percent 6/8	7/9	8/7
Control	0	0	2930	100	....	....	....
N_1	50	0	3140	107	0.30	0.37	0.36
N_2	100	0	3560	122	....	....	....
N_0P_1	0	100	2810	96	....	....	....
N_1P_1	50	100	3370	115	.30	.42	.46
N_2P_1	100	100	3250	111	....	....	....
N_1P_2	50	100	3420	117	.32	.45	.49
N_1P_1+ M-n*	50	100	3350	114	.38	.40	.50

*3 foliar sprays of zinc, iron and manganese mixture.

LONG STAPLE FERTILITY TEST

Apex Farms, Art Pacheco - Marana — Agent-in-Charge - Jim Armstrong

Fertilized Plot			Unfertilized Plot		
Seed Cotton* (Pounds)	% Turnout	Lint/Acre* (Pounds)	Seed Cotton* (Pounds)	% Turnout	Lint/Acre* (Pounds)
1640	32.8	655	1915	30.5	710

Pounds Nitrogen Per Acre

June 2 - 48# N/A
August 17 - 23# N/A
Total N - 71# N/A

* Rounded to nearest 5 lbs.