Nutritional investigations in cotton, Emerald Irrigation Area

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Poor cotton growth had been experienced on soils of the Emerald Irrigation Area with resultant unsatisfactory low yields of lint in the order of 450 to 800 kg ha^{-1}. The problem occurred predominantly on Open Downs (BUg) soil and to a lesser extent on scrub (Tb Ug) and alluvial (AUg) soil. Identification of deficient nutrients from plant symptoms remained uncertain. The suspected 4 deficient nutrients P, K, S and trace (Zn, Cu, Mn and Mo) were applied in a 2 factorial field trial on a previously low yielding BUg site using two replicates. Lint yields are presented in Table 1.

TABLE 1. Cotton lint yields (kg/ha) from BUg site, Emerald

	Lint yield kg ha^{-1}		Lint yield kg ha^{-1}		Lint yield kg ha^{-1}		Lint yield kg ha^{-1}
Control	720	S	800	T	900	S+T	760
P	1410	P+S	1550	P+T	1420	P+S+T	1450
K	930	K+S	790	K+T	750	K+S+T	790
P+K	1440	P+K+S	1510	P+K+T	1440	P+K+S+T	1510
Means P_0	810		L.S.D. for P	5%	100	Coeff. of Var. 16.3%	
P_1	1470			1%	140	T = Zn, Cu, Mn, Mo	

The phosphate treatment gave a highly significant response in yield representing a massive increase of 82%. No other nutrient responded significantly. The soil P status (bicarbonate extraction) was 5 ppm P in the 0-10 cm depth with 2 ppm P down the profile. Phosphate was applied as super king (19.2% P) banded in the hill at 40 kg P ha^{-1}. Table 2 shows that many of the soils sampled from 1975 to 1979 fall into the < 10 ppm bicarbonate P category. P deficiency in the area previously undetected may be widespread and would have been a major cause of the poor cotton growth.

TABLE 2. Bicarbonate P (ppm) status of soils, Emerald Irrigation Area 0-10 cm depth

Soil P level	BUg	TbUg	AUg	No. of Soils
0-10 cm P	44 (68%)	21 (55%)	33 (41%)	98
10-20	16 (25%)	15 (40%)	23 (29%)	54
20-30	4 (6%)	2 (5%)	12 (15%)	18
30-40	1 (2%)	0	5 (6%)	6
40	0	0	7 (9%)	7
No. of Soils	65	38	80	183

The results are noteworthy in that phosphate responses in cotton hitherto had not been recorded on low P soils in Queensland (St. George and the Darling Downs) or in New South Wales (Warren Area).