Sulfur status of soils of the darling downs, Queensland

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Sulfur deficiency symptoms were widespread in winter cereals on cultivated soils of the Darling Downs (upland and plains) in 1983 after an unusually high annual rainfall. Sulfur levels in the dry matter of barley grain at harvest were found to be 0.08% and in oats dry matter at tillering, 0.06 to 0.12%. Test strips, a soil survey and replicated trials were conducted to determine the extent of problems and the effect of the season (summer/winter) and crop on S response.

Methods

A survey of sixteen soils was conducted using virgin and cultivated sites at three depths with common recent histories and a similar total period of cultivation. Data for 0-60cm reported here was obtained from the addition of 0-10cm and 10-60cm results. Strip tests of S applied to maize and sorghum (35kg ha⁻¹ S) and soybeans (10 kg ha⁻¹ S) were conducted on one low sulfur soil in 1983/84. Seven trials were laid down in the 1984 barley crop to produce response functions to S at rates from 0 to 80 kg ha⁻¹ of S. Results of the replicated trials will be given in the final paper.

Results and Discussion

Site	Soil Series	Depth (cm)				
		0-60		60-	60-100	
		Virgin	Cult.	Virgin	Cult.	
Upland	Kenmuir	9.5	12	profile (25	depth cm)	
	Purrawanda	80	17	profile (40	depth cm)	
	Irving	28	38	20	36	
	Waco	18	8	204	60	
Plain	Mywybilla	91	25	71	223	
	Cecilvale	29	29	140	104	
	Anchorfield	30	39	32	36	
	Anchorfield/Baselmere	24	23	16	48	

Table 1. Soil profile sulfate sulfur⁽¹⁾ (kg ha⁻¹) of major soils*

*assumes bulk density of 1.0 gcc-1

Sulfate sulfur was not necessarily higher in virgin soils possibly due to mineralisation differences. The shallow upland soils had total profile levels of S well below the critical level of 28 kg ha⁻¹ for lucerne ⁽²⁾. On the plain, the Anchorfield series soils did not have large reserves of sulfate sulfur at depth and gave a 25% yield response to S in soybean hut no marked response in maize or sorghum. Loss of sulfate sulfur under cultivation may he related to a profile organic matter decline. Approximately 30% of the original whole profile organic carbon of upland sites and 19% of that in plains sites has been lost under cultivation according to levels seen in this survey.

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