**Nutrient limitations on yield and quality of peanuts grown in four soils from the Kingaroy area - I phosphorus**

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Poor responses to superphosphate have been reported with peanuts grown in krasnozem and red earth soils of the Kingaroy area and problems of quality have also been experienced (A. Baikaloff and S.R. Langford personal communication). A nutrient omission trial (Jones and Crack 1970) was established in a glasshouse to investigate nutrient limitations on yield and quality of peanuts grown on four soils viz. cultivated and uncultivated krasnozem (C.K. and U.K.) and cultivated and uncultivated red earth (C.R.E. and U.R.E.). The cultivated soils were selected to represent the major peanut growing areas. This paper reports the effects of phosphorus omission, by comparison with a "complete" treatment in which all nutrients tested were applied. Virginia Bunch peanut plants were grown to maturity and harvested.

TABLE l. Dry weight (g/box) of peanut tops and fruits.

| | Tops | | | Fruits | | |
|---|---|---|---|---|---|---|
| Soil | "Complete" | -P | L.S.D. (P=0.05) | "Complete" | -P | L.S.D. (P=0.05) |
| C.K. | 195.3 | 136.0 | 41.2 | 106.3 | 129.9 | 53.1 |
| U.K. | 178.3 | 132.3 | 40.4 | 155.1 | 94.6 | 50.6 |
| C.R.E. | 142.0 | 162.0 | 38.3 | 152.7 | 128.1 | 54.1 |
| U.R.E. | 161.0 | 86.7 | 38.9 | 154.5 | 49.2 | 53.0 |

Severe phosphorus deficiency in the U.K. and U.R.E. reflected the low extractable phosphorus levels (about 15 ppm) in these soils. The two procedures used for measuring extractable phosphorus (0.005M $H_2SO_4$ - Kerr and von Steiglitz, 1953 and 0.5M $NaHCO_3$ - Colwell 1963) gave similar results for both the C.K. and C.R.E. (viz. about 30 ppm). Fertilizer applied in the past has helped build up levels of soil phosphorus. A growth response to applied phosphorus was recorded in C.K. but not in C.R.E. This indicates that the analytical procedures do not consistently assess the phosphorus available for uptake by peanuts in these soils. More precise analytical methods appear to be necessary to enable better interpretation of analytical data. Omission of phosphorus reduced the yield of sound mature kernels in the U.K. and U.R.E., reflecting the low total yield of fruit in these soils. Although total fruit yield was not significantly affected by phosphorus omission on the C.R.E., the yield of sound mature kernels fell. The proportion of fruit recovered as sound mature kernels was reduced in the U.R.E., and there was a strong tendency to a reduction in the U.K. and C.K. These data indicate that fruit quality is particularly sensitive to inadequate phosphorus supply. Phosphorus application improves both fruit yield and quality, and may be necessary to maintain fruit quality even though total yield may not be increased.

Colwell, J.D. (1963). Aust. J. exp. Agric. anim. Husb. 3: 190.

Jones, R.K. and Crack, B.J. (1970). Aust. J. exp. Agric. anim. Husb. 10: 343.

Kerr, H.W. and von Steiglitz, C.R. (1953). Proc. 5th Congr. Int. Soc. Sugar Cane Technologists, 364.