Long term trends associated with usf of superphosphate on pasture, I. yields of clover

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Most experiments with superphosphate on sown pastures, on soils initially deficient in P and/or S, achieve large increases in clover yields, followed by grass dominance after some 4 to 6 years, depending on fertilizer rate. Few experiments are continued long enough to examine grass clover relation- ships and yields in the fertilizer maintenance phase. This paper documents a long-term decline in clover, which appears to be widespread in pastures of the Northern Tablelands of N.S.W. and elsewhere.

Methods

Five rates of single superphosphate at 0, 63, 126, 252 kg ha $^{-1}$ (autumn) and at 2 x 126 kg (autumn and spring), were applied annually, beginning in April 1948, to a newly-sown phalaris sub-clover pasture on virgin soil using two replicates, with plots 10 x 200 m. The soil, derived from basaltic alluvium overlying lateritized tertiary sediments, was a brown clay loam. The pH was 6.5 at 0-10 cm increasing to 8.0 at 100 cm depth. The surface slope was about 2?.

All plots were grazed by sheep at 8-10 ha $^{-1}$ as detailed in the next paper. Grazing was suspended some 6 to 7 weeks before sampling at the end of spring using 10 to 15 stratified random 1 x 0.5 m quadrats per plot. Yields were determined annually at first but less frequently in later years.

Results and Discussion

Yields of clover are presented for the years sampled in Fig. la and the percentage clover (of the total forage) in Fig. lb. Clover increased

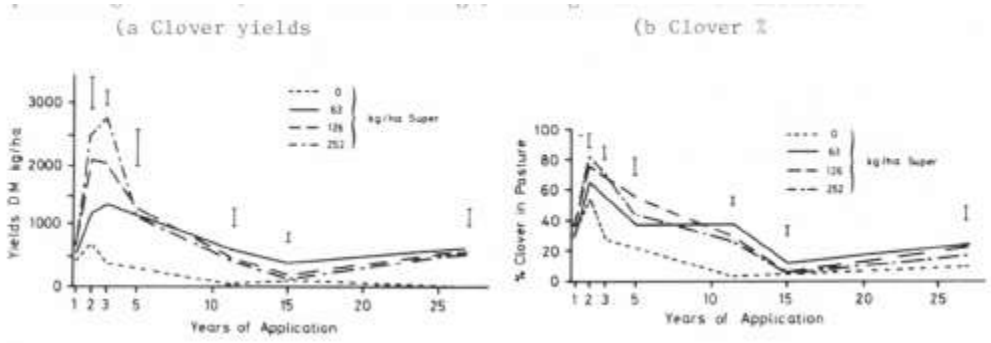

Fig. 1 Effects of superphosphate on (a clover yields and (b clover % 1948-73.

linearly with rate of superphosphate in years 1-3: a diminishing clover response was observed in year 5, concurrent with an increase in phalaris. Yields and percent clover declined considerably over the next 10 years, never regained former prominence, and differences between treatments receiving fertilizer diminished to insignificance. This was also true for total yields (not shown). Superphosphate rates above 63 kg ha ^{1} yr ^{1} were clearly wasteful. Phalaris showed a linear response to superphosphate in year S and comprised more than 98% of the sown grass of all treatments in early years. However it was largely replaced by perennial ryegrass by year 15 (1962). The decline in clover, commonly attributed to climatic, insect and other factors was found to be due to an emerging potassium problem (Paper III).