

Herbage biomass, ponded infiltration and sulfur in a disturbed woodland

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Eucallotus populnea F.Muell. (poplar box) is the most common tree over some 150,000 km² of northern New South Wales and southern Queensland. Shrub invasion has occurred in many poplar box areas since the advent of pastoralism. The decline of herb growth in the face of shrub competition is a major problem.

In 1975 an area of 200 ha of semi-arid shrub invaded poplar box woodland on a shallow red earth near Coolabah in north-western New South Wales was cleared of shrubs as part of a larger study of the management of these woodlands. Subsequent herbage production has been spatially very variable. Soil water recharge in the area has also been variable, with marked surface redistribution of water occurring (Johns 1979). To investigate yield variability, measurements were made of ponded infiltration, organic carbon, total nitrogen, incubatable ammonium, total and bi-carbonate extractable phosphorus, pH, electrical conductivity, and phosphate extractable sulfur near 30 permanent herbage quadrats. These parameters were included in a multiple regression relationship with yield, and a backwards elimination procedure was used to remove unimportant variables. The final significant variables were ponded infiltration (I) (cumulative infiltration after 5 minutes ponding using 30 cm diameter rings; $R^2=0.58$) and phosphate extractable sulfur (S) (0-30 cm depth, extracted with 0.01M calcium dihydrogen phosphate; $R^2=0.14$).

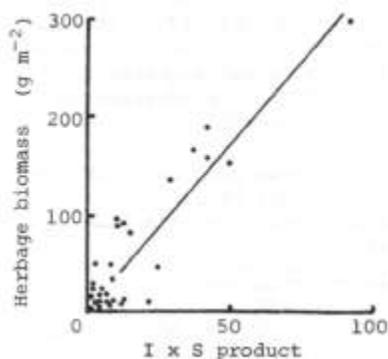


FIG. 1. Relationship between 1978 peak standing herbage biomass (g m^{-2}) and the product of ponded infiltration (cm (5 min)^{-1}) and phosphate extractable sulfur (ppm).

S values ranged from 2 to 29 ppm (median 6 ppm) while I ranged from 0.4 to 8 (median 1.7) cm (5 min)^{-1} . The multiple regression on I and S accounted for 74% of yield variance. However, when I and S were multiplied together to combine their levels interactively, the product accounted for 82% of yield variance (Fig. 1). It is implicit in the interactive regression form that adequate levels of both I and S appear necessary at a site for high productivity. Despite the semiarid environment, the variable S status of the area may be due to S redistribution by water at the base of the shallow stony profile. The interaction of S with hydrology on these shallow soils needs further investigation.

Johns, G.G. (1979). *Aust. J. Soil Res.* 17:249.