

The response of soybean varieties to zinc

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Zinc deficiency has been observed in soybeans on alkaline clay soils in Central Western New South Wales. It is characterised by interveinal chlorosis, stunted plants, unfilled pods and low yields.

The sensitivity of six commercial soybean varieties to Zn deficiency was studied on a grey clay loam (pH 8.5, 0.80 ppm DTPA - extractable Zn, 14 ppm P by modified Ohlsen). They were furrow irrigated and fertilized with 37 kg P/ha. Zinc sulphate heptahydrate (4 kg/ha per application) was blanket sprayed 4, 6 and 4 + 6 weeks after sowing. The responses to Zn were measured in terms of seed yield, yield components and growth (Table 1).

TABLE 1. Mean yield, seed number and height of soybean varieties with two foliar applications of Zn, and percentage losses without Zn.

	Forrest	Dare	Dodds	Bragg	Lee	Ruse
Yield, + Zn (kg/ha)	3220	2930	2700	2290	2400	2510
Yield loss, - Zn (%)	71	39	32	21	8	5
Seeds/ha, + Zn (millions)	17.2	14.8	13.0	10.9	12.3	10.9
Seed loss, -Zn (%)	68	39	28	21	7	1
Mature height, + Zn (cm)	71	64	68	95	65	78
Height reduction, -Zn (%)	6	11	18	5	2	0

Forrest is the most sensitive variety to Zn deficiency and without Zn, yielded significantly less ($P < 0.05$) than the other varieties. Its potential yield was not achieved when single applications of Zn were made alone at 4 or 6 weeks (yield losses were 19% and 12% respectively). Dare and Dodds showed similar trends but with smaller losses than Forrest. Bragg, however, yielded as well with each single spray as it did with the double; its deficiency being overcome more easily. Lee and Ruse were relatively tolerant of Zn deficiency and were the highest yielding varieties in the absence of Zn. The yield losses were due to reductions in the number of seeds/ha (Table 1). Forrest also produced smaller seeds (11%) and fewer seeds/pod (16%) without Zn. Other studies have obtained significant reductions in the number of flowers/plant, plant height and photosynthesis and enhanced respiration under induced Zn deficiency (Ohki 1977, 1978). Mature plant height was slightly responsive in this experiment (Table 1). The degree to which these plant processes are influenced apparently differs between varieties, as demonstrated here by the variations in yield response to Zn. Forrest is extremely responsive; Dare, Dodds and Bragg are moderately responsive; and Lee and Ruse are relatively tolerant of Zn deficiency.

The response of soybeans to soil incorporated versus foliar applied Zn is being tested in 1979/80.

Ohki, K. (1977). *Agron.* **1**:69:969.

Ohki, K. (1978). *Crop Sci.* **18**:77:79.