

Effect of plant population density on grain yield and lodging of three maize cultivars

J. M. Colless

Agricultural Research Station, Grafton, N.S.W., 2460.

There is scant knowledge on the effects of increasing plant population density of maize grown for grain under coastal dryland conditions in northern N.S.W.

Three recommended maize cultivars - GH128, a late-maturing, tall double-cross hybrid; GHSO04 and XL81, midseason single-crosses - were grown in a replicated split-plot trial at three population densities (34.0, 44.5 and 55.4 thousand plants per ha) at Grafton, N.S.W., in 1977. The trial was grown on a clay-loam alluvial soil. Sufficient fertilizer was applied to prevent nutrients from becoming limiting. Above-average rainfall (617 mm) was recorded for the period in which the crop was in the field (December 12 to May 5).

There were no significant differences among grain yields of the three cultivars at any one population density, but yields of all cultivars significantly increased as population density increased from 34.0 to 55.4 thousand per ha (see Table 1).

TABLE 1. Grain yields (t/ha) of three maize cultivars at three plant populations from all plants (A) and from standing plants only (B), Grafton, N.S.W., 1977.

Cultivar	Plant population ('000 per ha)					
	34.0		44.5		55.4	
	A	B	A	B	A	B
GH5004	7.95	7.54	8.87	7.29	9.22	7.74
GH128	7.88	6.31	8.61	6.39	9.41	6.21
XL81	7.66	7.10	7.68	7.01	8.77	8.01

Stalk rot was very prevalent at harvest and its incidence was significantly greater in all cultivars as population density increased. This was accompanied by more lodging in GH128 (20-34 percent) and GHSO04 (5-15 percent). In contrast, XL81, a stiff-stalked type, lodged very little (7-9 percent) even at the highest population density, despite a greater incidence of stalk rot than in the other cultivars.

Although GH128 produced the highest grain yield (9.41 t/ha) of the three cultivars at the highest population density, 34 percent of the plants were lodged. When only standing stalks were harvested XL81 yielded 8.01 t/ha compared with 7.74 t/ha from the standing plants of GH128. These yields would represent the most pessimistic estimates of yield obtained by machine harvest, but they emphasise the need for breeders to develop new cultivars with strong stalks which will resist lodging under conditions of high population density, to allow commercial growers to take full advantage of the cultivars' high yield potential.