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EFFECTS OF NITROGEN FERTILISER ON THE GROWTH, DEVELOPMENT
AND YIELD OF MAIZE (ZEA MAYS L.).

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SUMMARY

The response of a commercial maize cultivar (PX610) to nitrogen fertiliser (urea) was studied. Four levels of nitrogen viz. 84, 168, 336 and 672 kg/ha were applied over three different growth stages as follows: (i) all at planting; (ii) $\frac{1}{2}$ at planting, $\frac{1}{2}$ at 6 weeks growth; (iii) $\frac{1}{3}$ at planting, $\frac{1}{3}$ at 6 weeks growth, $\frac{1}{3}$ at 50% silking. The plants were grown at a population of 96,900/ha and water was continuously applied to the crop through a trickle irrigation system.

Total and component plant responses were determined on several occasions throughout the experimental period to physiological maturity. Nitrogen levels and distribution within the plant were also measured.

The yields of grain (11,000-14,000 kg/ha) and total plant dry matter (24,000-29,000 kg/ha) recorded at physiological maturity were high. However, no significant plant dry weight responses to different rates and times of nitrogen fertiliser application were detected. Nevertheless, critical analysis of these responses did show that the rate at which plants reached their maximum dry matter production (upper asymptote) was greatest in the treatments receiving intermediate levels (168 and 336 kg/ha) of nitrogen fertiliser.

Significant differences were recorded in terms of the nitrogen content of the plant in the response to the nitrogen applied. Uptake of nitrogen increased with nitrogen rate and the concentration of nitrogen in the grain and most other plant components, increased with higher rates of nitrogen fertiliser. During early growth there was a precocious accumulation of nitrogen in the leaves. Substantial losses of dry weight and nitrogen from non-grain components, especially the stems, occurred over the period of rapid grain filling. These losses were noticeable at an earlier stage in plants showing visual nitrogen deficiency symptoms (those receiving no nitrogen fertiliser and 84 kg N/ha). However, these plants appeared to make more efficient use of available nitrogen in grain production than plants receiving higher rates of nitrogen.