

EFFECTS OF METHANOL ON GROWTH, WATER USE AND YIELD OF BARLEY

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Foliar application of methanol has been reported to increase the yield and reduce the water requirement of C3 crops in a warm, high radiation, arid climate (1). These effects were novel and unexpected, and created considerable interest because of the apparent potential for methanol to increase agricultural production. A field experiment was conducted to determine whether the responses to methanol could be duplicated in New Zealand's cooler, temperate climate.

MATERIALS AND METHODS

Aqueous methanol at six concentrations from 0 to 50% was applied at 200 L/ha either every two to three weeks or every four to six weeks during the life of a barley crop. Glycine was added at 0.2% concentration, except in control treatments, to minimise the expected phytotoxic effect of methanol. A surfactant was included in all spray mixtures. The crop was managed intensively to minimise stresses. Water use, biomass production, leaf area index (LAI), and radiation use efficiency (RUE) were determined at regular intervals during crop growth. Grain yield and its components were measured at maturity.

RESULTS AND DISCUSSION

No phytotoxic effect of methanol was apparent, and none of the treatments significantly affected any of the indicators of crop performance. Mean total and grain dry matter yields were 14.2 and 6.9 t/ha respectively (s.e. = 1.7 and 0.5 respectively), cumulative water use was 292 mm (s.e. = 18), and maximum LAI was 5.2 (s.e. = 0.4). RUE after full canopy closure averaged 2.40 g/MJ(PAR) (s.e. = 0.28). These values were all within the usual range for a healthy barley crop in the test climate. Stable RUE value was consistent with values reported previously for barley and other C3 cereals (2, 3, 4). Its lack of response to the methanol treatments was particularly important in view of the proposal that the likely mode of action of methanol was through inhibition of photorespiration, thus improving efficiency of carbon utilisation for growth (1).

CONCLUSIONS

The results did not substantiate the claimed beneficial effects of methanol. This agreed with results from recent similar experiments with several crops in the USA. The repeated failure of attempts to duplicate the effects of methanol has resulted in the original claims (1) being widely discredited.

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