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How bad is the drought? Using a cropping systems model to assess severity of drought

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Climatic variability is a natural part of farming in Australia and current Government policy sees drought more as a normal part of the production environment, than an unpredictable disaster requiring relief. Despite this philosophy, the notion remains that *drought policy should provide assistance to producers in those calamitous circumstances where government action is required as a measure of last resort* (1). Government support to farmers suffering in the 1994 drought was provided because the circumstances were viewed as *calamitous*, although this view was not shared by all commentators (see for example the influential articles by farmer and ex Finance Minister, Peter Walsh in the Financial Review, 16-8-94). This paper examines approaches and criteria for assessing the severity of a prolonged drought.

METHODS

APSIM (Agricultural Production Systems Simulator) (2) was configured as a winter wheat - summer fallow cropping system in which temporal variability was associated only with rainfall amounts and distribution. The combination of retention of crop residues and the addition of 60 kg N ha⁻¹ at sowing of each crop ensured that soil fertility was non-limiting throughout the simulation. Other constraints such as pests, diseases and weeds were not considered. All other agronomic practices were assumed constant throughout the simulation period. Climate files for Dalby, Roma, Goondiwindi and Capella in Qld and Moree in north NSW were prepared using procedures outlined by Meinke *et al.* (3). The paper analyses the recent drought in the north-eastern cereal zone via the simulated wheat yields expressed on a four-year running mean basis.

RESULTS AND DISCUSSION

Average wheat yields estimated for sites such as Dalby and Roma over the 1991-1994 period represent some of the lowest values over the 110 year climate record, confirming the local view on the severity of this *four-year* drought. In contrast, while 1994 was a disastrous year in Moree, both in the model and on the ground, reasonable seasons and yields in the preceding years meant that the 4 year running mean was about on the median of expectation based on simulations over the climate record. Agricultural drought will be influenced by both the quantity and distribution of rainfall in relation to crop planting opportunities and crop developmental stage. In addition, the impact of prior-season rainfall needs to be considered in regions where fallows are important in storing water for subsequent crops. These factors are implicitly considered in the simulation approach but are difficult to quantify in climatic

analyses. The poster summarises strengths and weaknesses of a simulation approach to the assessment of the severity of drought.

REFERENCES

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