

TARGETING CLIMATE FORECASTS TO CROPPING IN NE AUSTRALIA

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INTRODUCTION

In north-east Australia climatic influences and their associated risks impact heavily on yields of winter and summer crops. To improve farm profitability and reduce risk in this environment, analyses incorporating crop simulation models indicate that substantial improvements in gross margins/profits are possible through changes in management based on a seasonal forecast. Appropriate tactical management techniques involving seasonal forecasting of rainfall and frost likelihood may help reduce losses in the potentially *bad years*, and aid the maximising of returns in the potentially *good years*.

METHODS

We applied a probabilistic seasonal forecast system based on pattern analysis of Southern Oscillation Index behaviour using SOI *phases* (2). Lagged probability distributions of rainfall or date of first or last frost corresponding to each of five SOI phases can be generated for any location that has sufficient data. The value of application of SOI phase-based management decision options, such as N fertiliser rate and cultivar maturity type was addressed through incorporation of the SOI phase system into crop simulation models (1). Further inclusion of economic and risk analyses allowed relative advantages of appropriate tactical decision options over long-term *best-bet* strategies to be assessed.

RESULTS

In general, there is a higher likelihood of any given amount of rain and a lower risk of a late damaging frost in winters following SOI phases *consistently positive* or *rapidly rising* in late autumn. Conversely, there is a decreased likelihood of any given amount of rain and an *increased risk* of a late damaging frost following SOI phases *consistently negative* or *rapidly falling* in late autumn. Reliable forecasts of first and last frost probability are also possible from the end of February. Potential yield was similarly related to SOI phase. For example, for *late wheat* (1 June sowing, N unlimited), clusters of yield distributions were related to whether the SOI phase in the previous autumn was *SOI rapidly-falling* or *SOI rapidly-rising*. Switching to a tactical approach instead of a long-term strategic approach reduces risk of making a loss through use of a rainfall forecast and improves *average* profit by \$10-20/ha per annum. Further adjustment of the tactical approach which utilises frost forecasts results in a further reduction in risk and additional average profit improvement of \$10/ha. However, the results can be higher or lower in individual years.

REFERENCES

1. Hammer, G.L., Woodruff, D.R. and Robinson, J.B. 1987. Agric. For. Meteorol, 41, 123-142.
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