Grain growing in northern New South Wales

Photo: iStock.com/markyhiggins

Seasonal climate forecasts were found to improve the returns for grain growers by between $0 and $204/ha by improving summer cropping decisions.

How can seasonal climate forecasts provide economic value to farming enterprises?

Seasonal climate variability is a key source of year on year variability in farm profitability. Seasonal climate forecasts provide opportunities for farmers to better match farm decisions with upcoming climatic conditions. These forecasts can provide economic value if they change management decisions to capitalise on opportunities in good seasons or minimise losses in poor seasons.

While seasonal climate forecasts help manage production risks associated with climate variability, they do not remove the impact of a particular climatic event. For example, a skilful forecast can reduce uncertainty about drought occurrence, but drought influences productivity and profitability however well farmers are able to anticipate it.

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Grain production in northern New South Wales

An important management decision for grain growers in northern New South Wales is which crop to plant in summer.

Sorghum and cotton are likely to be more profitable in better rainfall years but have high water requirements. Mungbean requires less water and can offer an advantage in lower rainfall years. With insufficient in-crop rainfall all crops may fail, making fallowing for winter crop potentially a better option.

A skilful seasonal climate forecast may influence this decision due to the relationship between rainfall and crop yield.

Can seasonal climate forecasts help growers make better summer cropping decisions?

A case study grain enterprise located at Gunnedah in New South Wales was used to test how a seasonal climate forecast could help grain producers decide whether they should plant a summer crop (sorghum, cotton or mung bean) or leave the land fallow. Returns from both the summer crop decision and the following winter wheat crop were evaluated to include soil moisture carry-over effects.

A decision model identified the most profitable summer cropping option (cotton, sorghum, mungbean or fallow) with and without a climate forecast. Increasingly skilful climate forecasts provided greater levels of certainty about the occurrence of one of three climatic states (dry, average and wet), allowing growers to make better summer cropping decisions.

Case study at a glance: Northern grains

Site: Gunnedah, New South Wales

Decision: Summer cropping planting choice – sorghum, cotton, mungbean or leave to fallow

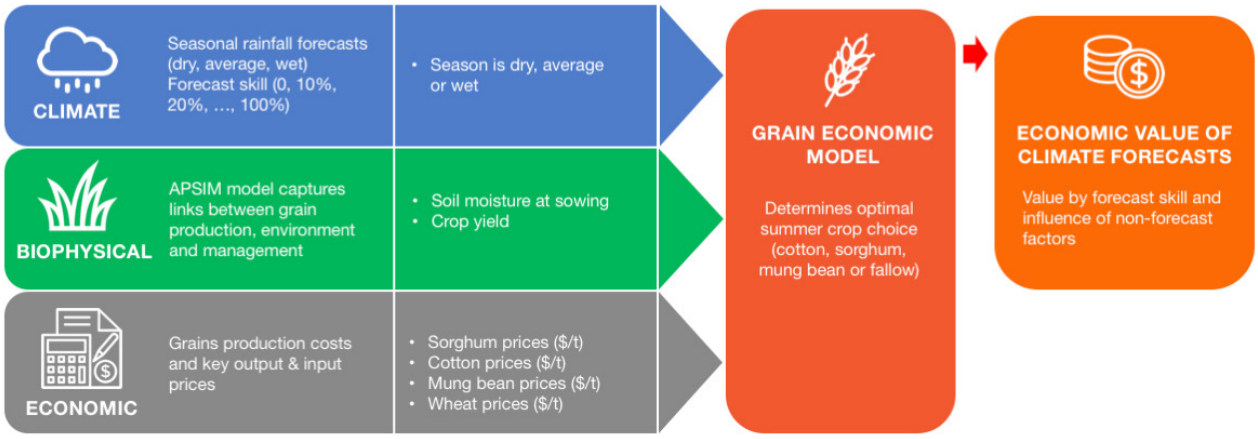
Decision time: October

Trade-off: Sorghum and cotton are likely to be more profitable but require more in-crop rainfall than mungbean. With insufficient in-crop rainfall all crops may fail, with fallowing for winter crop potentially a better option.

Forecast: Rainfall (October–December)

Other drivers: Soil moisture at planting; relative crop prices

Forecast value: $0–$204/ha



Inputs to the model used in this case study to assess the economic value of climate forecasts for grain growing in northern New South Wales.

Key findings

The level of initial soil moisture had a strong influence on cropping decisions. Low soil moisture at sowing led to an optimal decision to either fallow or sow mungbean in the absence of forecast information. In contrast, under high initial soil moisture cotton and sorghum were selected.

Relative crop price was also an important driver of decisions with investigation into various sorghum crop prices conducted. Without a forecast, high relative sorghum prices tended to encourage sowing of sorghum unless soil moisture at sowing was low.

In general, a dry forecast more often led to cropping decisions with lower water requirements (fallow and mungbean) compared to the decisions made without a forecast.

A wet forecast led to decisions to sow higher value crops with higher water requirements (sorghum and cotton).

Dry and wet forecasts were both found to be potentially valuable to growers, with improved returns of up to $204/ha for a dry forecast, and up to $188/ha for a wet forecast. Forecasts that lead to decisions that run contrary to the direction of conditions provided the most value. For example, a wet forecast under low initial soil moisture and high relative sorghum price was valuable as it triggered a change from sowing mungbean to sorghum.

While the value of seasonal climate forecasts increased as forecast skill improved, the extent to which value related to incremental improvements depended on initial soil moisture and relative crop prices.

When can seasonal climate forecasts have economic value?

For seasonal climate forecasts to have economic value:

- the climate for the months relevant to the decision must be historically variable, and that variability must translate into variable production and economic outcomes
- production (e.g. current soil moisture or standing pasture) and market (e.g. commodity prices or supplementary feed costs) conditions are at a point where decisions are sensitive to climate forecast information.
- the seasonal forecast must have sufficient skill and timeliness for the decision to be changed.

Important: The results for other sites, systems and decisions will differ from those in this case study. However, it is likely that the general findings around the circumstances for which forecast value was found will provide insights for the use and value of seasonal climate forecasts for grain growers more generally.

This fact sheet is a summary of the report: Darbyshire, R., Crean, J., Kouadio, L., Cashen, M., Anwar, M. and Cobon, D.H. (2018). Valuing seasonal climate forecasts in Australian agriculture: Northern grains case study. New South Wales Department of Primary Industries.

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