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DAQ104C: Using Seasonal Climate Forecasts for More Effective Grain-Cotton Production Systems

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The overall aim of this project is to significantly improve financial profitability, economic efficiency and resource risk management of dryland grain/cotton systems through effective use of seasonal climate forecasts and quantification of climatic variability.

Information on existing and potential cropping systems has been collected from co-operators farms in four districts within the Northern Grains region – Breeza, North Star, Warra and Central Queensland. This information will be used to construct relevant scenarios and has included:

- Crop options and cropping sequences
- Crop agronomic practices and "planting rules"
- Machinery assets and property valuation

The approach has been to run APSIM simulations for each phase of the nominated cropping systems, with simulations starting prior to both the summer and winter cropping phases of each system. APSIM runs have started at the beginning and middle of each decade starting from the earliest decade of reliable climate records (for Warra this is from 1890). Each run is continued for 30 years to approximate the life cycle of a farming business.

Output from the APSIM simulations included productivity and sustainability indicators (eg. yield of individual crops, soil loss and water use). Annual gross margins, cashflows and investment returns were calculated for each cropping system. This enables the examination of the profitability and sustainability of each cropping systems under a variety of historic climate sequences. Currently we are evaluating the strength of various climatic cycles that are evident in these 30-year cash-flow analyses, and the usefulness of predicting them. This will identify and quantify climate-responsive cropping strategies at seasonal, multi-seasonal and decadal time scales within the study region.

In addition to the cropping systems studies, we are investigating the value of using BMRC's Real time Multivariate (RMM) Madden-Julian Oscillation (MJO) Indices (also known as the '30-50 day wave') to predict rainfall. So far we found a positive correlation between rainfall and the location of the active convective phase of the MJO for Queensland. Work continues to complete an Australia-wide MJO analysis, including the seasonality and possible ENSO interactions. The aim is to produce an interactive website indicating the position of the MJO and its likely consequences on rainfall for specific locations. This has the potential to aid tactical decision making of farmers in this region – for example, when making early harvest decisions.