

The balloon goes up on crop monitoring

By Gary Alcorn

From model planes to big balloons to maybe baby helicopters — Toowoomba-based agricultural engineers are testing various airborne platforms to carry digital cameras for live crop mapping.

Their aim is to enable farmers to regularly check crop vigour and health from the air without the expense of chartering commercial fixed wing aircraft.

The principles and practices developed here could have wide application across a range of crops from cotton to turf.

Queensland DPI research engineer Troy Jensen and his colleagues in Toowoomba are concentrating on low-altitude, ground controlled options to build a database which logs and displays crop health in terms of various visible spectrum and infrared images.

High accuracy GPS equipment delivers precise ground location datum points.

“Our first trial used a remote controlled model aircraft (RCA) carrying a Kodak DC3200 digital still camera — one megapixel, 24 bit. The aircraft flew about 120 metres above the sorghum paddock and the preliminary test images gave usable datasets in the form of 80 high resolution (1344 x 971 pixels) images.

“Other test flights at another site last year investigated the spectral responses of a sorghum crop to varying rates of fertiliser and how spectral data relates to crop yield and protein,” said Troy.

Initial results using sophisticated software show this low costs system works — with variations in crop densi-

ty and greenness (chlorophyll percentage) correlating with leaf and soil moisture content measurements.

“For instance, the darker the crop the lower the levels of chlorophyll which means some stress is present. Healthy crops have more chlorophyll which reflect more sunlight and thus show up as a lighter colour.

This visual data downloaded into a laptop from the camera’s memory cards is the first step in a complex correlation process.

Fellow researchers such as Dr Steven Raine take simultaneous soil and plant samples of the target areas. Other measurements include hand held spectroradiometer readings, traditional airborne (one metre ground resolution) images as well as high altitude imagery from SPOT and Landsat satellites.

Recently the team inspected the new \$280 million Suncorp Stadium in Brisbane — with a balloon — to map and assess the health of the re-laid grass playing surface.

Flying a balloon and its payload in the sheltered environment above the fully enclosed playing field was straightforward.

Both the colour and infrared images confirmed the new grass surface was uniformly healthy and looks great for the return clash between England and the Wallabies on June 26, Troy said.

He also sees other roles for balloon-mounted video cameras.

“We are doing test flights over feedlots to detect lingering wet spots on the pen floors which can encourage odour formation.”

It’s quite feasible that some time in the near future growers will be able to use balloons to capture data about their crops, download to the farm computer and using modified software to determine the crop’s nutrition and disease status and estimate yields.

Are balloons the ultimate vehicle for this project? Maybe, but Troy Jensen has his eye on a remote-controlled Kawasaki helicopter which could hover and take the required pictures without the need for two ‘stabiliser’ staff.

All he needs is \$100,000. In the meantime he will continue to fly the low tech but effective helium balloon.

This project is part of a Queensland Department of Primary Industries (DPI) research on grain yield and protein mapping, and as a PhD project at the University of Southern Queensland (USQ), Toowoomba. The Grains Research and Development Corporation (GRDC) and USQ funded this project.

For more information contact Troy Jensen on 07 4688 1307. 🌱



Ken Cleminson preparing his model aircraft for another ‘sortie’ to check on the health and vigour of this Darling Downs crop.