

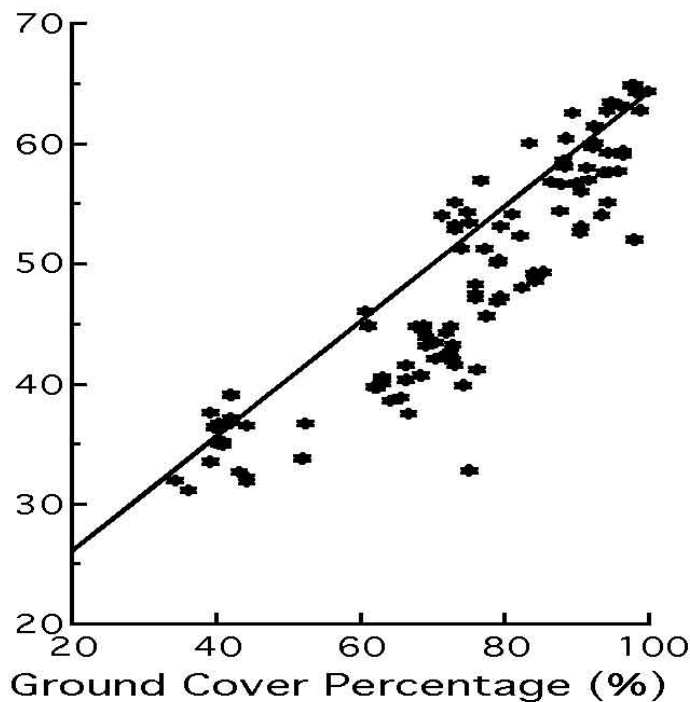
# Cropscanning Cotton

## Using Multispectral Radiometers to Ground Truth Aerial Video Imagery

Every system emits, absorbs, transmits or reflects electromagnetic radiation in a manner characteristic of that substance. Plant health is affected by numerous variables, most of which cause changes in the spectra of electromagnetic radiation reflected from the plant. These effects can be detected. This is the underlying principle involved in all remote sensing and on which CROPSCAN Inc., an instrument development and manufacturing company in the USA, bases its Multispectral Radiometers, designed for field radiometry.

By using a select number of spectral narrow-bands in the visible and near infra-red regions of the electromagnetic spectrum, enough essential information can be detected to relate to the plant health variables. Since the early 1980s CROPSCAN Inc. Radiometers have been used in agricultural research to develop models to measure and relate various plant health factors for such crops as barley, peanuts, cotton, potatoes and lucerne. Refinement of these models and development of other models continue today. As these models mature and prove to be valid, they can be used to estimate the effects of plant stress on yield and quality of crops.

Irricrop Technologies has been using the Cropscan radiometer to ground truth cotton fields being remotely sensed using aerial video for several years. The Cropscan is used to determine the degree of ground cover and plant height of the crop and compared to the data collected by aerial video. The correlation between percent reflectance of near infrared (800 nanometre) and ground cover is high for the Cropscan radiometer (Figure 1).

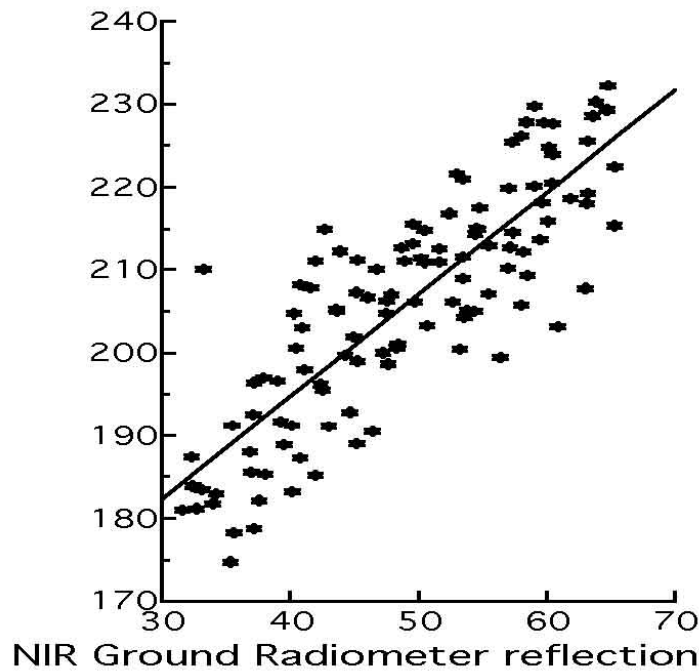


**Figure 1. Cropscan radiometer data showing the effect of ground cover on NIR reflectance.**

The correlation between percent reflectance of near infrared (800 nanometre) for the Cropscan radiometer and the near infrared aerial video is also high (Figure 2). The ease of use of the Cropscan radiometer and this correlation enables rapid monitoring of spatial variability in crop canopy cover for correlation with remotely sensed data.

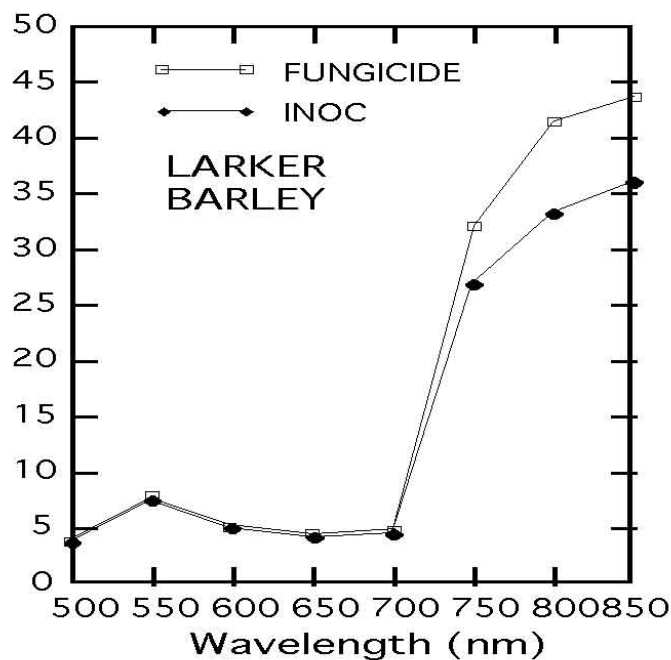
# Cropscanning Cotton

In variety trials variations in plant response due to soil variations, waterlogging, plant populations and disease response have been clearly determined using the Cropscan radiometer. In herbicide and fungal trials the Cropscan radiometer has been widely used in Europe. Fungicidal control of spot blotch in barley



**Figure 2. Data showing the correlation between NIR reflectance measured by the radiometer and NIR with the video.**

shows the plant response to treatment (Figure 3) as an increase in near infrared reflectance, indicating an increased green leaf area. In vegetation studies the Cropscan radiometer can show differences in different vegetation types. For example in Figure 4 the differences between two varieties of cotton with different leaf shape, one okra and the other normal, are shown.



**Figure 3. A comparison of fungicide control of spot blotch on barley.**

# Cropscanning Cotton

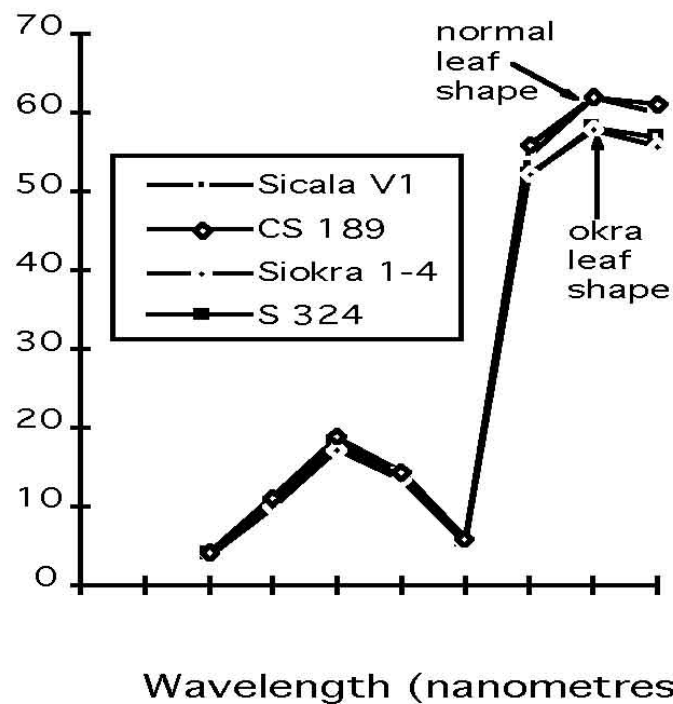


Figure 4. Reflectance from cotton varieties with a different leaf shape.

Along with Multispectral Radiometers, CROPSCAN Inc. manufactures a sophisticated programmable Data Logger Controller (DLC). This DLC is used with the Multispectral Radiometers to form a portable light weight cropscanner system that can easily be carried and used for field radiometry work. Data can easily be transferred from the DLC to a computer for subsequent analysis. The DLC is a general purpose data acquisition or controller system, by virtue of its being programmable (in a high level BASIC language). It is being used for a wide variety of purposes such as weather stations, laboratory data acquisition, grain bin storage monitor, and environmental chamber control.

The Cropscan radiometer is light, portable, quick and since it measures reflectance can be used at any time of day under any sky conditions. A versatile instrument for use in the field.

## Author

Dr Peter Cull

## ICT International Pty Ltd

PO Box 503, Armidale, NSW 2350, Australia.

Ph: [61] 2-6772-6770 Fax: [61] 2-6772-7616

sales@ictinternational.com.au

www.ictinternational.com.au