Detection of Snails in Grain and in the Field and Getting Sprays to Where the Snails Are

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Key Messages

- Snails may be detected in grain as it is being harvested using a mobile phone mounted in the bin.
- Mobile phones can be programmed to detect snails on the ground using WheelCam
- Time lapse photography and analysis can be used to study the behaviour of snails over many months.
- Nozzle choice can help deposit sprays where the snails are located around the time of spraying.

Aims

To determine if mobile phone technology can be used to map and study snails in the field.

Introduction

Snails are becoming a pest of crops on the South Coast of WA. More stringent export standards have recently been imposed limiting the level of snail contamination in grain. Mobile phone technology has advanced rapidly in the last decade allowing new methods of detection, mapping and surveillance to be implemented.

Method

GrainCam

A device was made that delivers grain from the bubble auger on the harvester to a plate so that it may be photographed with a mobile phone (see figure 1). The images are then analysed for the presence of Small Pointed Snails (*Prietocella barbara*).

WheelCam

A mobile phone was attached to the wheel of a Ute or harvester (see image 3) and programmed to take close up photographs of the ground and record the GPS location and time (see image 4). An image is taken with each revolution of the wheel and this eliminates motion blur.

VideoCam

Mobile phones were set up in the field with time lapse programs to record the presence and behaviour of Small Pointed Snails from October to March. Weather, soil moisture and leaf wetness were recorded at the site (see image 6).

Spray Deposition

Fine, medium and coarse quality sprays were compared using water sensitive cards placed in a canola canopy to measure spray deposition.

Results and Discussion

GrainCam

The device was tested in the laboratory as there were insufficient snails present at the sites being monitored at harvest. Preliminary image analysis is showing promise but the algorithms need to be improved to reduce the number of false positives and false negatives (see image 2).

Image 1: The GrainCam.

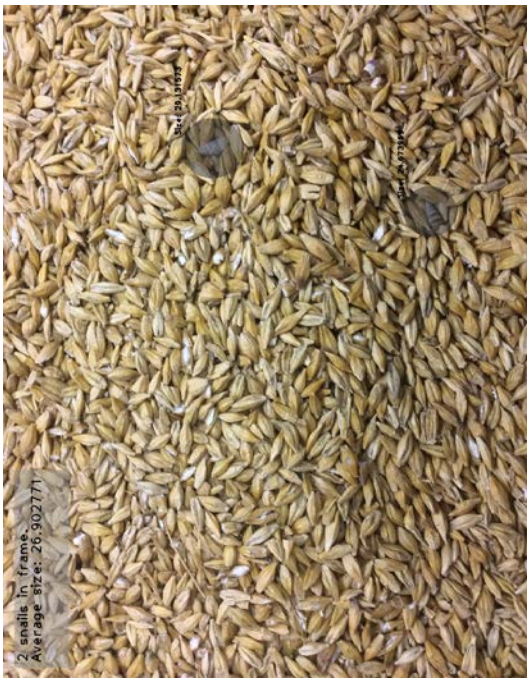

Image 2: Image analysis to detect Small Pointed Snails in GrainCam Images.

WheelCam

Snails could be mapped by manually inspecting the photos (see figure 1). Work is underway to use image analysis to see if the process can be automated as it is currently very time consuming. Collaborative work with SARDI and University of Adelaide is planned.

Image 3: WheelCams attached to a Case Harvester.

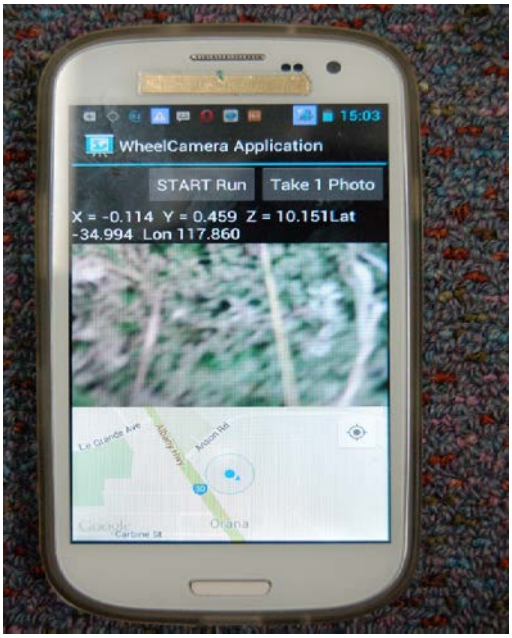

Image 4: The WheelCam app on a mobile phone.

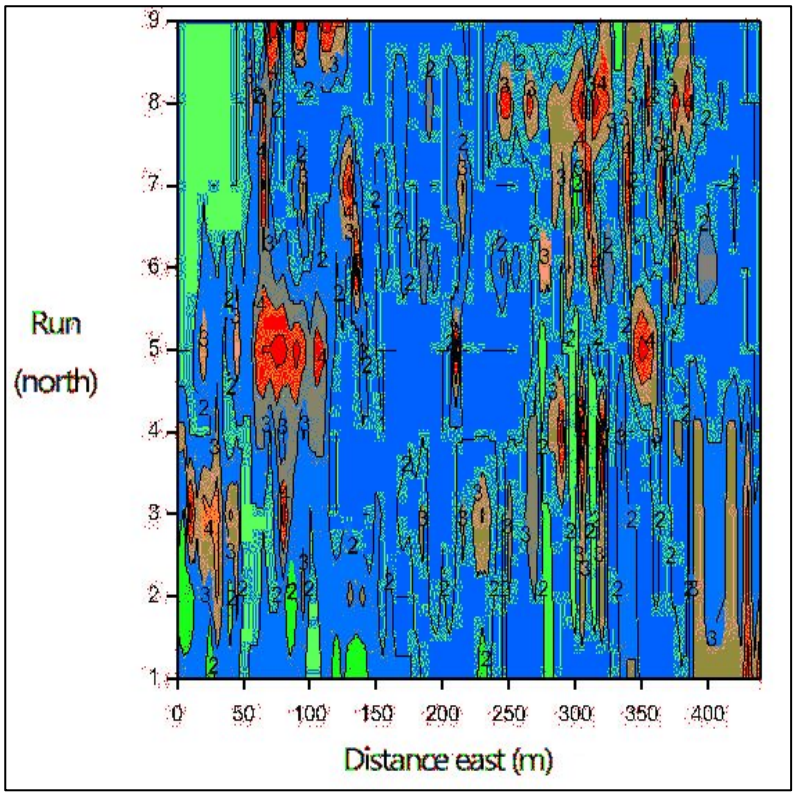

Figure 1: Map of snail densities from the field.

VideoCam

This is showing interesting results with snail activity continuing spasmodically over the whole summer period this year. Weather data is shown below. Currently these images are being manually processed. Work has started on motion detection programs (see figure 2)

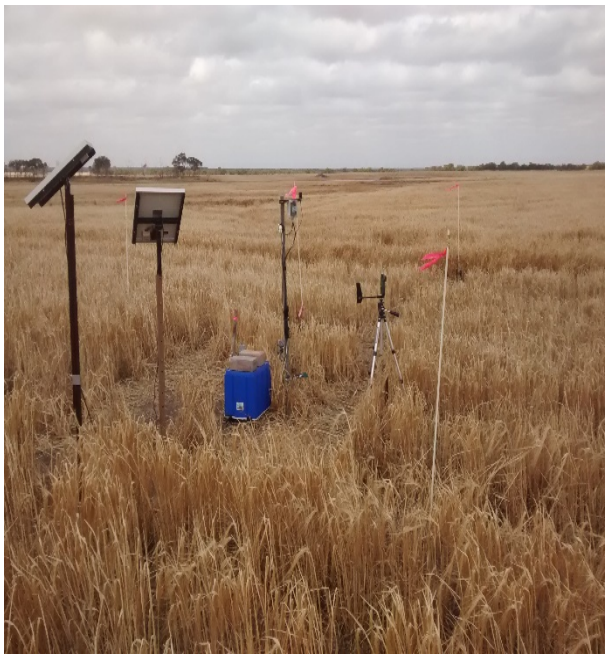

Image 5 & 6: The VideoCam setup and weather stations.

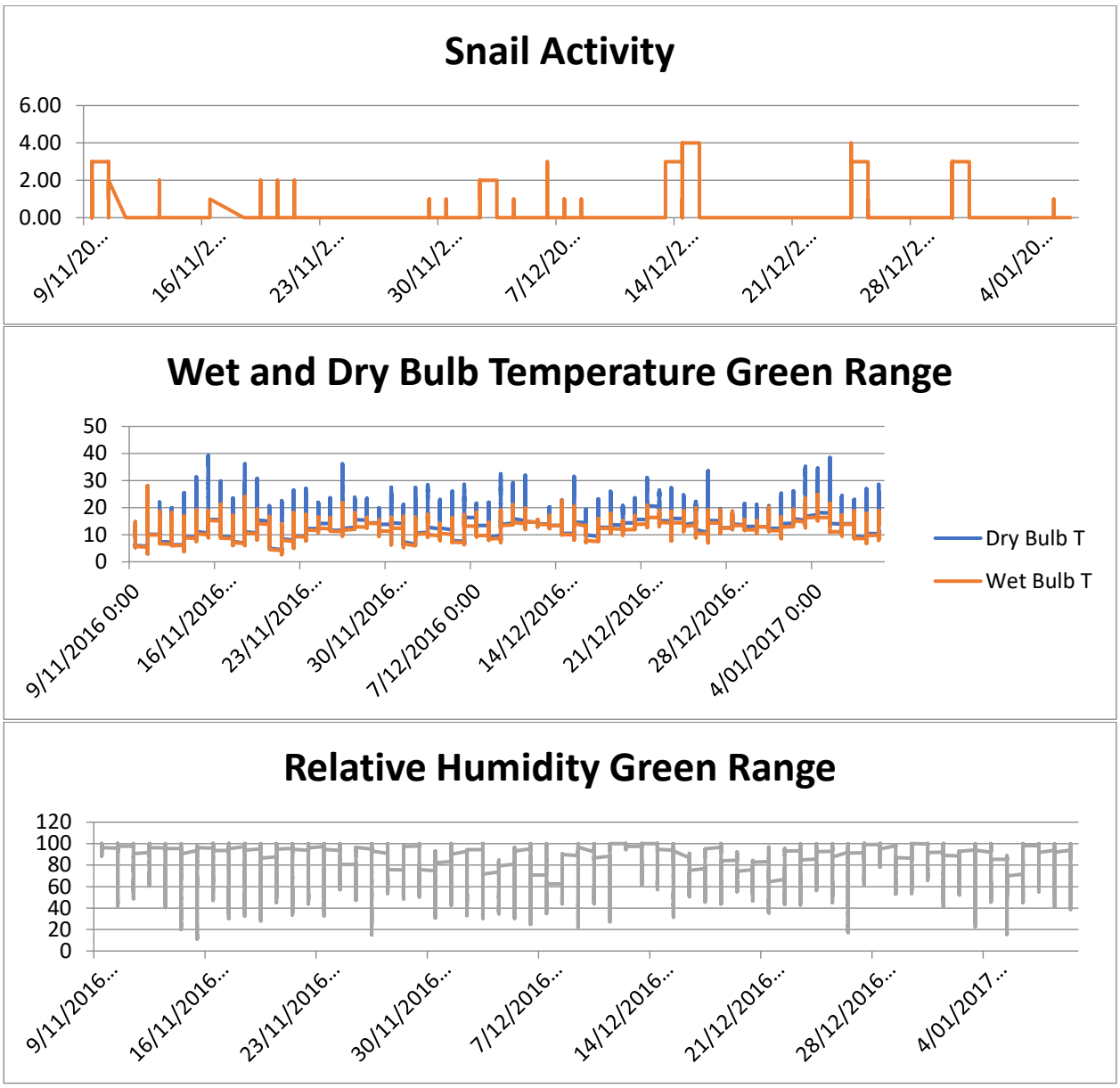

Figure 2: Snail activity with time and weather data.

Spray Deposition

Fine quality sprays deposited more spray at the top of the canopy. Nozzles producing coarse droplets (like the air induction nozzles) deposited fewer droplets at each level in the canopy because their droplets are bigger (see figure 3). When percentage cover is considered the fine nozzle deposit more spray at the top of the canopy but there is little difference deep in the canopy. (see figure 4).

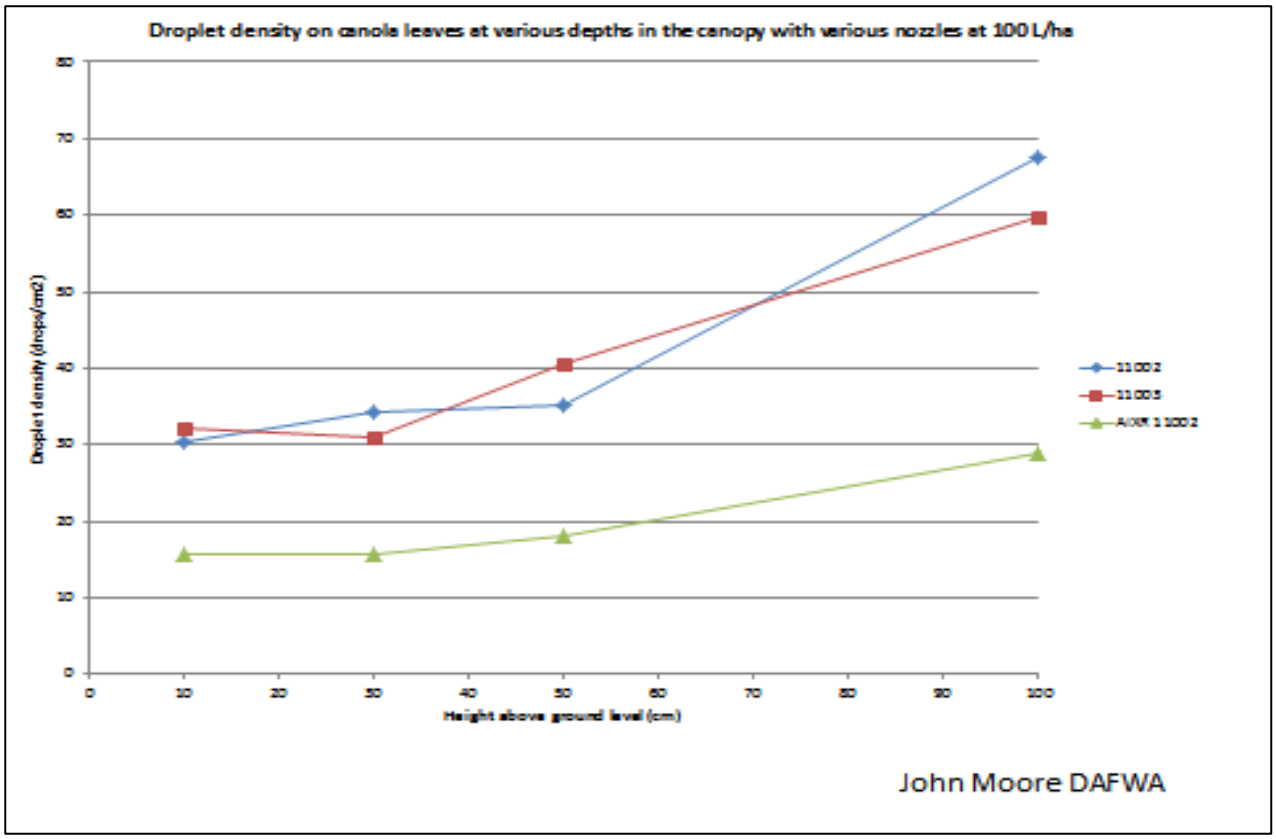

Figure 3: Droplet density at various heights in a canola canopy.

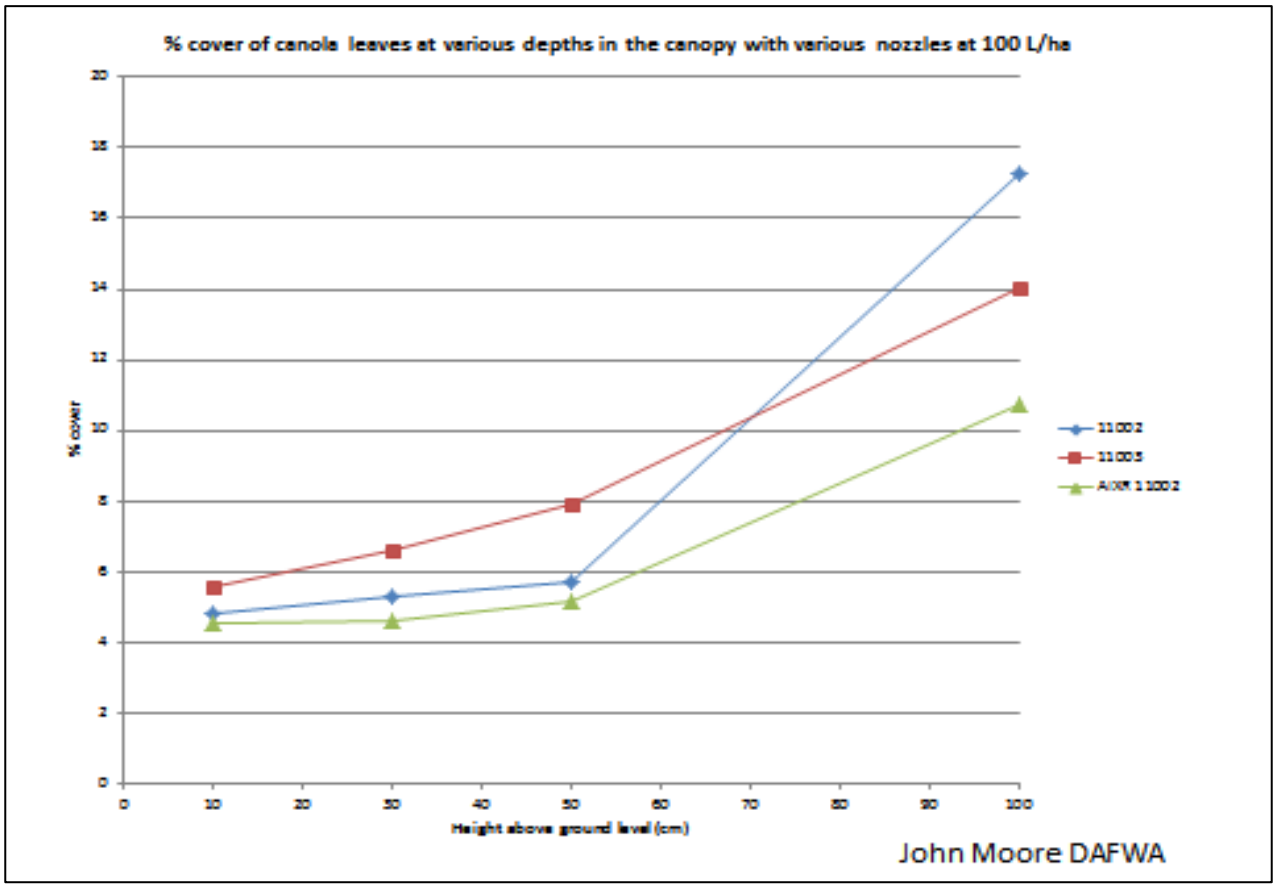

Figure 4: The effect of various nozzles producing fine, medium and coarse spray qualities on the percentage cover of spray at various heights in a canola canopy.

Conclusion

A better understanding of snail biology and distribution will help growers target controls and avoid grain contamination.

Key words

Apps, canopy penetration, control, GrainCam, grain contamination, image analysis, mapping, mobile phones, nozzles, *Prietocella barbara,* Small Pointed Snails, spray quality, VideoCam, WheelCam, weather.

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