

“Modelling ideal irrigation scenarios snares scholarship”

by Phil Laing

Helene Mitchelson, who is studying Agricultural Science at the University of Tasmania (UTAS), was the winner of the 2011 Tasmanian Wine Show Honours scholarship.

Her honours project looks at water use efficiency by hanging blue food dye from a number of emitters in Frogmore Creek’s drip irrigation system and monitoring where the dye travels in the soil profile.

She will measure wetting patterns under the drippers and measure soil infiltration rates and bulk density. These and some other soil physical data will then be used to model ideal irrigation scenarios using the software “Hydrus”.

Miss Mitchelson had extensive discussions with Frogmore Creek vineyard manager Jen Doyle before her three days out in the field in May collecting the data.

The first day was spent putting the dye through the drippers.

The second day was spent collecting soil data using a disc permeameter while the dye ran through the soil.

Soil pits were excavated on the third day to see the wetted profile of where the water had gone.

“I took photos of the dye and loaded the images into the computer to work out the percentage of wetted soil area around the roots – has it gone where the roots are? The software needs two things: one is the visual representation; the disc permeameter gives the computer the other information to simulate a video. From that video we can adjust water frequencies and durations,” Miss Mitchelson said.

Two irrigation treatments were compared, continuous watering and pulse application.

“I tested a continuous irrigation of around 3 hours and a pulse irrigation trial of 10 minutes on, 10 off, 20 on, 20 off, 30 on, 30 off 1hr on, 1 off. Then two days later I excavated soil pits beside the drippers and took photographs and soil samples of where the dye had traveled,” Miss Mitchelson said.

The two irrigation treatments required five soil pits each for replication of the data; the pits were one metre deep and half a metre wide.

She measured wetting patterns under the drippers and measured soil infiltration rates.

Other soil physical data, including initial and final moisture content and bulk density of the soil, was collected using a disc permeameter.

All the information was used to begin modelling ideal irrigation scenarios using a computer software model called ‘Hydrus’.

Miss Mitchelson said “Through this model I will be able to simulate optimal watering patterns and frequencies as well as looking at the distance emitters are spaced from the vines and whether they are in the most effective positions for that particular soil type, in this case a sandy soil.”

Miss Mitchelson is hopeful that her project will improve Frogmore Creek’s irrigation efficiency. “Through gaining a better understanding of how the water is moving through the soil will end up saving them water and money and improve their yield, as water is related to yield,” she said.

Miss Mitchelson is grateful for receiving the Tasmanian Wine Show scholarship.

“As you can imagine equipment, excavator hire, computer software and time is expensive,” she said.

Miss Mitchelson grew up on a mixed cropping and sheep farm in Westbury, northern Tasmania. She has had a keen interest in soils since starting her degree and, after visiting many vineyards through UTAS practical excursions, she has developed a keen interest in the viticulture industry and grape production.

She is contemplating a PhD if there’s an opportunity and is being encouraged by her supervisors.

“I love the industry. I haven’t studied viticulture but I do enjoy the soil side of things. The Chemistry is how the soil is made up and water movement is the Physics.

Every soil is different and water movement is going to be different as well.

When you are setting up an irrigation system the manager needs to know how the water is moving,” Miss Mitchelson said.