

## An interview with Senior Lecturer in Precision Crop Agriculture James Taylor



James Taylor joined the school from Cornell University, where he was working in precision viticulture and the challenge of finding the best ratio of leaf to grape to produce wine of a certain quality. But he grew up in Sydney, Australia, and that's where his career began, with an undergraduate degree in agricultural science.

"My major was in soil science," he explained, "and my honours thesis in precision agriculture, so I come to this from a soil science background, but a lot of the work is based around spatial statistics, and soil science is very strongly involved in that, so there's a lot of cross over".

Following a year off ("I went round the world and did some surfing"), James embarked on a PhD in viticulture, looking at spatial variability in yield within vineyards. He then did a post doc in precision agriculture in the Australian grains industry, working through grower groups to promote the adoption of the technology.

"People don't use it when there aren't the right protocols or right systems, so we were developing relatively simple approaches that growers could use on-farm to increase production efficiencies," he said.

At the same time James was also developing a sideline in precision agriculture in the horticultural industries, with work in the production of kiwi fruit, sweetcorn and apples. He also sat on the Information Technology advisory group to Horticulture Australia, the main funding group for the horticultural industries. All the while, he maintained a continuing interest in viticulture, which led to an offer to collaborate with wine growers and researchers in France via a post doc opportunity as an Agropolis Foundation Fellow, based in Montpellier.

“In Montpellier they were interested in using my expertise in very high resolution soil mapping,” he said. “Working at farm to catchment scales, we were particularly interested in looking at the spatial and temporal variability in vine water stress and how that translates into quality in the grapes. You can then differentially harvest or differentially manage to try to optimise or minimise the effects of the stress. That fed into work around decision support systems; how do you spatially vary canopy management and irrigation management? It was really driven by the French changing their regulations about irrigation of vines.”

His post at Cornell came next, investigating spatial crop load mapping, which looks at the ratio of leaf to fruit. There was a need to develop and adapt sensors to spatially estimate both leaf area and fruit set in vineyards.

He explained: “The quality of fruit depends on this ratio. So if you have a small vine with a small fruit load or a big vine with a big fruit load, your ratio of leaf to fruit is the same and you tend to produce the same quality of fruit. Historically everyone says you have to have small amounts of fruit and stressed vines to produce quality wines, but that’s not really true, it’s just that that ratio worked in places like Bordeaux. But there is no reason why you can’t increase the amount of irrigation and the amount of fruit and still produce fruit of the same quality, if the ratio is right. The Americans are very interested in this, particularly in California where everything is irrigated, and so are the Australians. The ratio (vine balance) can vary markedly within a vineyard, which increases the variability in grape quality, so understanding the spatial variability in crop load is very important for optimising grape quality. Of course some varieties are more susceptible to this ratio, and have a very narrow range of optimum vine balance compared to other varieties. That doesn’t mean to say you can start growing Pinot noir in the south of France and produce a quality wine – it doesn’t get cold enough to develop the flavour. You are still restricted by climate, the amount of heat, the need to manage the canopy and keep it open, avoid fungal disease and so on. There are lots of variables.”

So what persuaded James to move to Newcastle, not an area known for its viticulture? “Newcastle offered me a good job,” he said, “while there are few opportunities back in Australia. And my interest is less in grapes than in the statistics and spatial data analysis. I have worked on all kinds of crops. To me the interest is in how you go from having data to information to decisions – there’s a progress there and you can generate lots and lots of data, but until you can turn it into information and use it to make decisions the data is worthless. That’s why precision agriculture doesn’t always take off – it’s that jump from having the data to making the decision. When the technology and the economics are simple, there isn’t a problem, but when it gets more complicated then it’s harder to quantify – one field may be completely different from another.

“I talked to people I know who have worked or do work in the UK and Newcastle University and it seemed that the country and the university is serious about technology adoption in agriculture. I was impressed by the vision shown by the School when I visited. For me this position is also a challenge as there is no real history of precision farming at Newcastle. Starting with a clean slate obviously has its pros and cons; however, I think with the farming capital within the school there is an

excellent opportunity to develop a precision farming research domain, provide there is investment in the technology.

“Why Newcastle as a place? I like the size of Newcastle – it’s not a big city, but not too small, easy to get in and out of. It has a nice mix of the urban and rural. For an Antipodean who has been bitten by the travel bug it also has the added benefit of being easily accessible to all parts of the UK as well as continental Europe.”