



Top of the crops



WSU's unique protected cropping centre aims to lessen the effects of climate change and reduce costs for smaller-scale farmers.

David Tissue interviewed by Loren Smith

Sydney's Hawkesbury region has been fertile since 1891. Now, it's getting a new agricultural lease of life, and making Australia's food more secure in the process.

WSU's state-of-the-art National Vegetable Protected Cropping Centre, located at its Hawkesbury campus, is the first of its kind nationwide.

A collaboration between the university and not-for-profit research, development and marketing company Hort Innovation, the centre will feature a centrepiece \$7 million glasshouse.

Eight temperature-controlled research bays and one large-scale teaching bay will sit within the 2000m² structure. Using climate control technology, like diffuse glass and smart glass coatings that adjust the spectrum, direction and intensity of light, researchers will trial optimum plant-growing and crop-yielding methods. The first test subjects are eggplants, capsicums, cucumbers and strawberries.

University stakeholders say the centre's launch is timely.

"Until now, nothing like this has been developed locally to specifically suit Australia's harsh climate," vice-chancellor Professor Barney Glover says.

This harshness, they avow, is getting worse because of climate change. Resultantly, protected cropping – such as greenhouse-based agriculture – is growing rapidly. But this methodology is currently out of

reach for most small and medium-scale farmers. Through its research, the centre hopes to make it more accessible and thereby increase Australian crop production.

WSU's Professor David Tissue – an expert on the impact of climate change on ecosystems and a centre teacher and researcher – elaborates on the university's tree change. He emphasises that climate change, food security and energy costs are often thought of in silos, but in fact, they're interrelated.

"[A] changing climate threatens crop productivity; energy costs threaten the cost of getting things from external markets ... so the more food that we can grow locally [the better]."

Campus Review spoke to Tissue from WSU's Hawkesbury Institute for the Environment about the protected cropping centre and its aims to mitigate the effects of climate change and reduce costs for smaller-scale farmers.

CR: What makes the centre unique?

DT: It's the first large scale research-based glasshouse. There are very large industry-based glasshouses here, with 10, 15 hectares under glass. But they have very limited research objectives. What we're trying to do here is use high-tech sensor technology with research objectives to determine the best growing conditions for protected cropping.



Is there any particular research the centre will host?

Yes. One of the projects I'm leading, in collaboration with Swinburne University, is an investigation of novel glass and photovoltaic technologies for protected cropping using a special glass coating called smart glass. It blocks the heat which would otherwise be transferred through the glass.

What that means is, we get the quality of light we need to grow crops, but we have less heat inside the glasshouse, so the energy costs for cooling the glasshouse in the summer are greatly reduced. The glasshouse is the first of its kind to use that sort of smart glass technology to maintain crop production, but reduce energy costs, which are a primary cost of running a glasshouse, outside of personnel.

Which crops are you testing this on?

First, we're going to work with eggplant, then we're going to work with, and have already done some preliminary work on, capsicum, and also cucumber and strawberry.

This glasshouse, because it's funded by the Horticulture Innovation group, will be

using levied crops. So, vegetable growers of particular types of vegetables pay a levy to the HIA (Horticulture Innovation Australia), and then those funds are used for R&D, to then be used for the growers.

Will anyone be able to access the outcomes of this research?

Yes. We've set up two different ways. One is research-based objectives. So we've got eight bays that we use for research, and there will be limited access to those bays to graduate students, post-docs and specialised researchers. But we'll publish those data, and those data will be made freely available.

Then we have one large bay, it's about 420m², and that's a teaching education bay. It will be used to demonstrate our research on different crops. There'll be access to the public for guided tours. It's also the bay that we use for teaching – we'll be teaching courses on how to grow crops.

Moving on to the agricultural industry in Australia more generally, why does it need to be improved? What are the challenges it is facing?

There are a couple of main challenges. Protected cropping meets a few of them. We have changes in climate, so we've got more heatwaves, more intense droughts, more intense flooding events and rising background temperatures. All of these affect crop production outside, and there are only some things growers can do to mitigate that. Protected cropping means that we can control the environment inside. That allows us to grow crops under our environmental conditions to maximise productivity. That's one of the primary objectives.

The other is that we're trying to train people for hard technology growing. Australia has a group of growers, and a group of people who have some of the technical skills. But a lot of those technical skills have to be imported from overseas – the Netherlands is probably the main country. What we're trying to do is train people in Australia to be able to grow crops on their own. So we're trying to disseminate that knowledge nationwide.

Do you mean for people to have their own farm on their property?

No, we're asked that question a lot. What we're trying to do now is assist small and medium-level growers to use the

advanced technology the large growers use. [We want to] demonstrate that there is a decent cost benefit to producing a glasshouse like this – that is, they can grow crops more efficiently, they can grow better quality crops, and yet they can make their money back on the investment in the sensors and the control systems. But for your average person, it takes 5–10 years for this technology to trickle down. We don't expect them to be able to utilise this information immediately.

Right now it's used extensively by large growers. They'll build a glasshouse that's five or 10 hectares, even larger. Some of these operations have 400–500 employees working at a single site. They have the technology to do this kind of work. We're trying to reach some of the medium and smaller growers to be able to put this on a more reasonable scale, so that they can see the benefit in controlling the environment. There's a cost upfront to the infrastructure and so on to put this together. We've got to be able to generate proof of concept that this is a reasonable way to produce crops at a reasonable price.

If this sort of research wasn't being done, could Australia face a food security, or a food shortage problem?

Potentially, particularly in the vegetable market, without question. There's a lot more movement towards using protected cropping to help mitigate the climate issues we have. The other important thing is that we can build these facilities close to urban centres. They call it 'peri-urban', just on the outside. That means there's less energy to get the food to market, and we can also ensure that we grow the types of vegetables and fruits that people are interested in. In a lot of ways, it's climate-change proactive, and reduces the energy cost of getting things to market.

What is the centre's key purpose?

The food security issue is crucial. All these things are tied together. Most people like to put them in separate baskets, but changing climate threatens crops productivity.

Energy costs threaten the cost of getting things from external markets in here. The more food we can grow locally, and the more food we can grow closer to domestic markets, and the more we can control our own food production, the more beneficial it is to the country. ■