

# Future's bright for endophytic fungi

IMAGINE increasing a plant's protection against pests and pathogens that are at the core of major agricultural problems by using natural organisms that produce metabolites with the same functions as pesticides, herbicides and fungicides.

That is exactly what Ross Mann, recent recipient of Horticulture Australia Limited's (HAL) Young Innovators and Scientist's Award is set to do.


"We're focusing specifically on working towards utilising endophytic fungi (fungi contained in healthy plant tissue that do not cause disease) to counteract the four most problematic soil-borne diseases identified in Australian horticulture: Fusarium, Rhizoctonia (wilt diseases), Pythium (root rot) and Sclerotinia (stem rot)," he says.

"We're also going to look at using endophytes to control Plasmodiophora (clubroot), which causes huge galls or swellings on the roots of Brassicas."

Mr Mann says the key to his research – set



Ross Mann, DPI Victoria, is recipient of HAL's Young Innovator's and Scientist's Award.




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## Industry News

to begin next year – will be to use the ‘good’ fungi against the ‘bad’.

“Endophytic fungi produce metabolites which are active against plant pathogens and pests,” he says. “If you head out into nature, endophytes will be found living in, and protecting, almost all native plants. Now we will be trialling their inoculation into horticultural crops and soils.”

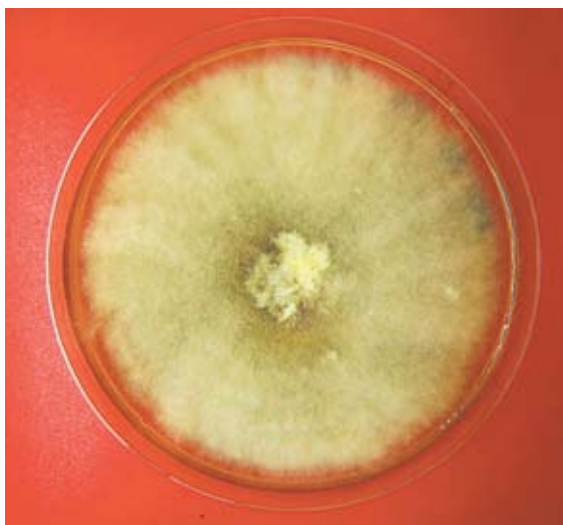
He says endophytes may be used in different ways, such as bioprotectants and biofumigants.

“For example, we are testing the idea that if we take a broccoli seedling and inoculate it with an endophyte, it will grow right through the plant, enhancing the plant’s defence against pests and pathogens,” he says.

“What we predict is that the endophytes will provide a form of systemic, natural resistance that means farmers will not have to spray crops routinely in a bid to avert disease. Essentially, the plant will be protected by an organism that remains active within the plant through the entire season.

“Another application being trialled is to inoculate the endophyte onto a substrate – wheat or barley seed, for example — and then use the biocidal metabolites from the endophyte as a form of biofumigant or myco (fungi) fumigant.

“Under the process of mycofumigation, the endophyte can suppress soil-borne pests and pathogens, but by releasing more natural biocides. Already, we have seen the metabolites that endophytes produce display



Endophytes.

similarities to known fungicides and herbicides.

“In the United States, an endophyte isolated from a cinnamon tree in Honduras demonstrated broad biocidal activity against a wide range of destructive pathogens and is being commercially developed as a mycofumigant – placed into the soil prior to planting to disinfest soils.

“This is achieved without reliance on currently used chemicals like methyl bromide which is a known ozone depleter (substances that break down the ozone layer, which contributes to an increased level of UV radiation at the earth’s surface).”

Mr Mann says he is excited about looking at giving farmers a potential alternative which could save on use of synthetic pesticides.

“I’ve worked on projects that have looked at fumigants in the past, and there are some very harsh chemicals available out there,” he says. “This whole project was designed around the knowledge that there is a continued shift towards a reduction in the use of synthetic agrochemicals globally.

“Consumers are demanding produce with no pesticide, herbicide and fungicide inputs while governments are tightening regulations on the use of harsh agrochemicals or withdrawing them altogether.

“In the US and Europe, there are a number of fumigants currently being reviewed to determine whether or not they should be in the market.”

Mr Mann says endophytes are a safer alternative for farmers.

“And in this particular instance, we are finding that the endophytes are active mainly on lower-level organisms like microbes,” he says. “They don’t seem to affect the health of higher organisms, including plants and animals.”

He says the process may take a few years yet, but traditionally, biological products are registered more rapidly than synthetic chemicals.

“If all goes well, it is likely that endophytes will become more commercially available as growers are pushed towards sustainable options,” he says. “There is enormous scope for endophyte application.”

For more information, contact Ross Mann, email <ross.mann@dpi.vic.gov.au>.

## Organic seeds – a time and place for growth

WHEN is it worth following up on organic seed?

According to the first World Organic Seed Conference in 2004, organic seed can get confusing: Is it seed grown according to organic production methods; seed bred according to organically accepted methods; and/or seed varieties adapted to organic agriculture conditions of low-external inputs?

Their overall consensus was: Currently, the question of organic seed or not is not the biggest concern of organic farmers. The challenge of sourcing organic seed across an array of species and at a commercially viable volume remains an issue for most Australian organic producers.

At present, the derogation which allows

producers to source non-organic (chemically untreated) seeds where organic equivalents cannot be found is keeping industry afloat.

“From the angle of aiming for the complete integrity of traceable systems, I think use of organic seed will be important in years ahead,” Mara Seeds managing director, Stuart Larsson, says.

Mara Seeds sells a range of pasture-grass organic seeds as a small part of their diverse operations.

“But right now, it’s not always easy to find,” Mr Larsson says. “Soy, barley, wheat and oats – commodity items — are being serviced by seed producers but something more specialised and a lot of the vegetable seeds just aren’t there.”

BFA (Biological Farmers of Australia) Standards Chair, Dr. Andrew Monk, says while there is an obligation on organic growers to buy organic seed where viable; the reality of escalating organic production will see the Australian Organic Standard derogation with regards to seed remain, to allow growers access to the varieties they need.

“However, it is critical that growers producing for export markets, including the United States, realise there are differences in operations relative to the sourcing of seed that must be considered,” he says.

Even globally, the organic seed market is a slow developer behind the fast-paced food production sector. The World Conference