Breakthrough in orchard seed surrogacy

March 30 2015, by Kerry Faulkner

Ms Bustam used Caladenia latifolia seeds for her research, drawn from more than 300 plant species whose seeds are stored at Perth's Botanic Gardens. Credit: Ilena Gecan

Research which germinated plantlets from orchid seed 'surrogates' has boosted the survival prospects of threatened terrestrial orchids.

The advancement means seeds from rare orchids can be preserved and the surrogates used for research into the many factors endangering them.

The research involves UWA PhD candidate Betty Mauliya Bustam who worked with Kings Park Botanic Gardens and Parks Authority scientists

Kingsley Dixon and Eric Bunn.

A terrestrial orchid seed does not have a cotyledon; the seed leaf within the embryo of the plant.

Theoretically the seeds do not germinate then, unless they are infected by a symbiotic fungus—(mycorrhizal fungus) which supplies them with the nutrients needed to grow.

A small ball-like protocom is formed as soon as the symbiosis is established.

Ms Bustam's research created secondary protocoms from the primary protocoms without symbiosis.

Ms Bustam used Caladenia latifolia seeds for her research, drawn from more than 300 plant species whose seeds are stored at Perth's Botanic Gardens.

The Caladenia is a genus endemic to WA, with at least 300 species. One third is consider rare and endangered.

The secondary protocoms were grown asymbiotically using a very specific combination of plant growth regulators (PGRs).

These included coconut water for germinating seed asymbiotically to generate primary protocoms, rather than symbiosis using mychorrhizal fungi.

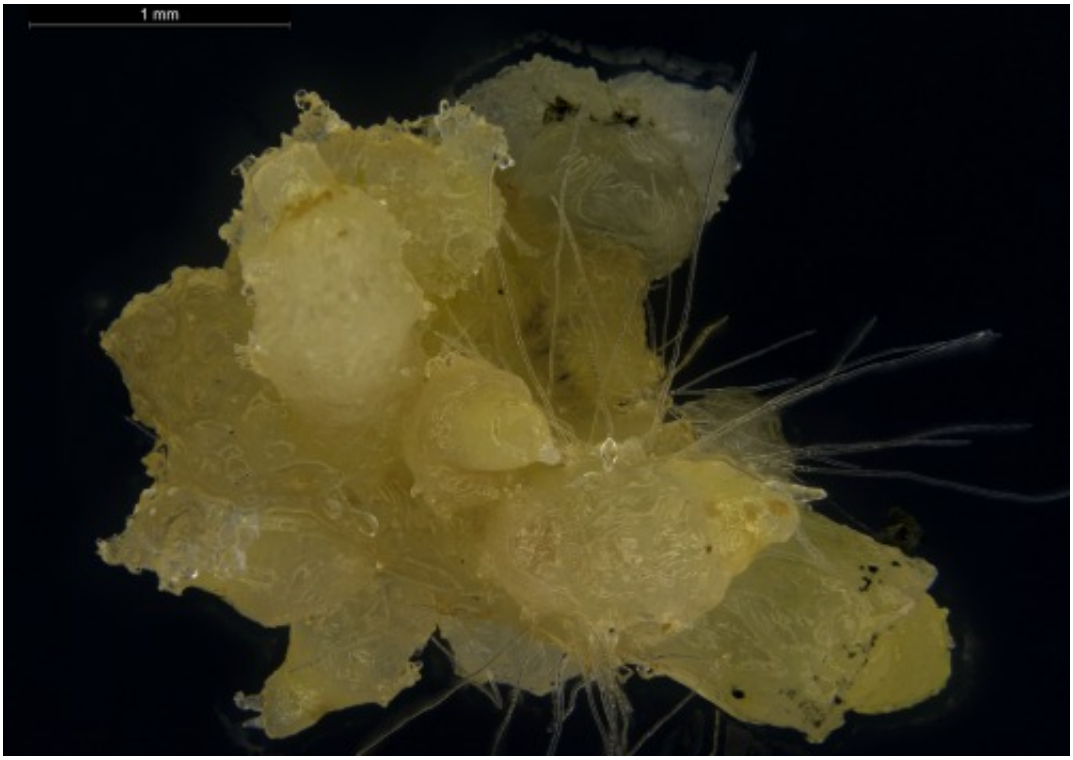
The work has established protocols for growing Australian species of terrestrial orchids using secondary protocoms. Credit: BGPA

Ms Bustam says germinating orchid seeds asymbiotically with unsuitable media in the laboratory could have taken up to a year.

Her combination of medium cut that time down to months.

"I tested many combinations of PGR and found a combination of two [to be] the most effective for growing primary protocoms into secondary protocoms and the research proved they can be developed into a plantlet with leaves and roots," she says.

"Many researchers believed it was hard to germinate terrestrial orchids asymbiotically, let alone with a simple way but we have shown it can be done," she says.



Secondary protocoms (scale: 1mm). Credit: BGPA

The work has established protocols for growing Australian species of terrestrial orchids using secondary protocoms.

In the five stages of developing seed to plantlets, the most suitable is stage four, which occurs five weeks post-germination.

Mrs Bustam says there are many factors around orchids becoming extinct that need to be investigated but this has been made difficult by fewer seeds being available each year.

"That's why we are trying to develop the secondary protocoms; we can store the actual seeds in cryostorage so the orchid doesn't become extinct and do experiments using surrogate seeds," she says.

More information: "Proliferation and harvesting of secondary protocorms as a novel means for improving propagation of terrestrial orchids" *Australian Journal of Botany* 62(7) 614-621 dx.doi.org/10.1071/BT14291

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