readily available to access synthetic CLE peptide hormones to test their activity in plants using feeding studies."

The study used the building block to chemically synthesise CLE40, which is a CLE peptide that modulates root development (by controlling the stem cell population of the root).

"This is obviously a very important peptide hormone to plant growth," he said. "We also developed a new assay to feed the CLE40 peptide and monitor root growth.

"Using this assay, we showed that the building block is important to CLE40 activity. Modifying root architecture via key developmental factors is viewed as a pivotal step in enhancing agricultural sustainability and food security.

"The building block can now be used to synthesise other CLE peptides, which can subsequently be used in feeding studies to establish their activity."

Tremendous potential for agriculture

Brett said CLE peptides found to modify aspects of growth or yield had tremendous potential in agriculture (increased food production), tissue culture (potential to stimulate shoot or root development), floriculture (potential to enhance flowering), and other industries that relied on plant growth.

This might be achieved by feeding, or through targeted breeding or genome editing techniques.

The study, "Arabinosylation Modulates the Growth-Regulating Activity of the Peptide Hormone CLE40a from Soybean", is published in *Cell Chemical Biology*.

Brett's group also recently published the complete CLE peptide family of two legume species in Scientific Reports, in addition to publishing another article in Scientific Reports on a CLE peptide receptor having a role in regulating shoot architecture.

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The study has identified a class of hormones in legumes that are responsible for plant growth and development.
(Supplied: University of Queensland)

Researchers identify gene to help hybrid wheat breeding

AUSTRALIAN researchers at the University of Adelaide have identified a naturally occurring wheat gene that, when turned off, eliminates self-pollination but still allows cross-pollination – opening the way for breeding high-yielding hybrid wheats.

Published in the journal *Nature Communications*, and in collaboration with US-based plant genetics company DuPont Pioneer, the researchers say this discovery and the associated breeding technology have the potential to radically change the way wheat is bred in Australia and internationally.

"Wheat is the world's most widely grown crop, delivering around 20 per cent of total food calories and protein to the world's population," says Dr Ryan Whitford, Hybrid Wheat Program Leader at the University of Adelaide's School of Agriculture, Food and Wine.

"But to meet increased food demand from predicted global population growth, its production needs to increase by 60 per cent by 2050. One of the most promising options to meet this demand is for farmers to grow hybrid wheat varieties, which can offer a 10 to 15 per cent yield boost relative to conventionally bred varieties that are currently on the market."

Hybrids could benefit a wide cropping area

In Australia, hybrid wheat would probably best serve those wheat growers in the higher yielding, high rainfall zones along the eastern seaboard, but hybrids also could provide improved yield stability in the more challenging growing regions of Australia.

Hybrid wheats result from crosses between two carefully selected pure wheat lines. But the challenge to produce hybrid wheat is in the breeding and commercial multiplication of the hybrid parent seed. Wheat is a self-pollinator while the production of hybrid seed requires large-scale cross-pollination.

"Hybrids are widely used for the cereals corn and rice but developing a viable hybrid system for bread wheat has been a challenge because of the complexity of the wheat genome," says Ryan. "We have now identified a gene necessary for cross-pollination in wheat which can be used in large-scale, low-cost production of parent breeding lines necessary for hybrid wheat seed production."

In the US, DuPont Pioneer has developed an innovative breeding technology for corn called Seed Production Technology (SPT) used to bulk-up parent breeding lines for hybrid production.

"The pollination gene is 'biologically contained' to the breeding process and does not make its way past the grandparent stage in producing the end-user hybrid seed," says Dr Marc Albertsen, Research Director, DuPont Pioneer.

"This identified pollination gene is the key step for a similar technology for wheat and could dramatically increase the efficiency of hybrid wheat seed production." ■