Researchers unlock key to iron-rich rice

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On the back of a groundbreaking scientific discovery, researchers from Flinders University are pushing ahead with a plan to create super-rice that could potentially combat nutrient deficiencies in third-world countries.

PhD student Bianca Kyriacou – under the guidance of Flinders' Associate Professor James Stangoulis – is leading a research mission to increase the iron content of rice grains in a bid to eradicate nutrient deficiencies, such as anaemia, in under-developed countries.

So far, her breakthrough research has produced a genetically modified rice grain containing up to four times more iron than conventional rice using the plant's own abilities to acquire more iron from soil, which is in turn transported to the grain.

With the 'proof of concept' stage an official success, Ms. Kyriacou said the next step is to grow subsequent generations of the iron-rich rice to determine whether the plant is capable of producing the same results year after year.

"We've proved it's possible to modify the plant so that it can extract more nutrients from the soil but what we now need to do test is the hereditability, so whether subsequent generations of the plant are capable of producing the same results year after year," Ms. Kyriacou, 26, said.

"Agronomic tests will also need to be conducted to see how well the

plants perform outside a controlled greenhouse environment, as well as whether the modifications impact yield and grain quality.

“Eventually, we’ll carry out animal tests to see if they can absorb more nutrients from the grain before hopefully producing a product for human consumption.”

Ms. Kyriacou said her research – a collaboration with all three universities in SA and the University of Melbourne – was unique in that it does not ‘trick’ the plant into thinking it lacks iron.

“The plant already has the ability to extract nutrients for its own benefit but we have human requirements from these plants so what we’ve done is modify the expression levels of the plant gene to enhance its natural transport mechanism of carrying nutrients from soil to grain,” Ms. Kyriacou said.

“This whole chain of events makes the plant do what it’s already capable of doing – we’re just improving the efficiency of that process.”

As an extension of her project, scientists from the International Rice Research Institute will begin field trials in the Philippines next month using a similar super grain.

Associate Professor Stangoulis, a leading plant biologist, said the breakthrough could provide a solution to iron deficiencies affecting an estimated two billion people worldwide.

“Many under-developed nations depend on rice for up to 80 per cent of their caloric needs, therefore many people in these areas are prone to iron deficiency,” Associate Professor Stangoulis said.

“That’s why a high-iron rice could significantly improve nutrition for

people who rely on rice as their main source of diet."

Ms. Kyriacou agreed the research, funded by the Australian Research Council and HarvestPlus, was a big coup for SA.

"This is world-class research coming out of Flinders, putting us on the international map for research that could potentially benefit millions around the world," she said.

Provided by Flinders University