

Fine-tuning plant cells for superior cereal crops

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Matthew Tucker

Changing the developmental path of grain in cereal crops to better influence yield, quality and end-use is the aim of University of Adelaide

research scientist Dr Matthew Tucker.

Dr Tucker, who was recently awarded a prestigious Australian Research Council (ARC) Future Fellowship, will be taking advantage of plant cells' ability to change identity as the plant develops, to determine how to tailor cereal grains that are healthier to eat or have other desirable attributes.

"Unlike animals, most plant cells essentially can become any cell type," says Dr Tucker, who is based in the ARC Centre of Excellence in Plant Cell Walls in the School of Agriculture, Food and Wine. "But how and why plant cells change identity during grain development hasn't been determined.

"I'm trying to identify the pathways that drive cells to become different. We'll be looking to identify natural variants in these pathways that can be used to purposely change [cell types](#) in the developing cereal grain."

One potential outcome could be increased [antioxidant levels](#) in wholegrain or wholemeal flour. Antioxidants are important because they contribute to health benefits associated with consuming wholegrain products, such as reduced risk of cardiovascular disease, type II diabetes and obesity.

"When we look at the whole grain, we can see it contains a lot of different cell types. It's the outer layers we're particularly interested in – they contain more of the dietary fibre, antioxidants and minerals that make whole grains so much healthier for us than just refined flour, which is mainly starch," says Dr Tucker.

Grain cross section

"What we do know is that there is great variation in the outer layers between different [cereal crops](#). We are investigating wheats from all over the world, some of which are old varieties only grown in certain regions and used for specialised breads, pastas, beers and baked goods. There are many wonderful varieties and they vary in their ability to contribute healthy antioxidants such as carotenoids, phenolic acids and flavonoids to our human diet.

"There is a lot of potential to bring this healthy compound-making ability to the cereals our farmers are growing. In this way we can develop a sustainable way of growing healthier foods."

Dr Tucker will use advanced molecular methods to investigate which genes are expressed in the outer layers and how the signals operate that drive some cells to accumulate starch and others to make antioxidants.

"We want to find the switch to be able to turn starch-accumulating cells into antioxidant accumulating cells. This will give us key information that can be used to naturally increase antioxidant levels in our staple cereal products and target prevention of chronic diseases that are becoming more prevalent in Australian society," he says.

Provided by University of Adelaide

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