

WHAT IF COELIACS COULD HAVE THEIR BREAD AND EAT IT TOO?



They probably can soon. Maybe the best thing since sliced bread: Coeliac friendly Wheat

Solution: Scientists in Spain, the Netherlands and the U.S. are using genome editing to make wheat suitable for people with coeliac disease and noncoeliac gluten sensitivity.

Did you know?

People with coeliac disease and noncoeliac gluten sensitivity make up more than 7% of the Western population. Helping these people will contribute to the third UN Sustainable Development Goal of Good Health and Well-Being.

The people behind the solution:

“I think that for a coeliac to enjoy good bread, made of wheat, with the taste of wheat, the aroma of wheat, it would be something really amazing”

Francisco Barro Losada,
Institute for Sustainable
Agriculture AS-CSIC

Approximately one person in 100 has coeliac disease, which means for them eating gluten is risking diarrhoea, vomiting, malnutrition, and even brain damage and gut cancer. Add to this group those who are gluten sensitive and you get 7% of the population avoiding foods that contain gluten. What exactly is this substance that impacts the lives of such a significant portion of people, but leaves the rest of us unharmed? Gluten is the general term for the proteins found in various cereal grains such as wheat, barley, and rye, and holds bread and cake together during the baking process. But not all gluten is created equal. It is the class of gliadin proteins that triggers the autoimmune response that damages the gut lining, causing the dire consequences for gluten-intolerant people. If these proteins could be specifically removed, it would result in bread and other products consumable by people with coeliac disease while leaving much of the characteristic taste and structure intact. This is in contrast with gluten-free breads made from rice or potato flour.

The scientists at the Institute for Sustainable Agriculture (IAS-CSIC) have tried to reduce gliadin in wheat in two ways. First by using a technique called RNA interference and later by gene editing with CRISPR/Cas9. These techniques have delivered results that show a decrease in the intensity of the immune response by 95% and 85% respectively. However, the first technique, RNA interference, introduces foreign DNA in the plant, making it transgenic. It works by downregulating the production of the protein while leaving the gliadin genes intact, in the end still risking potential gliadin production. CRISPR on the other hand is a precision genetic engineering technique that allows scientists to change individual letters of the genetic code with high efficiency and relative ease, with essentially the same outcome as conventional breeding with spontaneously arising mutations. With CRISPR the researchers can go into the genome and disrupt the specific disease-causing genes. The plants remain free from transgenes such that the CRISPR approach can assuage a fear some people may still have regarding transgenic plants. The research group has deleted 35 of 45 relevant genes this way, still leaving enough to make the wheat suitable for baking small-sized loaves of bread.

Taste tests have been conducted with noncoeliac gluten sensitive patients. The low-gliadin bread produced by the RNAi technique was found to be innocuous and highly palatable. The tests went on for several days and over time even improved the gut microbial profile when compared to the gluten-free regimen. The same results would be expected using gene editing technology. Promising news for those gluten-intolerant and looking to change up their diet.

Genome
editing is

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