

Scientists isolate genes affecting the quality of wheat grains

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A team of scientists from the Institute of Biology of Tyumen State University and universities of Kazakhstan and Australia studied the factors that affect the quality of wheat grains. Two groups of genes that control the synthesis of gluten proteins turn out to have a considerable affect the quality of wheat dough. The work will help make wheat more eco-friendly and healthy. The article was [published](#) in *Acta Physiologiae Plantarum*.

The characteristics of grain-based products, namely bread and pastry, depend on the quality of grain. Quality is affected by numerous factors, including the presence and type of gluten proteins. If the grain is of low quality, it can be improved chemically with fertilizers or by adding food supplements (leavening agents, dry gluten or vitamins) at the grinding stage. However, all these supplements can make the final product dangerous for [human health](#).

"Sometimes when you cut a loaf of bread, you can see a cavity under the crust. It means that the gluten was of low quality, and its structural proteins negatively affected the dough. Therefore, the genes of this variety of wheat are unable to support proper grain quality. We study these phenomena, describe them, and recommend wheat varieties that have "good" genes in their genetic profiles. This is the way to secure proper quality of baking materials and end products," say the authors of the study—Nina Bome, the Head of the Department of Botantics, Biotechnology, and Landscaping at the Institute of Biology of Tyumen State University, and Maral Utebayev, a postgraduate.

An international group of scientists including the representatives of Tyumen State University, studied the genes associated with the quality of wheat [grains](#). The authors of the work focused on two groups of genes – Gli and Glu. They control the synthesis of gluten proteins—gliadins and glutenins. Certain types of glutenins affect the quality of dough and therefore of bread. They are called high molecular weight glutenin subunits.

"The experiments were made in the Laboratory for Biochemistry and Breeding for Quality of A.I. Barayev Research and Production Centre of Grain Farming. Each co-author of the work was responsible for their part of the job. First of all, we selected the materials and agreed on the types of tests we wanted to conduct. Then we selected the samples of 122 varieties of wheat that grow in Northern Kazakhstan and carried out their genetic analysis. Finally, we carried out a number of statistical calculations, as well as technological and baking evaluation of 33 varieties and 40 promising breeding lines. We also established a connection between the content of high molecular weight glutenin subunits in the grain and technological parameters of the dough," said the scientists.

Similar projects have been carried out, but this is the first work to consider the wheat growing in Northern Kazakhstan and Northern Transurals. According to the scientists, the study shows a ratio between Gli and Glu and quality characteristics of [wheat](#) grain, making it more eco-friendly and healthy.

More information: Maral Utebayev et al. Genetic polymorphism of glutenin subunits with high molecular weight and their role in grain and dough qualities of spring bread wheat (*Triticum aestivum* L.) from Northern Kazakhstan, *Acta Physiologiae Plantarum* (2019). [DOI: 10.1007/s11738-019-2862-5](https://doi.org/10.1007/s11738-019-2862-5)

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