

Researchers discover high levels of selenium in wheat grown in selenium-rich areas

January 30 2020



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RUDN doctors have found an increased level of selenium and other significant microelements in wheat bread and wheat from selenium-rich areas. Thanks to this, bread and wheat can be used as a source of

selenium for people with selenium deficiency. The article was published in the journal *Biological Trace Element Research*.

Selenium (Se) deficiency may be associated with the development of such pathologies as Keshan and Kashin-Bek diseases, which are common in China and Central Asia, although isolated cases have been documented in Russia. Normalization of the level of Se in the body leads to a decrease in risk of a number of metabolic disorders. Therefore, the development of methods for correcting selenium levels in the human body has become an important aspect of preventive medicine.

RUDN doctors, in collaboration with colleagues from P. G. Demidov and Tapar University (Patiyala, India), with the guidance of Margarita Skalnaya, MD and professor of the medical elementology department of the RUDN University, evaluated the levels of Se and other microelements in [wheat](#) in the Se-rich Punjab region of India.

The researchers selected 12 samples of wheat grains from the Se-rich and Se-normal regions, and then made traditional Indian roti cakes using flour made from the wheat. The samples were processed by microwave decomposition in nitric acid at a temperature of 170-180 °C for 20 min. The levels of selenium and other microelements (Co, Cr, Cu, Fe, I, Mn, Si, Sr, V, Zn) were determined by inductively coupled plasma mass spectrometry.

The researchers found that the selenium level in wheat from Se-rich areas exceeded the similar value for the wheat from normal areas by more than 488 times. The [bread](#) contained 179 times more selenium.

The researchers have shown that in the bread made from the wheat grown in the area with a high Se levels, the levels of chromium (Cr), copper (Cu), iodine (I), manganese (Mn) and vanadium (V) exceed the control values by 203 percent, 22 percent, 78 percent, 43 percent and 40

percent respectively. As with the wheat grains, the levels of lithium (Li) and strontium (Sr) in the Se-fortified bread were 21 percent and 39 percent lower than in the bread with normal Se levels. The experiment has also shown that if wheat is grown on selenium-rich soils, the concentration of toxic metals decreases: the amount of arsenic (As) in grain has decreased by 23 percent, and arsenic and mercury (Hg) in bread have decreased by 37 percent and 65 percent.

"It is assumed that the identified differences may be the result of changes not only in the general level of selenium, but also in its individual forms, as well as the acidity of the soils. In this case, a decrease in the content of heavy metals and metalloids can be mediated by the direct interaction of selenium with mercury and arsenic, preventing their accumulation, as well as by an increase in the activity of the plant antioxidant system," said Alexei Tinkov, one of the authors.

The authors of the study believe that bread with high levels of [selenium](#) can help people with the deficiency of this microelement, but if consumed as usual, it can subsequently lead to an excess of it. Therefore, the consumption of these products must be controlled. Later, the authors of the study plan to evaluate Se bioavailability from other cereal products saturated with it.

More information: Margarita G. Skalnaya et al. Selenium and Other Elements in Wheat (*Triticum aestivum*) and Wheat Bread from a Seleniferous Area, *Biological Trace Element Research* (2019). [DOI: 10.1007/s12011-019-01776-6](https://doi.org/10.1007/s12011-019-01776-6)

Provided by RUDN University

Citation: Researchers discover high levels of selenium in wheat grown in selenium-rich areas

(2020, January 30) retrieved 25 April 2024 from <https://phys.org/news/2020-01-high-selenium-wheat-grown-selenium-rich.html>

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