

Lentils provide breakthrough in disease prevention

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A PhD student has made a significant breakthrough in preventing a global deficiency of the essential mineral and micronutrient in humans called selenium, which has been linked to the possible incidence of some diseases, including some cancers, viral infections, suppression of HIV progression to AIDS, heart disease and male infertility.

More than one billion people globally suffer from [selenium](#) deficiency due to low dietary intake in countries where soil selenium levels are low such as Australia, New Zealand and Bangladesh.

PhD student Mahmudur Rahman from Bangladesh and his supervisors Hackett Professor Kadambot Siddique and Professor William Erskine

have developed a way of increasing the concentration of selenium in lentil seed, a concept known as biofortification.

The group from The University of Western Australia's Institute of Agriculture and Centre for Plant Genetics and Breeding in the School of Plant Biology took analysis from selenium in the soil and lentil seeds in collaboration with North Dakota State University and Cornell University in the U.S.

Studies were conducted in Bangladesh and Australia to determine the concentration of selenium in lentil seeds. In Australia, in cooperation with the South Australian Research and Development Institute (SARDI) and Department of Environment and Primary Industries, Victoria they showed that applying 40grams per hectare (g/ha) of selenium directly on lentil plants during its reproductive stage increased its concentration in the seeds by more than 10 times from 200 micrograms per kilogram ($\mu\text{g/kg}$) to 2772 $\mu\text{g/kg}$.

"Our research shows that without changing food habits, biofortified lentils would provide adequate dietary selenium to people living in countries where soil selenium levels are low, such as Australia, New Zealand and Bangladesh," Professor Erskine said. "This means that eating just 20g of biofortified lentils can supply all of the recommended daily allowance of selenium."

Seed selenium concentration in Bangladesh studies averaged 312 $\mu\text{g/kg}$ compared with 200 $\mu\text{g/kg}$ in Australia. In both countries, research showed that different varieties of lentils and the location they were grown in was a factor for seed selenium concentration.

"The research found that genetic variation in lentils does affect the amount of uptake and concentration of selenium and therefore there is an opportunity to breed and select for improved varieties with selenium

seed concentration," Mr Rahman said.

"There is scientific evidence that a selenium-deficient diet may increase the risk of arsenic poisoning among people exposed to arsenic-contaminated water," Professor Siddique said. "In Bangladesh, more than 80 million people are at risk of drinking arsenic-contaminated water.

"The research is particularly significant to Bangladesh where the average consumption of selenium is only half of the World Health Organisation recommended level of 55µg per person per day."

More information: "Enhancing selenium concentration in lentil (*Lens culinaris* subsp. *culinaris*) through foliar application." M. M. Rahman, et al. *The Journal of Agricultural Science*. DOI:

[dx.doi.org/10.1017/S0021859614000495](https://doi.org/10.1017/S0021859614000495) (About DOI), Published online: 27 June 2014

M.M. Rahman, W. Erskine, M.S. Zaman, P. Thavarajah, D. Thavarajah, K.H.M. Siddique, "Selenium biofortification in lentil (*Lens culinaris* Medikus subsp. *culinaris*): Farmers' field survey and genotype x environment effect," *Food Research International*, Volume 54, Issue 2, December 2013, Pages 1596-1604, ISSN 0963-9969, [dx.doi.org/10.1016/j.foodres.2013.09.008](https://doi.org/10.1016/j.foodres.2013.09.008).

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