

Researchers develop new variety of soybean lacking the proteins that cause allergic reactions

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Soy is a legume cultivated worldwide for food and feed, and a well-established dietary source of plant-based protein. Nevertheless, soybeans are known to contain specific proteins that cause allergic reactions or that inhibit the absorption of other nutrients (so-called anti-nutritional proteins). Researchers from the University of Arizona and the University of Illinois have bred a new variety of soy in which the levels of three proteins associated with their anti-nutritional and allergenic properties are significantly reduced compared to existing varieties. Reducing the levels or eliminating these proteins from soybeans has the potential to increase nutritional value and reduce the occurrence of allergic reactions in both humans and animals.

Benefits of the development of a soy variety with low levels of anti-nutritional and allergenic proteins may include the potential elimination of the need for a heat treatment, which is normally applied before using raw soybeans. This could reduce energy costs, and avoid negative effects of the heat treatment on the quality of raw soybeans. Furthermore, such new varieties could reduce the number of intolerances or allergic reactions in both humans and animals.

Three specific proteins have been identified as major contributors to anti-nutritional and allergenic properties of soy. The three proteins addressed in this study are: P34, a major allergen for both humans and animals; Kunitz trypsin inhibitor (TI), which affects the digestibility of soybeans; and lectins (LE), known to hinder the absorption of other nutrients from food. Humans, calves, swine, fish and dogs have shown intolerances or sensitivities to these proteins.

In this study, a new variety of soybean was developed that contained low or zero levels of all three proteins. Individual soybean varieties containing “null” genes (i.e. genes that limit or stop the production of these proteins) for the production of either P34, TI or LE proteins, respectively, have been developed in earlier studies by other scientists. These varieties were used as the starting point to create the novel variety with low levels of the three proteins. In a first step, a soybean with null gene for one of the proteins was crossbred with a soybean with null gene for another, to produce a plant combining the two sets of null genes. This variety was then crossbred with one with a null gene for the third protein. The new soy variety contained null genes for all three of the concerned proteins, and was therefore named “Triple Null”.

The physical and chemical characteristics of the new Triple Null were compared with well-known reference variety, the ‘Williams 82’. Visually, no differences were observed as the seeds grew and flowered. Overall, there was a slight reduction in the ratio of protein to oil content in the Triple Null. The researchers showed that production of the LE protein was completely eliminated in the Triple Null, while the production of p34 and TI proteins was reduced to a large extent, and only very small amounts could be detected.

For further information please see:



Schmidt MA, Hymowitz T & Herman EM. (2015) Breeding and characterization of soybean Triple Null; a stack of recessive alleles of Kunitz Trypsin Inhibitor, Soybean Agglutinin, and P34 allergen nulls. *Plant Breeding* 134:310-315.