



Non-Transgenic Mutations in Wheat to Create Grain Hardness Variations

Background: Wheat quality is a complex term which depends upon the intentional use of the flour or the specific requirements of processors. The foremost determinants of wheat quality are endosperm texture (grain hardness), protein content and gluten strength. Endosperm texture in wheat is the single most important and defining quality characteristic, as it facilitates wheat classification and affects milling, baking and end-use quality (From: <http://fst.sagepub.com/content/16/6/511.abstract>). More specifically, grain hardness helps to determine qualities such as milling yield, starch damage, water absorption, flour particle size as well as end-product quality traits.

The wheat puroindoline genes puroindoline a and b control grain hardness. When the puroindoline genes are present in functional form wheat is soft textured. When there is a mutation in either puroindoline a or b, the wheat is hard textured. All soft wheat varieties contain the same puroindoline alleles while the vast majority of all hard wheat varieties contain one of two different puroindoline mutations.

Researchers at Montana State University have discovered a series of new puroindoline alleles via EMS mutagenesis that create defined levels of grain hardness and texture. These alleles could be used to impart the following traits:

- Group 1: Super soft wheat. Decreased grain hardness of a soft wheat and increase in break flour yield, reduced starch damage and water absorption.
- Group 2: Enhanced milling yield soft wheat. Increased grain hardness of a soft wheat to increase overall milling yield and reduce sifting time.
- Group 3: High milling yield hard wheat. Decreased grain hardness of a hard wheat increases overall milling yield and reduces flour ash levels.
- Group 4: High water absorption hard wheat. Increase grain hardness of a hard wheat increases starch damage in flour.

This discovery was made at Montana State University by Dr. Mike Giroux and Dr. Jack Martin of the College of Agriculture.

<http://plantsciences.montana.edu/facultyorstaff/faculty/giroux/giroux.html>
<http://plantsciences.montana.edu/facultyorstaff/faculty/martin/martin.html>

Technology Transfer and Development Status: A patent is pending and research is ongoing.

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