Unlocking Barley's Potential: Improving the Bioavailability of Barley With Ipa Mutants

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As of 2024, micronutrient deficiency cases are increasing throughout the world. To counter this, my experiment aimed to improve micronutrient availability in barley low-phytic acid (lpa) mutants, specifically focusing on the lpa1-1 mutant. Phytic acid binds essential minerals, limiting their absorption in the human body. Thus, developing a hulless barley variety with less phytic acid is key to increasing nutrient intake. More specifically, I identified F2 progeny that contains the lpa1-1 mutant for further advancement in the breeding program. My research involved extracting DNA from barley embryos, conducting gel electrophoresis, validating a PACE marker for the lpa1-1 gene, and screening lines containing this gene for further improvement. Using an allelic discrimination plot from a competitive allele-specific PCR assay for parental lines and F2 lines, I gathered data on which F2 progeny lines can be used for future research. I also conducted a Chi-square Goodness-of-Fit test to predict offspring outcomes. The 1:2:1 ratio was used due to Mendelian genetics as it applies to the F2 generation and determines the genetic makeup of the population. The results are consistent with our expectations. Overall, I used the PACE marker to identify high-potential progeny that are homozygous for the lpa1-1 mutation, rather than heterozygous lpa-1-1 mutants that only contain one copy of the mutation. This allowed me to develop barley plants that consistently exhibit the low phytic acid trait, making them valuable for future breeding programs and agricultural improvements.

Awards Won: