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Exploring a barley fast neutron generated mutant population

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We developed a mutant population in the barley (*Hordeum vulgare* L. cv. Golden Promise) by fast neutron irradiation. To evaluate the mutant population, we screen the seeds for high free phosphate phenotypes. Phytic acid (*myo*-inositol 1,2,3,4,5,6-hexa*kis*phosphate) is the primary storage compound of phosphorous in plant seeds. Although the biosynthesis is not fully understood, several genes have been shown to be involved in the accumulation of phytic acid. To investigate the importance of different genes involved in variation of phytic acid, we are currently in the process of analysing the mutant population to locate deletions of genes involved in the biosynthesis of phytic acid using PCR based techniques.

We are also examining the natural variation in the level of phytic acid. This will be done by association studies as a part of the ERA-PG EXBARDIV project. This project includes three *Hordeum* populations. We are currently propagating 421 *Hordeum spontaneum* lines in the greenhouse to obtain seeds that can be used in this study together with barley cultivars (417 accessions) and landraces (480 accessions). The level of phytic acid in the grain will be quantified. Genotyping will be done using two Illumina Oligonucleotide Pool Assays (OPA) each containing 1536 barley SNP.

In human nutrition, phytic acid acts as an anti-nutritional factor for, in particular, Fe and Zn uptake in the digestive tract, and thus potentially contributes to the 'hidden hunger' caused by mineral malnutrition. However, phytic acid might also have anti-carcinogenic and antioxidative effects on human health. In animal husbandry, the main problem caused by phytic acid in the grain is that phosphate bound in phytic acid cannot be digested by monogastric animals. Low-phytic acid mutants might help to solve the problems that high levels of phytic acid create in food and feed consumption.