

GRAIN TRAITS FOR FOOD, FEED AND BIOFUEL APPLICATIONS

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Compositional changes to grain components can improve the nutritional and functional properties of products produced from processed grains leading to new end-use applications and improved process efficiencies for current applications. Pioneer uses multiple molecular approaches to discover and develop improved crops, including its focus on grain traits. Genetic screens and transcript profiling are used to identify candidate genes which are tested, typically in model plants or model systems, for their effects on grain composition. Leads identified using surrogate screens are then validated in the crop plant of interest under greenhouse conditions and in managed and production field environments. A complementary approach identifies natural variation for grain composition or grain processing attributes through analytical screens; the genetic basis underlying such variation is determined through association mapping, linkage mapping and positional cloning approaches. Gene shuffling technologies may be employed to introduce further improvements in gene efficacy and trait quality. Validated genes are either developed into transgenic products or are used to develop molecular markers to support introgression of native genes into elite germplasm. Examples of grain modifications leading to increased available energy for animal feed applications, improved ethanol production for biofuel applications and the production of seed oils with improved nutritional and functional properties will be discussed.