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Development of high value soybeans with high oleic acid vegetable oil and enhanced nutritional energy meal

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Soybean (*Glycine max* L. Merrill) is one of the important crops worldwide which has been widely used as an edible source for humans and animals because of its high nutritional value. Soybean grain generally contains 40% protein, 20% oil, 35% carbohydrates, and other useful secondary metabolites. Among these components, the fatty acids in the seed oil and carbohydrate compounds in the seed meal deserve attention when considering soybean value. The fatty acids in soybean oil are generally comprised of 11% palmitic, 4% stearic, 23% oleic, 54% linoleic, and 8% linolenic acid. For oil, the high oleic and low linolenic acid traits (HOLL; >70% oleic and <3% linolenic acid) are now targeted to improve oxidative stability of soybean oil and recapture lost market value due to issues with *trans* fats. In terms the carbohydrate compounds of soybean meal, there are three major oligosaccharides; sucrose which is fully digested by monogastric animals and related to sweetness of soy-based foods, and raffinose and stachyose (RFOs) which cannot be digested in the animals. Research related to the carbohydrates has been conducted to elevate sucrose, and to reduce raffinose and stachyose (low RFO trait). The objective of this research is to develop soybean germplasm that can increase the value of soybean oil and meal. Soybean lines are being developed with the aid of marker assisted selection for combinations of genes that contain the four alleles necessary for the HOLL trait, one allele for the low RFO trait, and the appropriate targeted maturity group (III and IV). Soybean germplasm with the desired allele combinations will be grown in the targeted environment to produce seed that can be assessed for increased value in the oil and meal. The results generated will determine the feasibility of soybean variety development with this unique combination of oil and meal traits.