

Grain Genomics Platform

Grain Foods CRC Ltd headquartered in Sydney, Australia was set up to improve the value and competitiveness of the grains industry through the delivery of unique, higher value functional foods. The company develops technologies that meet market needs in terms of cost, health and nutrition using a combination of genetic and processing technologies that enable the commercialisation of differentiated grain based ingredients.

The **Grain Genomics Platform** supports determination of the genetic basis for desirable phenotypic traits. A particular focus has been elucidation of the genes affecting milling extraction rate and aleurone quality in Australian Wheat through the Next Generation Wheat (NGW) program. Other achievements include determination of the genetic basis for grain fragrance and folate content, novel promoters for wheat and maize and improved transformation technologies.

Increased Extraction Rate:

Conventional breeding strategies and processing techniques have reached a plateau in wheat milling extraction rate. The objective of this technology is to provide a genetic approach to increased flour yield when used either alone or in combination with other techniques. Flour yield increases will be possible via the selection of lines with the greatest genetic potential for this trait. This project will provide the means for quality preselection in breeding programs and by removing constraints such as milling quality enable increases in genetic gain and agronomic yield. This technology is protected by an International Patent Application.

Enhanced Aleurone Content:

An effective approach to improving the health characteristics of grains is through enhancement in the amount and quality of the functionally rich aleurone layer. Wheat aleurone is a substantial source of a wide range of important bioactives with demonstrated health and nutritional benefits and is a “natural” health food “reservoir” (antioxidants, minerals, vitamins, fibre etc). At the present time the majority of this grain layer is fractionated with bran during milling and downgraded to feed. There have been some attempts to mechanically separate aleurone from bran but the derived products are expensive and of variable quality. A more appropriate solution is the development of new varieties with enhanced aleurone that easily fractionates to flour at milling.

Novel Wheat Promoter:

Grain Foods has identified a wheat promoter sequence capable of achieving high levels of gene expression. Advances in plant transformation technologies provide opportunities to pyramid several transgenes into a single plant. In order to control the expression of these transgenes, they have to be linked to special gene sequences known as promoter sequences. However use of a single promoter or a promoter with sufficient homology to another promoter can lead to homology dependent gene silencing and no expression. The impediment of transgene silencing can be circumvented by using promoters from other species with the desired expression specificity but low homology to each other. This patented technology has entered National Phase in several jurisdictions.

Fragrance BioFortification:

The gene controlling fragrance in rice has been characterised and patented by GrainFoods for use in a wide variety of applications in the food industry. A deletion in the fragrance gene results in the accumulation of 2-Acetyl-1-pyrroline (2AP), which is responsible for the desirable aroma of fragrant rice. This technology offers the opportunity to replicate the fragrance trait in a range of other cereals such as wheat, barley, corn as well as micro organisms. Novel products that could be produced from fragrant grains are fragrant noodles, biscuits, cakes, breads, popcorn, corn chips, tortillas and beers, etc. each with the potential to enjoy similar premiums to fragrant rice. This patented technology has entered National Phase in several jurisdictions.

Folate BioFortification:

Grain food consumers demand nutritional benefits and functionality in basic foods. The vital role of folic acid in the prevention of birth defects and in general health has received much attention. In response, artificial fortification of flour with folate has been mandated in many countries. Whilst this is a cost-effective solution, it has disadvantages in that it is not technically feasible for large grain markets in developing countries. Grain Foods has established the genetic basis for novel varieties with increased levels of folate. This technology is available for licensing to interested philanthropic organisations on a royalty free basis.

For more information on these and other grain processing technologies and how your business can benefit from a partnership with Grain Foods please contact:

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