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Functional Genomics of Abiotic Stress

Status	Past
Competition	Competition I
Sector	Agriculture
Genome Centre	Genome Prairie
Project Leaders	Bill Crosby & Randall Weselake

Project Description

Early frost on the Canadian Prairies can mean the difference between a healthy profit and a staggering loss for farmers. In Saskatchewan alone, frost damage to the 2003-04 crop amounted to an estimated half a billion dollars.

The rapidly expanding area of functional genomics offers significant opportunities for the understanding and manipulation of complex genetic systems, ultimately resulting in improved low-temperature tolerance of crop cultivars.

Our project harnessed the skills of top plant abiotic stress researchers in Canada, who exploited a range of genomics and proteomics technologies to decipher the complex genetic and biochemical mechanisms that underlie plant responses to a range of abiotic stresses, such as extreme temperatures and adverse soil nutrient conditions. The project was focused on wheat and canola – two crops of central importance to Canadian agriculture.

The project has positioned Canada as a world leader in the area of multidisciplinary genomics research related to abiotic stress in plants, and has provided foundational tools for the development of abiotic stress resistant plants. For example, a Genome Canada funded project led by Dr. Brian Fowler of the University of Saskatchewan is using the knowledge and resources generated by our project to develop cold-resistant wheat through breeding programs. In addition, the project forged international linkages with leading research centres in the United States, Australia and Europe in a way that has strengthened Canada's crop development programs at a technical and organizational level.

Planting crops with enhanced tolerance to low temperature exposure could save millions of dollars for a large number of farmers and related industries in the Prairies. Farmers could also plant their crops earlier, allowing them to compete better with weeds and thus reduce herbicide costs and increase production.

Fast Facts

Highlighted outcome:	The project has provided foundational tools for the development of plants that are resistant to certain abiotic stresses, such as early frost. The research is expected to pay enormous dividends to the Canadian agriculture industry, which has the coldest climate for crop production of any developed nation in the world
Number of research personnel employed by the project:	25
Number of peer reviewed publications published:	34 peer-reviewed papers, 9 books, and 87 invited presentations
Number of patents in process or obtained:	2 provisional patents and 1 company formed