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Bridging Comparative, Population and Functional Genomics to Identify and Validate Regulatory Regions and Genes for Crop Improvement

Integrated GE³LS Research The Integration of Genomics with Plant Breeding

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Summary

The use of genomic methods to improve crops has implications for Canadian society. As the demand for food rises, crops with traits that allow them to thrive in marginal conditions, such as cold tolerance, drought tolerance and low-nitrogen will become increasingly important. In order for scientific knowledge to be brought safely and effectively to practical application, the GE³LS component of the project will pursue several research themes to address economic, policy and legal questions related to agricultural genomics.

First, to inform and guide the scientific aspects of the overall project, a socio-economic impact analysis of the traits that are coded by the target genes will be conducted, so that the genes that hold the greatest societal benefit are selected. Second, we will develop methods of estimating the value of genomics patents to the agricultural industry. We will carry out case studies of five selected patents that are likely to come from the genomic research component of this project. We will consider several indicators, such as economic value, impact on knowledge creation and expert analysis of specific patents. Finally, we will explore how advances in genomics have affected the productivity of the plant breeding process by comparing the economic returns to marker assisted breeding with conventional breeding methods. The outcomes of this phase of the research will be widely applicable to crop-improvement generally and in providing guidance on ways to improve the breeding efficiency.

Our research will have important policy implications for the future of agricultural genomics in Canada, and how the integration of genomics with plant breeding can best be realized.