NEWS RELEASE
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Eight new projects empower BC researchers to solve climate change challenges in food and fisheries

Vancouver, BC — From kelp to hops, bees to berries, BC researchers are harnessing the power of genomics to solve challenges facing the province's agriculture and aquaculture sectors that stem from climate change.

Eight new projects have received a combined $1.84 million in funding from the Genomic Innovation for Regenerative Agriculture, Food and Fisheries (GIRAFF) program - a collaboration between Genome BC and the Investment Agriculture Foundation of BC (IAF) with support from the BC Ministry of Agriculture and Food.

To combat the impacts of climate change on the agricultural and natural resources of BC, a comprehensive range of solutions is required. "These projects are developing new genomic tools and approaches, that will help producers mitigate and adapt to the impacts of climate change," said Federica Di Palma, Chief Scientific Officer and Vice President, Research and Innovation at Genome BC.

Among the eight projects are initiatives that will:

- Breed disease and drought-resistant traits into hop varieties to enhance their resilience to climate change, with the long-term goal of revitalizing BC's hops industry
- Contribute to an early-warning system for Canadian farmers by monitoring pathogens that affect wheat crops
- Create tools that can evaluate how well Chinook Salmon populations can handle climate events, like heatwaves, with the goal of identifying salmon stocks that are more resilient to temperature changes.

"We need to be continuously innovating to improve local food sustainability and the GIRAFF program is giving researchers in B.C. the chance to play an active role in reducing threats to food production," said the Hon. Pam Alexis, Minister of Agriculture and Food. "Innovations like these will be crucial not only to ensuring food security and responding to impacts from climate change, but also for lasting prosperity and a growing food economy for British Columbians."

The GIRAFF program is a pioneering initiative dedicated to delivering genomic solutions that bolster the resiliency and sustainability of BC's agriculture, food and fisheries sectors. It harnesses IAF's experience as an industry-led organization and Genome BC's expertise in connecting academic researchers, industry partners and public policy priorities to deliver enduring, sustainable benefits for BC.

"Climate change poses significant challenges to global agriculture. To face these challenges and ensure food security we must develop crops that are more resilient, productive, and

adaptable," said Christopher Reed, Chief Operating Officer at IAF. "The use of genomics in agriculture will advance the development of climate-resilient crops, thereby enhancing food security and promoting sustainable agricultural practices that demand fewer resources."

THE EIGHT FUNDED PROJECTS:

1. **Developing Disease Resistant and Climate Change Resilient Hop Varieties** by Mathias Schuetz and Paul Adams, Kwantlen Polytechnic University's Applied Genomics Centre. This project will develop genomic tools to build a selection system that will screen thousands of hops seedlings for genetic markers and determine which are linked to positive traits such as disease and drought resistance. This data will inform future efforts to breed hop varieties that have the ideal mix of traits to be climate change resistant. The genomic innovations from this project will help identify new hop varieties faster and at a scale not previously possible.
2. **KelpGen: Genomic Tools for Preserving and Restoring Canada's Kelp Forests** by Gregory Owens from the University of Victoria with participation from the University of British Columbia (UBC). Kelp forests are under threat by multiple stressors including climate change that has resulted in the loss of more than half of BC kelp forests in the last eight years. The KelpGen project will develop high-quality genomic resources for two keystone kelp forest species. By quantifying how kelp populations are related, the team will guide conservation efforts to protect genetic diversity and adaptive potential. This work will also identify the genes involved in adaptation to warmer water.
3. **Optimize soil-plant interactions to maximize root exudation that increases carbon sequestration and agroecosystem resiliency** by Jean-Thomas Cornelis of UBC. This project is investigating how plants grown under slight nutrient limitations can stimulate root activity and the release of organic molecules that have an important role in plant-induced process that promote nutrient mobilization and carbon sequestration. These natural processes are thought to contribute to climate change mitigation and adaptation. The proposed research will potentially identify new strategies for designing crop systems with better nutrient-use efficiency and carbon storage capabilities.
4. **Adapting cannabis for outdoor production to reduce greenhouse gas emissions** by Marco Todesco of UBC and José Celedon of Aurora Cannabis. Indoor cannabis production has an extreme carbon footprint. One possible solution is to switch to outdoor production. However, current elite varieties are sensitive to day-length and will not flower until late summer, making the crop vulnerable to cold/wet weather conditions. The project aims to develop varieties more suited to outdoor cultivation for the Canadian climate.
5. **Leveraging genomic data from cereal pathogens to develop a biovigilance strategy** by Gurcham Brar of UBC and Guus Bakkeren of Agriculture and Agri-Food Canada. The project is investigating patterns in how cereal pathogens move into Canada with the goal of developing fast, DNA-based diagnostic tests. This will contribute to an early-warning system to allow producers to make more informed management decisions based on pathogen presence and risk forecasting.

6. **Identifying climatic determinants of pollinator health** by Leonard Foster of UBC and Lan Tran of Agriculture and Agri-Food Canada. The project is using models to study how landscape differences, weather patterns and food availability, in combination with pest and pathogen prevalence, will impact overall bee health. The models developed in this project will provide a better understanding of how climate change will affect bee health and help BC beekeepers, crop growers and policymakers to prepare and take preventative steps to mitigate future challenges.
7. **Biocontrol of bacterial blight in berries using bacteriophages** by Siyun Wang of UBC and Karen Fong of Agriculture and Agri-Food Canada. The bacterium *Pseudomonas syringae* has caused significant damage and economic loss to BC's blueberry sector. Bacteriophages are naturally occurring viruses that can infect and specifically kill bacteria. This project seeks to design, validate, and commercialize a new bacteriophage to treat the *P. syringae*-induced bacterial blight of blueberries. In doing so this innovative solution will provide a green technology alternative and reduce the impact of conventional treatment approaches.
8. **Genomic tools for predicting climate change resilience in chinook salmon** by Patricia Schulte of UBC. This project will create a genomic tool to determine the current climate resilience of chinook salmon stocks and their capacity to evolve increased tolerance for events, such as heatwaves. This will help guide efforts to enhance chinook salmon hatchery production as well as conservation and climate change mitigation approaches.

RESEARCHER QUOTES:

"The genomics technology funded by Genome BC will facilitate the KPU Applied Genomics Centre to identify new hop varieties much faster and at a scale that is currently not possible. The goal of these new hop cultivars is to increase BC hop production from the current ~100 acres to over 1,000 acres by 2030 by developing climate change resilient hop varieties to supply Canada's domestic industry and provide new export opportunities for local hop producers."

- Dr. Mathias Schuetz, Professor, Kwantlen Polytechnic University

"The goal of this project is to safeguard kelp forests, which are under serious threat from climate change and human actions. We will examine the genetic makeup of bull kelp and giant kelp throughout B.C.'s coastal waters. This analysis will inform conservation efforts to preserve the genetic diversity of these species and improve their ability to adapt, thus ensuring the survival of these vital coastal ecosystems and the fisheries they sustain."

- Dr. Gregory Owens, Assistant Professor, Biology, University of Victoria

"In this project, we aim to investigate how reducing the inputs of mineral fertilizers can help to optimize root activity to propose new strategies for designing crop systems with superior nutrient use efficiency and soil carbon storage capacity. In advancing knowledge on plant genomic and root metabolomic responses to soil conditions, this project hopes to contribute to improved agriculture sustainability and resiliency to changing climate."

- Dr. Jean-Thomas Cornelis, Assistant Professor, Soil Science, Faculty of Land and Food Systems, University of British Columbia

“The cannabis industry plays an important role in the BC economy, but unfortunately cannabis cultivation in indoor facilities also has an enormous carbon footprint. Our project uses leading-edge genomics technologies to help develop more sustainable cannabis varieties that can be grown outdoor at Canadian latitudes, reducing greenhouse gas emission from cannabis cultivation in BC and beyond.”

- Dr. Marco Todesco, Assistant Professor, Biodiversity Research Centre, University of British Columbia

“As a global cannabis company enabled by science, we are proud to invest in the continued advancement of cannabis cultivation that will positively impact the longevity of the industry in Canada. Our long-standing relationship with UBC has allowed for valuable, collaborative work in genomics. Our shared findings from the GIRAFF project will be applied to Aurora’s leading growing practices today and in the future and support a more sustainable industry.”

- Dr. Jose Caledon, Director, Breeding and Genetics, Aurora Cannabis

“Rust diseases remain a constant problem for wheat production, in BC and worldwide. The issue is that these rust pathogens often mutate, overcoming the wheat’s disease resistance and making existing fungicides less effective. These pathogens disperse as spores that are carried on the wind and blow into Canada from other regions as spores, so we need fast diagnostic tools to detect new rust pathogens before they become a problem. Our project is deciphering the genetic code of many pathogen isolates to design specific, rapid diagnostic tests. Coupled with wind projections and modeling, our goal is to create an early warning system for farmers.”

- Dr. Guus Bakkeren, Research Scientist, Agriculture and Agri-Food Canada

“Honey bee health can be affected by many factors, including climate and geography. In this study, we are mining an enormous dataset of BC and Canadian bee health measurements, including the microbiome. We will correlate these data with geographical and climate data to determine which factors are most important for bee health. The result will be best practices advice on how to better manage bees in certain situations.”

- Quote by Dr. Leonard Foster, University of British Columbia and Dr. Lan Tran, Agriculture and Agri-Food Canada, project leads; and Dr. Marta Guarna, Agriculture and Agri-Food Canada, project conceptualization

“The $7 billion BC blueberry industry is threatened by severe plant diseases such as bacterial blight. We will provide innovative genomic solutions to protect berry crops against bacterial blight, as well as reduce environmental impacts brought by conventional approaches on soil and water.”

- Dr. Siyun Wang, Associate Professor, Faculty of Land & Food Systems, University of British Columbia

“Climate change and other habitat alterations are causing declines in chinook salmon populations in BC, which threatens important recreational and First Nations fisheries, as well as

the many wildlife species that depend on these fish. Our team of scientists from UBC and the Department of Fisheries and Oceans is using genomic approaches to develop new tools that can be used to help in monitoring and recovery of this iconic salmon species."

> - Dr. Patricia Schulte, Professor, Department of Zoology, the University of British Columbia

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About Genome British Columbia:

Genome BC is a not-for-profit organization supporting world-class genomics research and innovation to grow globally competitive life sciences sectors and deliver sustainable benefits for British Columbia, Canada and beyond. The organization's initiatives are improving the lives of British Columbians by advancing health care as well as addressing environmental and natural resource challenges. In addition to scientific programming, Genome BC works to integrate genomics into society by supporting responsible research and innovation and foster an understanding and appreciation of the life sciences among educators, students, and the public. genomebc.ca

About the Investment Agriculture Foundation of BC:

The Investment Agriculture Foundation of BC (IAF) delivers programs and services to support a thriving agriculture and agri-food sector in British Columbia.

With more than 25 years of experience, IAF is recognized as the leading provider of high-quality and cost-effective program delivery services for the agriculture and agri-food sector in BC. Since 1996, IAF has delivered more than $250 million to industry on behalf of the federal and provincial governments.

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