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Genomics research on invasive forest pests and pathogens, epidemiology and host suitability (introducing BioSafe, a Genome Canada funded project)

Canada's forests are facing unprecedented threats from invasive insect pests and pathogens. This threatens, both, the ecological equilibrium and the economic stability of our natural forest resources and our urban forests. In Canada, four species have been identified as current and urgent threats: the Asian longhorned beetle, the Dutch elm disease fungi, the sudden oak death pathogen, and the Asian gypsy moth. New introductions and interceptions of such pests and pathogen species in North America are escalating at an alarming rate and managing this risk requires vigilant biosurveillance. Therefore, the prevention and an early detection are keys to successful biosurveillance programs, but are challenging to achieve. My research team will address these challenges by helping to develop a biosurveillance pipeline that promotes the rapid generation of genomics-based biosurveillance tools for these four species and that will provide: 1) accurate species identification, 2) assignments to source populations and knowledge regarding the invasion pathways of the species, 3) identification of fitness and outbreak-related epidemiological traits that can impact invasion outcome of the species in question, and therefore 4) reduce uncertainty of invasion outcomes and inform decision support systems to speed up and improve decision-making for forest invasive alien species mitigation and management.