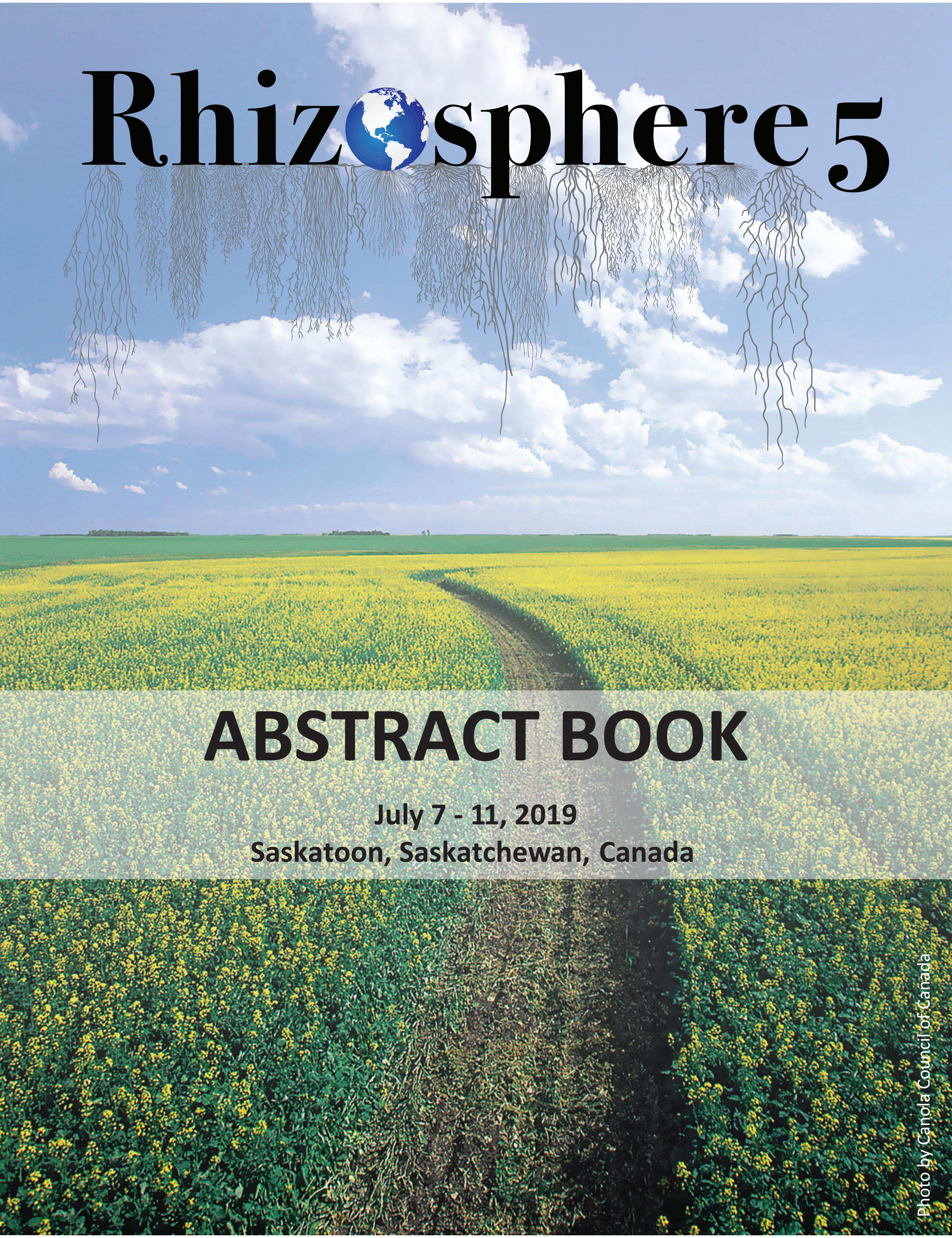

# Rhizosphere 5

# ABSTRACT BOOK

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Photo by Canola Council of Canada

endophytic bacterial communities, reaffirming that root endophytes are a subset of the rhizosphere microbiome. The genera *Pseudomonas* and *Stenotrophomonas* were predominant in the rhizosphere and root interior of all crops, suggesting a generalist distribution of these bacteria. However, other genera including *Arthrobacter*, *Streptomyces*, *Rhizobium*, *Variovorax* and *Xanthomonas* also were abundant in the root interior of specific crops. Bacterial communities colonizing aboveground plant organs varied greatly among crop species, soils and plant organs and consisted mainly of *Corynebacterium*, *Pseudomonas*, and unclassified Enterobacteriacaeae. In our study, the relative abundance of specific bacterial groups in the rhizosphere correlated significantly with soil pH, silt and organic matter contents. There was, however, no correlation between analyzed soil properties and most abundant endophytic bacterial genera. These results indicate that soil characteristics may not influence bacterial communities within plant roots. Moreover, the bacterial microbiome in rhizosphere, root and stem of wheat and canola was influenced by plant growth stages and this effect was mainly crop and organ specific.

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## IMPACT OF INDIVIDUAL AND COMBINED ABIOTIC STRESSES ON PLANT GROWTH PROMOTING BACTERIA

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Abiotic stress conditions, such as drought and salinity, are some of the foremost limiting factors for agricultural productivity. The effects of abiotic stresses on plants and plant growth promoting bacteria are typically being studied individually under controlled growth conditions, but under field conditions plants are exposed simultaneously to more than one abiotic stress, such as combination of drought and salinity. Recent studies revealed that bacteria and plants respond to a specific combination of stresses in a non-additive manner, producing complex effects that could not have been predicted from the study of either stress individually. This study was designed to investigate the complexity of individual and combined stresses by measuring different characteristics of four endophytic bacterial strains (32a, 727b, 11e and D7G) related to plant growth promotion and endophytic colonization of tomato plants. These characteristics included stress tolerance, auxin and biofilm production, swimming and swarming motility, endophytic colonization and plant growth promotion. Drought, salinity and combined stress were induced using different concentrations of polyethylene glycol and sodium chloride, alone or in combined mixtures. Bacterial strain 32a was less negatively affected than the other tested strains on auxin and biofilm production under drought and salinity as compared to the combined stress. Swimming and swarming motility of 11e was less negatively affected than the other bacterial strains under individual and combined stress. Endophytic colonization and tomato plant growth promotion of 727b were less negatively affected under combined stress as compared to individual stresses (salinity and drought). Salinity

and drought tolerant plant growth promoting bacteria characterized in this study will be further developed as biofertilizers to mitigate the negative effects of abiotic stresses on crop growth and production.

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### FINDING THE NEEDLE IN A HAYSTACK - DEVELOPMENT OF MICROBIAL FERTILIZERS OR PESTICIDES FOR SUSTAINABLE AGRICULTURE

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Plants are holobionts that are associated with complex microbiomes, and many endophytes that reside within plant tissues have plant growth promoting capabilities. To maintain the increasing growth requirements of food and crop production, alternative strategies to chemical fertilizers and fungicides will need to be developed to ensure cost-effective and environmentally sustainable agriculture in the future. The application of plant endophytes as biological fertilizers and pesticides have the potential to positively impact crop yields under a broad range of abiotic (e.g. drought, salinity, heavy metals, nutrient deficiencies) but also biotic stress conditions (e.g. pathogenic bacteria or fungi, or plant herbivores). Bacterial endophytes can promote plant growth through their ability to produce plant growth hormones, fix atmospheric nitrogen, solubilize recalcitrant phosphate or potassium resources, suppress the growth of phytopathogenic fungi, or decrease the levels of the plant growth stress hormone ethylene through their biosynthesis of 1-aminocyclopropane-1-carboxylate. We isolated diazotrophic bacterial endophytes from *Brassica carinata* on nitrogen free agar, and characterized their plant growth promoting characteristics through a diverse set of *in-vitro* assays. We conducted root vigor assays and examined root architectural traits, greenhouse trials and field studies to test the capability of these plant endophytes to promote the growth of soybean, corn or wheat plants under a variety of different stress conditions. There is a high variability in the plant growth response after endophyte inoculation among different plant species but also among different cultivars of one species. We will provide an overview of these results and will correlate the observed plant growth promoting capabilities of different strains to data mining approaches after whole genome sequencing of the different plant endophytes. In addition, we will discuss the reliability with which different screening tools are able to predict plant growth promoting capabilities of endophytes for different crop species under different field conditions.

**P.160** (will also be presented as poster pitch)

### DOES ROOT MUCILAGE PLAY A ROLE IN SALINITY TOLERANCE?

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Soil salinization is a growing threat to environments across the globe, affecting over 800 million hectares of land spread across 100 countries. This area is estimated to increase as climate models predict a major alteration in rainfall patterns combined with rising sea levels. With the tandem effects of climate change and soil salinization beginning to take hold, a greater understanding of the mechanisms driving plant abiotic stress tolerance is becoming increasingly urgent. Hidden below the soil surface, plant roots are intimately exposed to