

Applying Locally-Derived Symbiotic Endophytes in Haskap Production in the B.C. Peace Region

Keira Nichol, Environmental Science, C.H.R. Faculty of Environment, Earth and Resources, University of Manitoba

Overview

A growth chamber experiment was carried out to assess the effects of inoculation with locally-derived class 2 fungal endophytes on yearling haskap plants. Class 2 endophytes are symbiotic fungi with significant potential to confer biotic and abiotic stress tolerance to agricultural host plants. This study investigates differences in the growth of haskap plants inoculated with locally derived endophytes, known beneficial endophytes and control plants. Recommendations will be produced to guide similar growth chamber trials in the 2022 growing season. This honours thesis contributes to an ongoing field-based study of the application of locally-derived class 2 endophytes to enhance haskap production in the Peace Region of British Columbia, Canada, in support of an emerging soft fruit sector.



Figure 1. Tomato seedlings grown to screen locally-derived endophytes.

Methods

One year old haskap (*Lonicera caerulea* var. Aurora & Indigo Gem) plants were divided into three treatment groups of n = 18 plants each with approximately equal size distribution. Groups were assigned one of three treatments: (1) inoculated with locally derived class 2 endophytes (treatment), (2) inoculated with known beneficial class 2 endophytes (positive control), (3) untreated (negative control). Class 2 endophytes were derived from local native vegetation. Tomato seedlings were inoculated with each strain and the most successful strains comprised the treatment group. Haskaps were grown at 25°C with 18 hours of artificial light per day for 62 days. Following the growth period, haskap plants were washed of soil, photographed and root and shoot length and wet and dry biomass were measured. One-way ANOVA tests and post hoc t-tests were conducted.

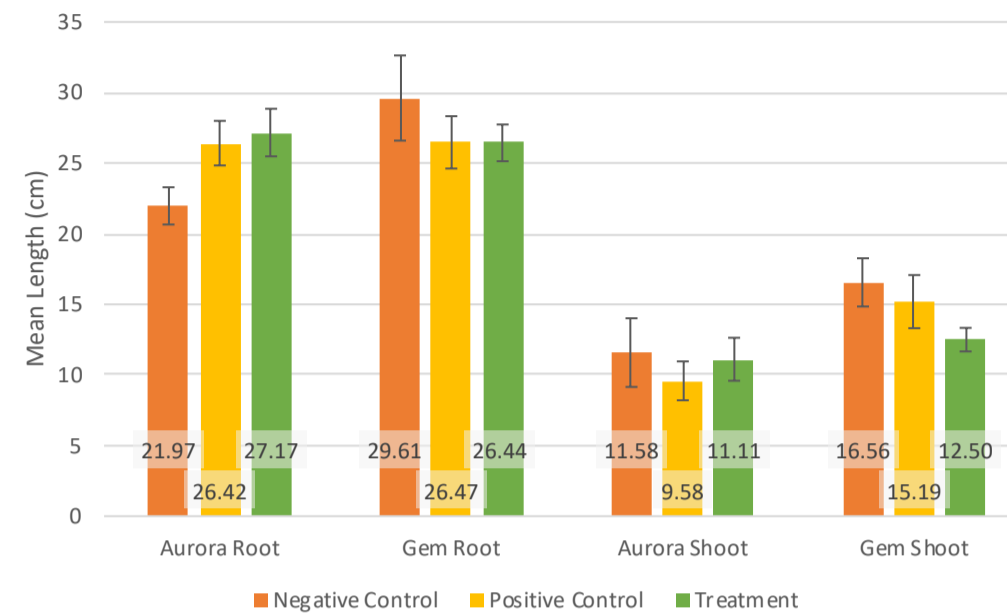


Figure 2. Mean length (cm) of haskap roots and shoots by variety.

Results

- For plants of the Aurora variety, mean root length was significantly higher in the treatment [$t(16) = 2.43, p = 0.03$] and positive control [$t(16) = 2.16, p = 0.05$] groups than in the negative control group.
- Mean root to shoot ratios for wet weight, dry weight and length were all highest in the treatment group for both varieties, however these differences were not statistically significant.
- No definitive trend emerged in haskap biomass or length (data not shown).

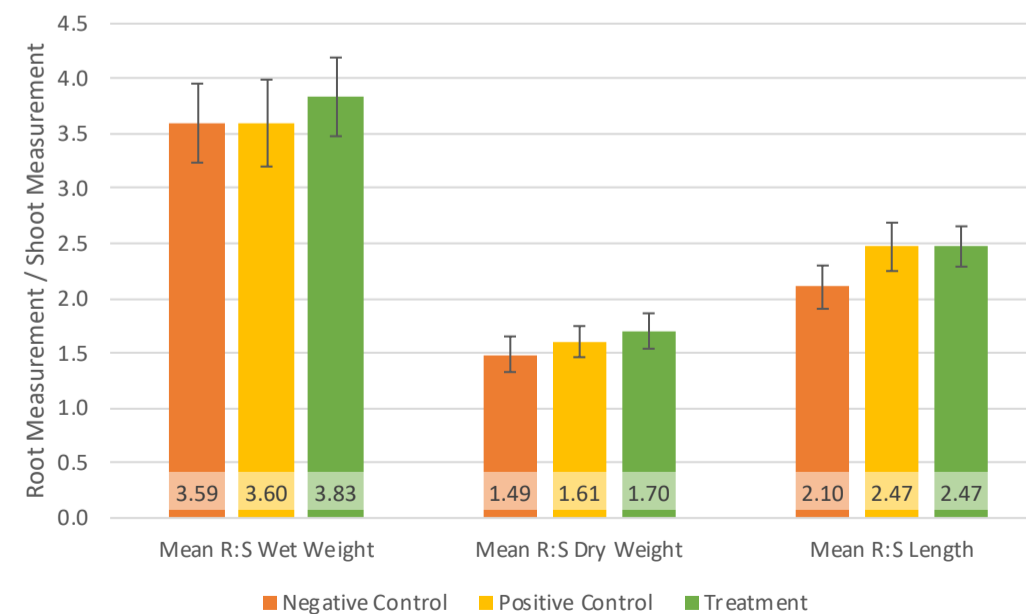


Figure 3. Mean root to shoot ratio of haskap weight and length.

Discussion

No clear trend in plant weight or length was detected among the three treatment groups. However, tendencies in some parameters, though below the threshold of statistical significance, suggested increased growth of treated plants, as is consistent with outcomes described in the literature. The absence of any significant difference between the treatment groups may indicate deficiency in the experimental design. The growth period may have been too short for detectable differences to emerge in the long-lived perennial plants. Because class 2 endophytes improve plant resilience to biotic and abiotic stress, the introduction of a stressor in the growth chamber environment may reveal the effects of the symbionts on host plants more clearly in a short time than when grown in ideal conditions.



Figure 4. Aurora variety haskap inoculated with locally derived class 2 endophytes removed from soil, measured and photographed to show root and shoot structure prior to weighing and desiccation.

Challenges

Evaluating the efficacy of the experimental design is challenging due to the limited extent of similar studies in the scientific literature. A variety of potentially applicable techniques will be reviewed.

Outlook for Completion

The honours thesis is on track for successful completion at this time. Moving forward, the greatest emphasis will be on reviewing relevant literature in order to provide recommendations to refine the experimental method for the second growth chamber trial of locally derived class 2 endophytes taking place in the spring of 2022.



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