

A hydroponic pH experiment on Haskap

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Background

pH levels for haskap is generally thought to be in the range of 5.0 to 7.0 (Hummer, 2006) but the University of Saskatchewan haskap fields are more alkaline (pH 8 to 8.4) and many growers of haskap have alkaline soils yet haskap seems to be doing fine. We have a diverse collection of wild haskap from around the world in addition to our breeding populations. It was of interest to test some of these wild types to see if some are better adapted to higher pH levels.

Goals

To see the effect of different pH levels on haskap.

By using a diverse mix of different subspecies of haskap, perhaps some types might be more adaptable to the higher pH soils commonly found in prairie soils. Those types could be emphasized in future breeding.

Experimental design

The variety 'Tundra' and seven sub-species of *Lonicera caerulea* (*pallesii*, *stenantha*, *venulosa*, *emphylocalyx*, *kamtchatka*, *altaica*, and *villosa*) were grown in hydroponic solutions with pH levels of 5, 6, 7, 8, or 9. Plants were grown for 60 days. There were 2 reps, 1 in winter and the other in spring. Data included weighing roots stems and leaves as well as measuring macronutrients of N, P, and K. The hydroponic solution was aerated with an aquarium air pump. The experiment was carried out in the USASK greenhouse.

Results

The various types of haskap plants showed a common trend whereby lower pH plants were larger. All the plants had healthy green leaves including 5 and 9 pH levels (see figure 11). This indicated that haskap has a wide range of adaptation but acidic pH may be optimum. The study did not reveal any subspecies with a preference for alkaline soils. Statistically, there was not a difference going from one pH level to the next, but there was a statistical difference between the highest and lowest pH levels with the lowest level being best. As can be seen in figure 1, 'Tundra' leaves looked healthy at all pH levels but plants were larger at acidic pHs of 5 and 6. The photo shown is just one set of plants. Full details on results will be available when Bayar completes his thesis and publishes his results.

Discussion

Natural soils are more complicated than hydroponic solutions. Hydroponic solutions have nutrients for plants in reasonable balance based on research with many plant species. Under the hydroponic system in this study the only symptom of having a higher was reduced plant size.

The subspecies studied in this experiment were represented only by one accession and cannot be construed as an in-depth investigation all subspecies of haskap. Neither was this study, an in-depth look at our breeding lines. So far, there are not any indications of specific subspecies being more adapted to pH levels any other subspecies. It might be more worthwhile to spend time investigating breeding lines, which are hybrids between different sub species.



Figure 1. Tundra plants after growing in hydroponic solution at 5 pH levels for 60 days. In this set of plants the pH 6 plant is largest but the pH5 plant has more roots. But all the plants look healthy.

Recommendations

If a grower has a choice of fields to plant haskap, they should use the field that has lower pH. Soil pH levels can be adjusted somewhat, but adjustments are more easily accomplished before planting.

Some references on how to change soil pH

It is important to consider a field's soil pH and the desired range. Amendment types may have other effects on crops and soils and will vary in cost and labour. Some organic materials such as pine needles or peat moss can lower pH. However, this change is gradual and takes many years, while chemical amendments may be faster. Soil texture can be a major factor. Clay soils have a greater buffer capacity and are harder to change than lighter soils.

<https://hgic.clemson.edu/factsheet/changing-the-ph-of-your-soil/>

<https://vric.ucdavis.edu/pdf/soil/ChangingpHinSoil.pdf>

Using sulfur to lower soil pH is a biological process requiring soil bacteria therefore temperatures are important and time is required for this process to change pH.

https://www.canr.msu.edu/uploads/files/Lowering_Soil_pH_with_Sulfur.pdf

<https://www.extension.purdue.edu/extmedia/ho/ho-241-w.pdf>

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This pH level experiment was done by PhD graduate student Bayartulga Lkhagvasuren (Bayar). Bayar has not yet finished his thesis or published scientific papers in this area so this paper is necessarily less detailed so as not to interfere with future publications.

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