



In This Issue:

2018 Harvest

Species of Interest—Labrador tea (*Rhododendron groenlandicum*)

Mycorrhizae—definitions and distinctions

Inoculation

Mutualism and Orchids

UAMH

2018 Harvest

NAOS

33 L balsam poplar
7 L aspen
3 L marsh marigold
31.25 L buffaloberry
7 L Saskatoon
6.5 L dwarf blueberry
131.5 L tamarack
4 L pin cherry
14.5 L dogwood
12 L chokecherry
5 L bearberry
20 L paper birch
20 L beaked hazelnut
10.5 L shrubby cinquefoil
20.75 L Labrador tea
50.25 L green alder
28.5 L lowbush cranberry
1 L twinflower
1.75 L crowberry

Total: 435 L

SAOS

1330 L tamarack

COLK

900 L tamarack

Species of Interest

Rhododendron groenlandicum or Labrador tea (once known as *Ledum groenlandicum*) is a circumpolar species characteristic to hygric ecosystems in northern Alberta, but can also be found in fens and bogs of h, i and j ecosystems. This versatility makes it a sought after species in reclamation. The First Nations of the Athabasca area seek it for its medicinal value. Labrador tea, like many other ericaceous species, forms mutualistic mycorrhizal relationships with fungi in the soil. Although nurseries have been successful in producing seedlings, survival is uncertain. Lack of mycorrhiza (or the correct strains of mycorrhiza) may be a part of the reason. Dr. Janusz Zwiazek (University of Alberta) is currently studying the effects of these associations on survival of Labrador tea, blueberry (*Vaccinium myrtilloides*) and lingonberry (*Vaccinium vitis-idaea* var. *minus*) in a reclaimed setting. Initial results suggest that inoculation of soil improves growth rates and tolerance to salinity and drought in ericoid plants. For more information, please see the [2017 COSIA Annual Report](#).

Labrador tea in flower.



Publications of Interest

Kaur J, AL Schoonmaker & J-M Sobze. 2016. Length of cold stratification period affects germination in green alder (*Alnus viridis* (chaix) DC subspecies *crispa* (Aiton) Turrill) seed collected from northwestern Alberta. *Native Plants Journal* 17(2):95-101.

[Link](#)

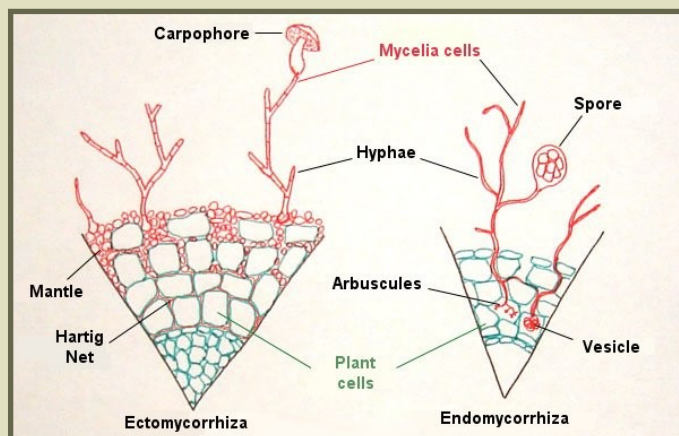
Pinno BD, EHY Li, B Khadka & A Schoonmaker. 2017. Germination and early growth of boreal understory plants on three reclamation soil types under simulated drought conditions. *Native Plants Journal* 18(2):92-105. [Link](#)

Vogt, N & A Janin. 2017. Native seed bank in Yukon: State of the Art. Yukon Research Centre. Yukon College.

Mycorrhizae—definitions and distinctions

Mycorrhizae are an association between fungi (mykes) and plant roots (rhiza). This relationship is generally mutualistic with the fungi assisting the plant in the uptake of water and nutrients and the plant providing the fungus with sugars. They take a variety of forms including two broad groups: endomycorrhiza and ectomycorrhiza. Endomycorrhizae can be divided into four common types: vesicular-arbuscular mycorrhiza, arbutoid mycorrhiza, ericoid mycorrhiza (that form with Ericaceae, the heath family) and orchid mycorrhiza (that form with Orchidaceae, the orchid family) (Thormann *et al.* 1999).

Ectomycorrhiza grow between plant cells but do not generally penetrate them. They form a mantle, an external layer of mycelium surrounding the root tip, with hyphae reaching into the soil. Hartig nets are another morphology of ectomycorrhiza, where mycelium surround plant root cells.



Wikimedia commons

Endomycorrhizal fungi penetrate the plant cells, often forming vesicles or arbuscules. The former is a single growth within a plant cell, whereas the latter has several points within the cell. Both develop hyphae similar to ectomycorrhizae and for the same purpose. Arbutoid mycorrhizae are ectoendomycorrhizas, meaning the mycelium both penetrates the plant cells as well as forms a mantle and Hartig net (Thormann *et al.* 1999).

Inoculation

Because a number of species benefit from mycorrhiza, several commercial inoculants are available. However, these are often the most common strains rather than those best adapted to a given species. One form of inoculation uses soil taken from the native habitat. This increases the possibility that the fungal strains introduced are effective. When a direct soil transplant isn't possible, soil from a nearby community is also likely to carry fungal strains desired. However, in reclamation, undisturbed soil is limited and sometimes remains stockpiled for several seasons. Although soil fungi might survive, doubtless some will be lost without the support of the host plant. In the cases of minor disturbances, pipelines and well pads for example, the fungal strains are readily available from neighbouring soils. A common practice in the Athabasca oil sands includes mixing peat with overburden material. The peat may carry some effective fungal strains that can assist new seedlings. The cost of commercial inoculants can be significant and the results are not guaranteed.

To learn more about the OSVC, go to <http://www.cosia.ca/oil-sands-vegetation-cooperative>
For information regarding this newsletter, please contact kim.wildrose@shaw.ca

Mutualism and Orchids

Mycorrhizal relationships are generally mutualistic, meaning they benefit both the plant host and fungal associates. Fungi deliver nutrients to plant root cells that are otherwise unavailable to the plants. In return, the plants supply carbohydrates to the fungi.

Monotropoid and some orchid mycorrhiza are examples of non-mutualist symbioses. Monotropoideae and some Orchidaceae species do not produce their own carbohydrates and often lack chlorophyll (Currah & Sherburne 1992). Instead, they draw carbon as well as other nutrients from the fungi.

In addition, orchids require mycorrhizal fungi for germination and nutrition as a seedling (Shefferson *et al.* 2005). Extremely small orchid seeds have limited food reserves, resulting in developing plants that rely on mycorrhizal fungi to supply minerals and sugars (Smreciu & Currah 1989). Unlike some European and tropical orchids, North American orchid species are not easily germinated *in vitro*. This is unfortunate as terrestrial orchids in North America are becoming rare due to habitat disturbance (Smreciu & Currah 1989).



Calypso bulbosa flower ([W. Siegmund 2009](#))

One species of orchid native to Alberta is *Calypso bulbosa* (Venus' slipper) found in coniferous and mixed woods. It is highly sensitive to changes in its habitat (Currah *et al.* 1988). Gaining a better understanding of conditions and mycorrhizal strains necessary to germination and survival may assist us to develop conservation or propagation strategies.

Currah, R.S., S. Hambleton and A. Smreciu. 1988. Mycorrhizae and Mycorrhizal fungi of *Calypso bulbosa*. *American Journal of Botany* 75: 739-752.

Currah, R.S. and R. Sherburne. 1992. Septal ultrastructure of some fungal endophytes from boreal orchid mycorrhizas. *Mycological Research* 96(7): 583-587.

Shefferson, R. P., Weiß, M. , Kull, T. and D.L. Taylor. 2005. High specificity generally characterizes mycorrhizal association in rare lady's slipper orchids, genus *Cypripedium*. *Molecular Ecology*, 14: 613-626. doi:10.1111/j.1365-294X.2005.02424.x

Smreciu, E.A. and R.S. Currah. 1989. Symbiotic germination of seeds of terrestrial orchids of North America and Europe. *Lindleyana* 1: 6-15.

UAMH Centre for Global Microfungal Biodiversity

For over 50 years, Edmonton was home to a rich collection of fungi, including pathogenic, opportunistic, toxigenic and allergenic strains in addition to mycorrhizal fungi. In 2015, the University of Alberta Mold Herbarium & Culture Collection (UAMH) was moved to the University of Toronto's Gage Research Institute. It includes more than 1000 type specimens and is fundamental in systemic and genomic classification. If you would like more information, visit their [website](#) or email the [curator](#).