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Carbohydrate storage in aspen clones – implications for suckering.

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In mature aspen stands, it has always been assumed that cutting stands in late winter is beneficial for subsequent aspen sucker regeneration due to the higher root carbohydrate reserves which had been translocated to and accumulated in the root system over the summer months. In woody shrub and small tree species, it has been shown that the carbohydrate content in the roots are at their peak in late fall and carbohydrates remain at a high level over winter, but dip sharply during the time of leaf flush. This same pattern has been assumed to be the case in mature aspen trees but it has never actually been tested. Since trees are large, and up to 80% of the total biomass is represented in the aboveground portion, we hypothesized that most of the carbohydrates needed to drive the flush of new leaves might come from the reserves stored in the aboveground portion of the tree. Our objective was to analyze the carbohydrate content of roots, stems and branches of mature aspen throughout an entire growing season.

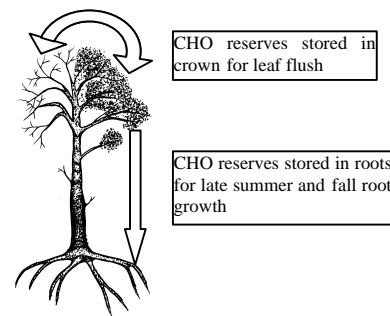


Ten mature and healthy aspen clones near Drayton Valley were selected and the carbohydrate content in the roots, bole, branches, and twigs in early spring prior to leaf flush, after leaf flush, in late summer, early fall (leaf senescence), late fall and late winter were determined. We also determined the time of fine root growth of aspen by measuring the time of root growth into ingrowth plots.

There was little or no root growth in spring from the time of leaf flush until the end of June; we speculate that during that time the soil was too cold for root growth. Root growth began in late June and continued into late fall (after leaf fall).

Implications:

- In mature trees, especially in northern climates, reserves stored in the roots are mostly used to feed the growth of fine roots late into the fall when soils are warm.
- In mature aspen, the flush of leaves is driven by reserves stored in the bole, branches and twigs.
- In terms of root carbohydrate storage, there is likely no benefit to cutting stems in winter, as most of the root carbohydrates are already spent by growing roots in the previous fall.
- If winter logging is beneficial to aspen suckering, the reasons for it likely relate to reduced soil compaction and root damage (if soils are frozen), or more optimum levels of growth regulators in roots when stems are cut at this time (ongoing research).
- The positive impact of peak root carbohydrate concentrations in the roots during summer might be significantly outweighed by the negative impacts that summer harvesting could have on the soil and root systems (ongoing research).



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Further Information:

Landhäusser, S.M., Lieffers, V.J. 2003. Seasonal changes in carbohydrate reserves in mature northern *Populus tremuloides* clones. TREES in press.

<http://www.rr.ualberta.ca/research/EFM.htm>

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