

The Effects of Three Nursery Production Methods on Transpiration Rates in Trees

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INTRODUCTION:

In 1996, a field study was conducted on ninety trees located at Colorado State University Horticulture Research Center. The species used in the study are commonly found and grown in the High Plains and Rocky Mountain Region. In part, this is a continuation of a study which began in 1994.

OBJECTIVE:

To see the effects that various nursery production methods have on growth rates, transpiration rates, and overall tree quality.

METHODS:

In the spring of 1994, thirty of each tree species were planted in a randomized complete block design in the field. Drip irrigation has been installed to allow various irrigation treatments of the trees. Approximately 12-15 gallons per tree per watering day was used.

SPECIES STUDIED:

- *Fraxinus pennsylvanica 'Patmore' (Patmore Green Ash)
- *Quercus macrocarpa (Bur Oak)
- *Pinus nigra (Austrian Pine)

PRODUCTION METHODS:

- *Balled and burlapped (B&B)
- *Fabric container (FC)- Root Control Bags
- *Plastic container (PC)-above ground

DATA COLLECTION FOR 1996/1997

- | | |
|------------------------|------------------------------|
| *Trunk caliper(in) | *Tree height (ft) |
| *Growth increments(in) | *Leaf Area(ft ²) |
| *Dry weights(g) | *Sap flow measurement(g/hr) |

More about sap flow measurements:

They are taken with a Dynamax Flow 32, which is a non-intrusive stem heat balance method that measures sap flow in grams per hour. The sap flow in combination with leaf area can determine transpiration rate.

RESULTS FROM 1994/95:

*The effect of production method varied by tree species and the differences due to these methods were dependent on the variable measured.

*For all species, plastic and fabric container trees outperformed B&B trees with greater incremental growth.

*In 1994, fabric container trees seemed more water stressed than B&B, and ash appeared more stressed than oak.

*In 1995, fabric container trees were not more stressed than B&B, however the ash were still more stressed than the oak.

RESULTS FROM 1996:

*All three species showed the greatest growth increments and heights for those trees planted in fabric containers.

*Trees in plastic containers exhibited greater leaf area and dry weights for the ash. Oaks in fabric containers had greater leaf area and dry weights.

*Overall, the fabric container trees across all species illustrated the highest quality trees, followed by those planted in plastic containers and the B & B.

*Minimal data was recorded for transpiration rates in 1996 and will be further investigated in 1997.

CONCLUSION:

By accumulating data in a field study that will provide accurate information on growth variables and water requirements of woody plants in different nursery production methods; perhaps we can achieve improved tree quality and water use know-how.