



SMART Tree Report

2021 Research Update
to the Christmas Tree Industry of
Nova Scotia and Atlantic Canada

MARCH 2021

RESEARCH UPDATE

Introduction

In February 2021 the **SMART Tree Cooperative** members met with researchers and scientists who have been leading embryo development research and in-field evaluations to discuss how the SMART Tree project has progressed this past year.

President Jim DeLong stated, **“This is a very important time to share an update with stakeholders, investors, funders, and all of those who have an interest in SMART Trees, and the Nova Scotia Christmas tree industry.”**

In 2020, our research advanced to the final phase of tree quality analysis, and various plots across the province were selected for in-field evaluations. This is an observational study that will continue to be carried out over the coming years to monitor seedling quality.

At the meeting, Dr. Andrew Schofield and Jay Woodworth, of Perennia reported to the Cooperative the most recent laboratory and in-field reports. As a result of findings, SMART Tree cooperative is providing the following important updates.

SMART TREE
SUCCESS





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PHYTOCULTURES UPDATE

Phytocultures Somatic Embryogenesis Project Results

Dr. Schofield reported that in 2020, the Maritime Innovations robot transferred mature embryos from tissue culture to 132 germination trays. It became evident that the pre-selection system for identifying the quality of the mature embryos was not stringent enough. Although the robot had plated 50,000 pieces, fewer than 20,000 were estimated to have been mature embryos.

In September 2020, after two months of germination, the estimated yield was approximately 3,500-4,500 good quality emblings, and approximately 15,000 poorer quality emblings. The trays were cold-stored for 8 weeks and all emblings were transferred to soil. After 2 months' growth on soil (February 2021), the seedlings were consolidated. 3,246 seedlings were kept, the rest had not developed and were discarded because of a low estimate of success.

This experience at Maritime Innovations has emphasized the value of quality selection at each step of the production process. It is particularly important to select high-quality mature embryos for germination and to select larger/stronger germinants for transplanting to soil. Phytocultures have begun culling at these stages which has improved their efficiencies tremendously.

CALLUS
IN PLATE





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SEEDLING STATUS UPDATE

Initial Seedling Evaluation

During the development of the SMART Tree seedlings at Dalhousie University, some select lines were distributed for field planting. Currently, these trees are approximately 4-5 feet in height.

Jay Woodworth, who heads the CTCNS field research team, reported that there are a total of 446 of these initial seedlings located over three sites in New Germany (115), St. Andrews (150), and Onslow Mountain (181).

The CTCNS Research Team has mapped the location and completed quality evaluations on every tree in this project for characteristics including growth, flush date, colour, bottling of brush, budding, needle length, branch angle, and overall ranking.

NEEDLE LENGTH





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FIELD EVALUATION UPDATE

SMART Tree Field Evaluation Trials

CTCNS received funding to undertake a 3-year field evaluation trial on SMART Tree field performance. The first seedlings for these trials, funded under the Canadian Agricultural Partnerships' Crop & Livestock Management Trials program were planted in the fall of 2020.

A total of 451 SMART seedlings were obtained from Phytoculture Laboratory (PEI) (309) and Dalhousie University's inventory (142). Custody of these seedlings was finalized just weeks before planting.

There are a total of nine evaluation sites, three in each of three regions across the province including Lunenburg County, Northeastern region, and Cobequid region. Each site has 44 trees planted across 4 rows with 6 by 6-foot spacing, for a total of 360 SMART seedlings planted out. Each site also has 4 control seedlings which were produced conventionally and provided by Scott & Stewart Forestry Consultants.

The sites will be monitored and the trees will be evaluated for quality characteristics such as growth, flush date, colour, bottling of brush, budding, needle length, branch angle, and overall ranking. Additional sites will be planted as more seedlings become available or as additional trials are needed.

BARCODING





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GENETIC RETAINMENT UPDATE

Genetic Retainment Effort

Approximately 150 scions were collected from superior clones in the Plumdale Orchard in Bible Hill, NS, (where approximately 1,016 clones are planted across three orchards). These scions were grafted into a protected lot in New Germany, NS. As of Fall 2020, we had an estimated survival rate of 70%. Another round of grafting to retain more genetic material will be completed in 2021.

GRAFTING





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FORECASTING UPDATE

One Year Forecast

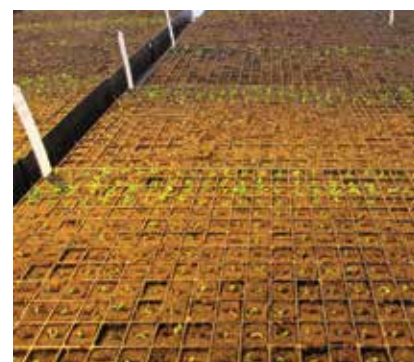
Additional evaluations will take place over the 2021 year, with the next field evaluation in May of 2021.

Availability Forecast

Over the past year, Phytocultures have made great strides in developing SE protocols that work well in their hands at a large scale. The final hurdle in the process has been the development of a tissue culture regime in which the germinated seedlings become big enough and strong enough to continue their growth once they are transferred to soil. Results from experiments in March suggest that this last hurdle has now been solved. Phytocultures is currently transplanting 30,000 germinated seedlings to soil and has even greater numbers in earlier stages of production. With the key pieces of the protocol now in place and working well, Phytocultures is able to ramp up production over the coming months.

The initial focus of SE seedling production is for the field evaluation trials. Additionally, our conservative estimate is that there will be tens-of-thousands of SE seedlings available for growers to purchase in the first batch of production.

BUILDING INVENTORY





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FORCASTING UPDATE

Availability Forecast (cont.)

The projected timeline for this batch is that the SE seedlings will complete one growing season at Phytocultures and a second growing season with Scott & Stewart. These 2-0 SE seedlings would then be available to growers for transplanting in the fall of 2022.

Since each SE line constitutes an individual “variety” of Balsam fir, it is important to evaluate the performance of these SE varieties at different locations. The ongoing field evaluation trials are one way to accomplish this. Another way is for individual producers to grow them on their own lots. There will be several SE lines produced in this first batch, which will give growers the opportunity to observe the performance of some of these different varieties for themselves.

SCALING UP
PRODUCTION





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FORCASTING UPDATE

President Jim DeLong stated research and development are progressing well. **“Scaling up the production of seedlings has been an uphill climb, but we believe that we have reached the top step with the SE production process, and look forward to having results back from the field trial evaluations. Thank you for your patience.”**

Interested in learning more, purchasing a share, or joining the SMART Tree mailing list?

We invite you to visit our website

<https://smarttree.ctcns.com/> or contact

Brittany Frenette at outreach@ctcns.com.

FIELD TRIAL EVALUATIONS



PROJECTED DATE FOR NEXT REPORT - SPRING 2022