Agriculture and Agri-Food Canada
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CONVENTIONAL METHODS COMBINED WITH BIOTECHNOLOGY IN BLUEBERRY IMPROVEMENT

Blueberries are a diverse group of perennial, woody shrubs, which bear fruit in clusters and have a powerful punch of antioxidants.

They have the highest antioxidants among all common fruits and are linked to the prevention of numerous health conditions, including cancer, heart disease, glaucoma and dementia.

Currently, five major groups of blueberries are commercially grown: 1) lowbush (*Vaccinium. angustifolium* Ait.), 2) highbush (*V. corymbosum* L.), 3) half-high (cross between lowbush and highbush); 4) rabbiteye (*V. ashei* Reade) and 5) southern highbush (*V. corymbosum and hybrids*). Although blueberries are native to North America, they are grown commercially in Europe, Asia, Africa, Australia, New Zealand and South America.

Natural stands of lowbush blueberries are commercially managed and harvested throughout Newfoundland and Labrador. However, with increased consumer awareness and demands for nutritious, high-antioxidant berries, demand is now exceeding production.

Traditional propagation methods are unable to supply the large quantities of genetically superior plants needed for commercial production. Scientists at Agriculture and Agri-Food Canada in St. John's are currently working with tissue culture techniques and molecular biology to develop highly productive, high antioxidant, superior mid-size blueberry plants.

The process involves crossing superior lowbush blueberry with half-high blueberry plants **(Figs. 1, 2)** to develop amid-bush variety. This will be the first time mid-bush blueberries will be produced from crossing half-high with lowbush blueberry plants.

Figure 1. *Half-high blueberries*

Canada

Figure 2. *Greenhouse-grown half-high blueberry plants.*

Figure 3. *Tissue culture lowbush blueberry shoots in a gel medium.*

Figure 4. *Tissue culture lowbush blueberry shoots in a bioreactor system containing liquid medium.*

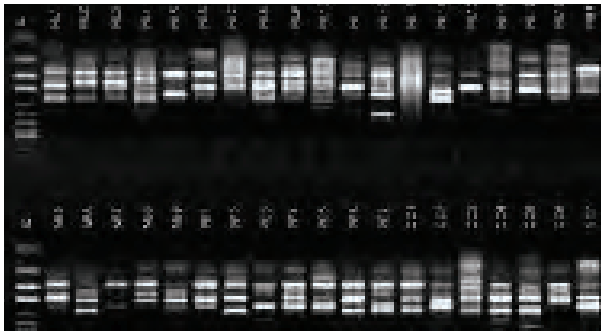

Figure 5. *Molecular analysis to identify lowbush blueberry plants*

Lowbush blueberries are high in antioxidants while half-high blueberries have better yields and are easier to harvest. Scientists, with the leadership of Dr. Samir Debnath, would like to develop a mid-bush plant exhibiting all properties that would be suitable for commercial production in NL and other cool climates in Canada.

Scientists have been examining tissue culture techniques and molecular biology to develop an improved production system for the mid-bush blueberry suitable for cool climates. Significant progress in plant tissue culture research related to propagation using a gel medium **(Fig. 3)** and in a bioreactor system using liquid medium **(Fig. 4)** have been developed for blueberries. The enhanced vegetative growth and rhizome yield of tissue culture blueberry plants may prove to be beneficial for rapid establishment of plants in the field with an early fruit production.

Scientists are also using molecular analysis such as genetic fingerprinting to identify molecular markers in blueberry plants which allows a direct comparison of genetic material. The degree of similarity between the banding patterns can provide information about genetic similarity, and relationships between the blueberry varieties **(Fig. 5)**. Accurate and rapid genotype identification is important in blueberry plants for germplasm characterization, practical breeding purposes and proprietary-right protection.

For more information on this project please contact:

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