

Developing F1-Hybrid Seed-Propagated Dayneutral Strawberry Cultivars

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Traditionally Ontario growers have produced June-bearing strawberries that are harvested for a 4-6 week period. However, strawberry growers are progressive and many are moving to dayneutral strawberry production. Dayneutral strawberries can be harvested over an extended season resulting in fresh local berries for up to 6 months depending on the climate and production systems.

At present, Canadian growers are faced with several challenges in their efforts to grow dayneutral strawberries. The cultivars currently grown were bred in California and, therefore, are not well suited to the Canadian climate. Canadian-adapted cultivars are required which are winter-hardy, adapted to our climate, have high yields and can fruit as long as possible. Developing new cultivars is a long-term project. In the short-term, recommendations are required to maximize production and reduce costs using the existing cultivars and new production techniques.

We are addressing these concerns in a project under the Industry-led Research and Development Stream of the Agri-Innovation Program Federal Growing Forward 2 initiative. Research for this 5-year project is being conducted at three University of Guelph sites in Ontario, Cedar Springs Research Station and Simcoe Research Station both located in southwestern Ontario and the New Liskeard Agricultural Research Station located in northeastern Ontario. Our objectives include:

1. Develop and evaluate dayneutral F1-hybrid cultivars and selections
2. Develop strategies for substrate culture of dayneutral strawberries
3. Develop production recommendations for dayneutral strawberries in high tunnels and outside for a variety of climates

In this article we will describe our research to develop F1-hybrid seed-propagated strawberries. This research is lead by Dr. Adam Dale at the Simcoe Research Station.

Hybrid seed-propagated strawberries are a radically new approach, as strawberries are normally vegetatively propagated. F1-hybrid production involves crossing inbred parents to produce hybrid vigour similar to hybrid corn production. Seed propagation of dayneutral strawberries can be done reliably in Canada overcoming the problems experienced in Canada with dayneutral vegetative propagation.

Seed-propagated strawberry cultivars have many advantages. First plants can easily be produced for planting at any time of the year and these plants produce fruit 40 days after planting. As they are from seed not runners, the plants start out free of aphid and nematode-borne viruses. Seed can be germinated and grown without overhead irrigation reducing the chances of anthracnose infection. And last but not least, seed-propagated cultivars can be bred that don't produce runners reducing labour costs in the field.

To make F1-hybrid seed-propagated strawberries practical requires an efficient and economic seed production system. Most strawberry cultivars are hermaphrodites where the flowers contain both male and female functions enabling them to flower, self-pollinate and bear fruit. Hermaphrodite inbred lines would have to be hand pollinated to make F1-hybrid seed. As part of this project, genetically female lines are being developed as these can be pollinated by insects/wind making seed production inexpensive.

To make a hybrid you need inbred parent plants. However inbred plants demonstrate severe inbreeding depression, so a carefully designed production system is needed to overcome these challenges. Propagation and handling systems for these inbred parents are being developed. Becky Hughes, New Liskeard Agricultural Research Station has developed a system to maintain inbred parents in tissue culture. Toktam Taghavi at the Simcoe Station is working with Fafard et Frères Ltée to evaluate the effects of substrate and fertility on pot-grown inbred plants.

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