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Apple Breeding Program at the Pacific Agri-Food Research Centre in Summerland

The apple breeding program at Agriculture and Agri-Food Canada Pacific Agri-Food Research Centre (PARC) in Summerland began in 1924. The program continues to focus exclusively on the traditional breeding methods that have produced some of the world's most popular apples. It is one of the first apple breeding programs in the world to use formal sensory evaluation panels to screen breeding selections for taste, texture and appearance.

Since 1995, the program's reach has expanded beyond the Okanagan and PARC-Summerland's researchers have been breeding apples for other Canadian regions. Efforts to breed varieties resistant to apple scab have also expanded. Apple scab is one of three major apple diseases in the world. The others are fire blight and powdery mildew. In British Columbia scab ranks third in importance, but in Ontario, Quebec and Nova Scotia it is the number one concern.

Breeding the Perfect Apple

The ultimate goal is to provide high quality apple cultivars with the following characteristics for Canadian apple growers:

- High fruit quality, including appearance, texture, and flavour
- Distinctive appearance and flavour
- Good storage and shelf life
- Mid- to late-season harvest date
- Early bearing, high yielding
- High proportion of top-quality fruit
- Disease resistance
- Well adapted to the Canadian climate
- Winter hardiness
- Good growth habit for high-density orchards

Nicola apples, above, have excellent shelf life.

Developing New Varieties

It takes 20 years to develop a new variety, or cultivar. Each year hundreds of new trees are added and inferior ones are removed from the test orchards. There are three stages of testing that each new variety must pass:

Canada

1. Seedling Stage: 25,000 to 30,000 different types, one tree of each for initial screening.

2. Second Selection Stage: Fewer than 1% of the seedlings from stage 1 are re-propagated after screening. At this stage there are about 400 hundred types, two to ten trees of each.

3. On-Farm Testing: Five (or fewer) of the most promising cultivars are tested in commercial orchards under different management and climate conditions. This stage is organized by PICO, the Okanagan Plant Improvement Corporation.

Summerland selections are tested in Ontario, Quebec, Nova Scotia, France, Italy, Norway, Japan, Holland, Republic of South Africa, Washington State, and across the northeastern United States.

Apple cultivars developed in Summerland, from the earliest release: Spartan, Stirling, Jubilee, Spencer, Summerred, Summerland, Sinta, Shamrock, Sumac, Sunrise, Chinook, Creston, Silken, Golden Sentinel (columnar), Scarlett Sentinel (columnar), Aurora Golden Gala™, Nicola™, Sabina™.

Silken, left, is an early fall cultivar noted for its unique white gold porcelain colour and for its outstanding texture and flavour.

Beyond Apple Breeding

Summerland apple researchers have a number of other projects in addition to the breeding program, including:

- evaluating apple rootstocks for Okanagan conditions and assessing cultivars for multi-gene scab resistance
- maintaining a small variety collection of several hundred cultivars
- assessing and using “heirloom” apple cultivars for breeding disease-resistant apple cultivars with better orchard performance and storage life
- expanding the collection of red fleshed varieties and cider apples for future breeding efforts
- collaborating with an expert in post-harvest physiology at PARC-Summerland to develop apples suitable for fresh-cut slices.

The program’s research staff also collaborate with the US Department of Agriculture and various universities for rootstock and cultivar testing; provincial governments and universities in Canadian provinces for Summerland apple testing; apple breeders in Saskatchewan, Japan, Mexico and Minnesota for germplasm exchange; and members of the BC Fruit Testers’ Association who assist in finding obscure cultivars with apparent scab resistance.

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