

Canadian Breeding Program for White Pine Blister Resistance in Black Currants

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ADDITIONAL INDEX WORDS. **genetics, germplasm, *Ribes*, *C. ribicola*, cultivar development**

SUMMARY. The search for appropriate white pine blister rust (WPBR) (*Cronartium ribicola* J.C. Fischer) resistant germplasm to use in black currant (*Ribes nigrum* L.) breeding programs began in 1935 in Ottawa. Crosses were made in 1938 and 1939 with three different *Ribes* L. species and two standard black currant cultivars. The resulting seedlings from these crosses were evaluated for rust resistance. Three promising selections resulted from this program and were named 'Coronet', 'Crusader' and 'Consort'.

WWPBR affects five-needle white pine (*Pinus* L.) and currant and gooseberry, (*Ribes*). Both *Pinus* and *Ribes* are required hosts to complete the rust life cycle. In *Ribes* the disease is more of a nuisance than a serious problem. However, WPBR devastates pine production, often destroying the trees. Agriculture and Agri-Food Canada (AAFC) started a program in 1935 to search for germplasm that could be used in a breeding program for rust resistant black currants.

The direction of research carried out by AAFC during its formative years was shaped largely by the first director of the Central Experimental Farm (CEF), William Saunders (Fisher, 1976). The CEF was established in Ottawa in 1887. Saunders was a druggist by training but he had a deep, abiding interest in horticulture and cereal crops. Under his tutelage a national fruit experimental program was created. A Dominion horticulturalist position was created to oversee systematic trials of old and new fruit cultivars to improve commercial fruit production and establish regional cultivar recommendation lists. Out of this program the breeding work for WPBR resistant black currants evolved. M.B Davis, who was the Dominion horticulturalist from 1933–55, worked with A.W.S. Hunter on this project.

Results and discussion

An existing *Ribes* plantation at the Central Experimental Farm in Ottawa, Ontario provided the germplasm for the breeding program. This planting had been previously observed for rust occurrences. One bush (*R. ussuriense* Jancz.), in particular, had never shown any sign of rust infection. Two other bushes, golden currant (*R. aureum* Pursh.) and *R. odoratum* Wendl. were also selected for the program as they were the next least susceptible of all other plants in the block.

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Table 1. Results of crosses of three *Ribes* species and two black currant cultivars (Boskoop Giant and Kerry) to determine white pine blister rust resistance. Adapted from Hunter and Davis, 1943.

Cross	Total no. seedlings grown	No. seedlings with rust
<i>Ribes ussuriense</i> x Boskoop Giant	45	0
<i>Ribes ussuriense</i> x Kerry	168	0
Kerry x <i>Ribes ussuriense</i>	130	6 ²
Kerry x <i>Ribes aureum</i>	12	5
Boskoop Giant x <i>Ribes odoratum</i>	20	20

²Presumed to be the result of accidental self-pollination.

In 1938 and 1939, these three plant species were crossed with two standard black currants, 'Kerry' and 'Boskoop' (Table 1). The progeny of the crosses *R. ussuriense* x 'Kerry' and 'Kerry' x *R. ussuriense* were chosen for further evaluation. In 1945, ten of the rust-free seedlings were chosen for further evaluation on the basis of yield, berry size, fruit cluster length and evenness of ripening. These 10 were: O-381, O-382, and O-391 to O-398; these were established in a yield trial along with the standard *R. nigrum* cultivars 'Climax', 'Kerry', 'Magnus' and 'Saunders' (Hunter 1949). The selections O-381 and O-393 were two of the highest yielding in the trial. These selections were also tested in many other parts of Canada and Europe and no rust ever occurred. Plants were sent to the United States where

deliberate inoculations with *Cronartium ribicola* failed to produce rust (Hahn 1948). 'Crusader' (O-381), selected in 1942, and 'Coronet' (O-393), selected in 1943, were named on 9 Dec. 1948 and released in 1949 (Hunter, 1949). Both resulted from the *R. ussuriense* x 'Kerry' cross. During the next few years 'Coronet' and 'Crusader' were widely distributed and grown. It was soon discovered that when whole blocks of each cultivar on its own were planted as opposed to test gardens where several cultivars were planted, problems occurred. As a rule black currants are self-fruitful although many do require insect cross-pollination for increased fruit set. 'Coronet' and 'Crusader' were almost entirely incapable of self-pollination and flower irregularities hindered insect pollination. In 1951 a third rust resistant

cultivar, Consort, was named and released (Hunter, 1954). 'Consort', which was tested as O-396, had been selected in 1944 and was the progeny of the 'Kerry' X *R. ussuriense* cross. 'Consort' produced higher yields when planted on its own and it soon replaced 'Coronet' and 'Crusader' in plantings. Its chief drawback was susceptibility to powdery mildew [*Sphaerotheca morsuvae* (Schw.) Berk.]; however 'Coronet' and 'Crusader' were also susceptible. Plans were developed to combine resistance to both mildew and rust in further breeding work (Hunter, 1949).

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