Self-Fertile Sweet Cherries

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Self-fertility in sweet cherries is of practical interest because of the advantages that would be gained from the elimination of pollinator varieties from orchards—although the presence of bees and/or other insects would still be necessary for effective pollination. Trees would be effectively pollinated, leading to regularity in cropping and increased yields. Single-clone blocks would be easier to cultivate and harvest, and the cost of management would be reduced.

In traditional sweet cherry orchards, even in good pollination years, cropping may be unevenly distributed within the orchard. This is probably due to the localized nature of hive-bee foraging. They tend to work intensively, one tree at a time, and only those nearest their hives.

To some extent the efficiency with which cross-pollination occurs depends on the amount of pollen available. For effective pollination, bees must work two trees of different incompatibility groups. Compatible pollen rapidly becomes diluted as bees work a second clone, although large numbers of flowers are selfed.

Self-sterile (incompatible) clones are frequently erratic in their cropping for other reasons. Pollinators may flower out of step with the main clone due to pre-blossom climatic conditions, or a cool blossom period, which restricts hive-bee foraging.

Self-fertility results from mutations of the S-gene, one of the many alleles of which determine self-incompatibility in the sweet cherry (1). Mutations may occur spontaneously, or they may be induced artificially, for example, by the use of X-rays (2).

Three self-fertile seedlings were obtained at the John Innes Institute, Bayfordbury, Hertford, Herts, England, in 1946 by D. Lewis and L. K. Crowe. Two seedlings, 2420 and 2434, were produced by irradiation of Bigarreau Napoleon (Royal Ann) pollen, while a third, seedling No. 2538, was spontaneous in origin (2):

John Innes Seedling 2420 (3/45) (Emperor Francis x Bigarreau Napoleon—X-ray 8)

John Innes Seedling 2434 (11/45) (Emperor Francis x Bigarreau Napoleon—X-ray 9)

John Innes Seedling 2538 (1411/46) (self exchanged Merton 42 (Schrecken x Governor Wood)

Seedlings 2420 and 2434 are basically small fruited Napoleon types, seedling 2538 is a small, early black cherry; all three have very low resistance to bacterial canker.

Families obtained by selfing each of these self-fertiles comprise seedlings which are all self-fertile. Also, all three seedlings have been crossed with a large number of well known commercial varieties at the John Innes Institute. The resulting families have been analyzed and we now know that all three of the original self-fertile seedlings carry an unmutated S_3 gene, self-fertility resulting from a mutation of the other S-allele. Consequently, crosses with varieties carry S_3, those belonging to incompatibility groups II, III, IV, V and VI (1, 3), yield completely self-fertile progenies, while crosses with clones which do

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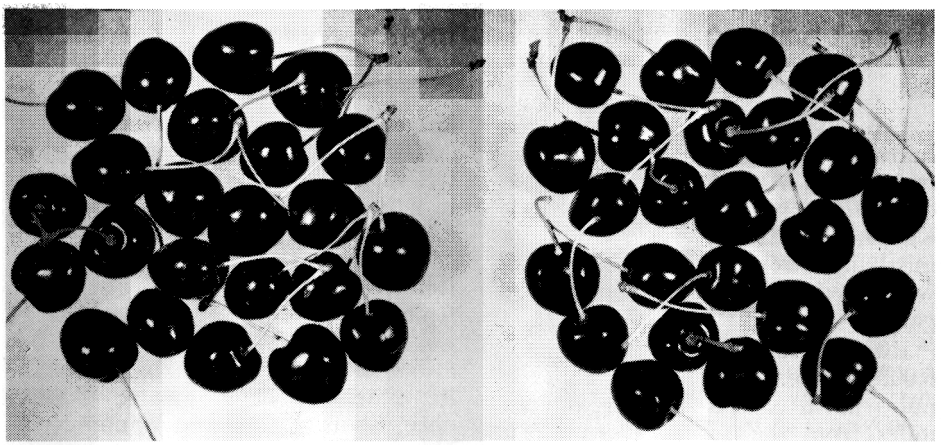

Fig. 1. Fruit of Self-fertile, Summerland seedling selection 2C-27-19 (left) and Lambert.

not carry S_3 segregate equally self-fertile/self-incompatible seedlings (5).

Seedlings 2420, 2434 and 2538, used as pollinators, are being systematically crossed with S_3 clones resistant to bacterial canker, and selfed in a program aimed at producing new varieties combining self-fertility and resistance to bacterial canker (4).

This program has so far yielded more than 4,200 self-fertile seedlings at the John Innes Institute. To date, two promising seedlings have been selected for further trials:

John Innes Seedling 5667 (Merton Heart x J. I. Seedling 2434). Mid-season, black, resistant to bacterial canker.

John Innes Seedling 5673 (Black Cherry x J. I. Seedling 2434). Late mid-season black, resistant to bacterial canker.

At the Research Station, Summerland, B. C., Canada, the original John Innes self-compatible seedlings have been used in crosses on a small scale since 1956. One selection, 2C-27-19, appears promising, and is offered to other experiment stations for trial. The selection 2C-27-19 resulted from the cross Lambert x John Innes Seedling 2420 made in 1956. The tree of the selection is vigorous, healthy; it comes into bearing early and bears heavily. The fruit of 2C-27-19 resembles that of Lambert, being heart-shaped, black, large in size, medium in firmness, sweet. It ripens 3 to 4 days before Lambert (Fig. 1). In comparison to Lambert, the fruit of 2C-27-19 is larger, wider at shoulders, slightly softer, lower in acidity, and comparable to Lambert fruit in skin cracking due to rain. Experience so far indicates that this self-compatible selection will set fruit under adverse conditions during bloom. Blossoms of bagged experimental branches have set nearly a normal amount of fruit without pollination by either hand or by insects.

Literature Cited

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