

Prairie Fruit Breeding Cooperative (PFBC)

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In any discussion of a long-term program, such as the PFBC, one is well to define the purposes of the discussion. As I understand this meeting, we wish to look at the PFBC specifically and at fruit breeding more generally. This could be summed up by the following questions - What has been done and where are we in terms of the PFBC?

These questions lead us to examine the purposes that led to setting up the PFBC. Firstly, let me say that it was a product of dedicated horticulturists belonging to this WCSH organization. The disastrous autumn freeze of 1942 and subsequent woody plant mortality in 1943 led to a complete examination of the splintered fruit breeding efforts on-going at that time. Resolutions were presented to restructure fruit breeding in a cooperative way between federal, provincial and university researchers in the prairie region. Out of this grew the PFBC, a program in which designated crosses made at Morden produced seedlings for distribution to several test stations. The aim was to generate information on fruit breeding and to develop adapted fruits to withstand the prairie conditions.

For the benefit of younger WCSH members, including myself, I wish to review briefly several highlights of the three developmental stages I perceive in the PFBC. The decade of the 1950's marked the distribution, planting and maintenance of about 130,000 controlled cross seedlings from Morden. The 1960's marked the selection phase of this project while the 1970's marked the second-test phase which is currently on-going. Each of these phases show a measure of overlap. Let me review then, in brief, these three periods in the PFBC.

When the PFBC was initiated, horticultural staffing existed at nearly every federal experimental station on the prairies. Most institutions had directors and staff firmly committed to some level of horticulture aimed at serving the home gardener as well as commercial growers. In the light of these interests, enthusiasm for the PFBC ran high. The 1949 WCSH Proceedings detail the designation of three key stations (Morden, University of Saskatchewan and University of Alberta). The 1950 report tells of 100,000 hand-pollinations in the greenhouse and outdoors made at Morden. No less than 15 prairie units reported on fruit breeding in 1951 - a far cry from today. The earlier enthusiasm seems to have partially dimmed by 1954 and 1955 when reports of surplus controlled-cross seedlings at Morden indicated that many cooperators were not willing to grow out the vast numbers of

seedlings produced at Morden. In 1956, Dr. Leslie retired and the 1957 report tells of Dr. Hilton's move to Guelph and of the departure of Mr. Williams from Morden and Mr. Enns from Saskatoon. This period marked the start of the horticultural staff erosion at the federal stations, a continuing factor to this day. In summary, the first decade of the PFBC was marked by the distribution of about 130,000 apple and apple-crab seedlings, 13,000 plums and 5,000 cherries.

The decade between 1960 and 1970 was dominated by selection of superior seedlings from the vast number of seedlings. Guidelines were set for selection with the main interest in apples larger than two inches. Selections from several stations were compared at joint meetings in 1966, 1967, 1969 and 1971 and a total of 52 entries were designated for a second test (Table 1). Final testing of crabapples, plums and cherries was left to the individual stations.

Three test sites (Morden, Melfort and Brooks) were chosen for evaluation of second-test selections. Trees were propagated at Morden and sent out at the rate of about 10 selections per year in 1968, 1969, 1970, 1972 and 1974. The experimental design was that of the randomized block with tree spacing 20' x 20' with a space of 30' from shelterbelts.

The decade of the 1970's marks the evaluation of second-test plantings, a process which is on-going. Each year more information is accumulated, particularly on more recent plantings. Quality tests are conducted at Morden; the Brooks and Melfort plantings are especially important in terms of hardiness. At last year's WCSH meeting a report was given on four outstanding selections. I wish to repeat the information for three of these entries.

Rescue x Melba - Originated at Lacombe. Ripe on August 10th; small, well-coloured apple, fair quality; annual bearing; hardiness 9. This tree was in good condition at Brooks in 1975 and is also fruiting at Melfort.

Rescue x Melba - Originated at Scott. Good quality apple, well-coloured; tree dwarf-type, annual bearing; hardiness 10. In 1976, two trees fruited at Melfort.

Heyer 12 x Dr. Bill - Originated at Brooks. Very large, well-coloured apples, ripens August 18, fair quality; pendulous branching habit; hardiness 10. Trees were healthy at Brooks in 1975 and three trees fruited at Melfort in 1976.

At this meeting, I believe we should ask ourselves what we can learn from the PFBC. Most obvious is the long-term nature of the program, the personnel changes which lead to

lack of continuity and the importance of continuing support. In terms of fruit breeding genetics, it appears that a relatively few parents have given rise to the most useful seedlings. For example, 226 Rescue x Melba seedlings distributed to Melfort, Brooks and Lacombe are the basis for three of the four outstanding selections. Heyer 12 and Rescue are most common as females, while Melba and Dr. Bill are most common as males (Table 2 and 3).

A pertinent question for discussion is whether a second round of crossing among the best PFBC selections should be done. My answer would be affirmative. Perhaps with the enthusiasm of younger members here today we can find an interest in such a project.

Table 1. PRAIRIE CO-OPERATIVE FRUIT BREEDING PROJECT -
 Parentage of selections under test at Brooks, Melfort and Morden

| P.F. Number | Original Selection Number | Parentage | Original Source | Year Planted in Test | |
|-------------|---------------------------|-----------------------------------|-----------------|----------------------|---------|
| Brookland 1 | 17C-23-33 | Heyer #12 x Haralson | Brooks | 1968 | BR |
| 2 | AA-17-52 | Cortland x Rupert | Morden | 1968 | |
| 3 | M-363 AA-13-87 | Haralson x Melba | Morden | 1968 | |
| 4 | 51-101-61 | Rescue x Melba | Lacombe | 1968 | |
| 5 | W.O. #25 | Rescue x Melba | Scott | 1968 | |
| 6 | W.O. #6 | Rescue x Melba | Scott | 1968 | Late BR |
| 7 | P.A. 6040 | Heyer #12 x Dr. Bill | Edmonton | 1968 | |
| 8 | 11E-14-40 | Heyer #12 x Dr. Bill | Brooks | 1968&69 | Late BR |
| 9 | 11E-14-34 | Heyer #12 x Dr. Bill | Brooks | 1968 | BR |
| 10 | 11W-10-16 | Haralson x Rescue | Brooks | 1969 | BR |
| 11 | 11W-15-60 | Heyer #12 x Goodland | Brooks | 1969 | |
| 12 | 11E-2-15 | Rescue x Haralson | Brooks | 1969 | BR |
| 13 | 51-88-24 | Rescue x Mantet | Lacombe | 1969 | |
| 14 | 51-156-20 | Goodland x Rescue | Lacombe | 1969 | |
| 15 | 51-88-47 | Rescue x Mantet | Lacombe | 1969 | |
| 16 | M-378 EE-7-97 | Wealthy x Lobo | Morden | 1969 | |
| 17 | M-377 EE-1-5 | Duchess x McIntosh | Morden | 1969 | BR |
| 18 | M-379 HH-13-304 | Tetofsky x Patricia | Morden | 1969 | |
| 19 | 11E-14-7 | M-329 x Patricia | Brooks | 1970 | |
| 20 | 11E-14-83 | Heyer #12 x Melba | Brooks | 1970 | |
| 21 | 11W-15-3 | Heyer #12 x Goodland | Brooks | 1970 | |
| 22 | 11W-16-5 | Heyer #12 x Goodland | Brooks | 1970 | |
| 23 | M-380 GG-6-3 | (Duchess x W.Rose) x Anisim sdlg. | Morden | 1970 | |
| 24 | M-381 EE-18-2 | Snow x Bedford | Morden | 1970 | |
| 25 | 51-88-35 | Rescue x Mantet | Lacombe | 1970 | |
| 26 | 51-101-1 | Rescue x Melba | Lacombe | 1970 | Late BR |
| 27 | A208 | Unknown | Saskatoon | 1970 | |
| 28 | 58-315 | Unknown | Saskatoon | 1970 | |
| 29 | R10T11 | Unknown | Saskatoon | 1970 | |
| 30 | 58-314 | Unknown | Saskatoon | 1970 | |
| 31 | P.A. 6027 | Heyer #12 x Dr. Bill | Edmonton | 1970 | |
| 32 | P.A. 6028 | Heyer #12 x Dr. Bill | Edmonton | 1970 | |
| 33 | P.A. 6037 | Heyer #12 x Dr. Bill | Edmonton | 1970 | |
| 34 | 56A-6407 (Blk 3) | Rescue x Haralson | Edmonton | 1970 | |
| 35 | Mel. 5-64 | Columbia x Dr. Bill | Melfort | 1970 | |
| 36 | #6021 | Rescue x Haralson | Beaverlodge | 1972 | Late BR |
| 37 | S 6669 | Columbia x Dr. Bill | Saskatoon | 1972 | |
| 38 | 15C-8-30 | Heyer #12 x Melba | Brooks | 1972 | |
| 39 | 15C-11-23 | Heyer #12 x (0-2312 x M-359) | Brooks | 1972 | |
| 40 | M-372 AA-13-97 | Haralson x Melba | Morden | 1972 | |
| 41 | M-374 DD-4-10 | Bl. Calville x McIntosh | Morden | 1972 | |
| 42 | Heyer #12 | Hardiness standard | Morden | | |
| 43 | M-382 MM-7-15 | Wealthy x Lobo | Morden | 1972 | |
| 44 | CC-16-15 | Lobo x Rosilda | Brooks | 1974 | |
| 45 | LL-83-72 | Haralson x Lobo | Brooks | 1974 | |
| 46 | 11E-2-72 | Rescue x Haralson | Brooks | 1974 | |
| 47 | M-370 | Trail x McIntosh | Brooks | 1974 | |
| 48 | M-368 | Trail x McIntosh | Morden | 1974 | |
| 49 | M-359 | Wealthy x Melba | Morden | 1974 | L BR |
| 50 | AA-18-66 | Duchess x Haralson | Edmonton | 1974 | |
| 51 | P.A. 13 | Haralson x Rescue | Edmonton | 1974 | |
| 52 | 601 | Rosilda x Rescue | Edmonton | 1974 | |

Table 2. Frequency of crosses as parents in the Malus selections from the Prairie Fruit Breeding Project

| <u>Cross</u> | <u>No. of Selections</u> | <u>Selected at</u> |
|--|--------------------------|---------------------------------|
| Heyer #12 x Dr. Bill | 5 | Edmonton 4, Brooks |
| Rescue x Haralson | 4 | Brooks 2, Edmonton, Beaverlodge |
| Rescue x Melba | 4 | Lacombe 2, Scott 2 |
| Heyer #12 x Melba | 3 | Brooks 3 |
| Heyer #12 x Goodland | 3 | Brooks 3 |
| Rescue x Mantet | 3 | Lacombe 3 |
| Haralson x Melba | 2 | Morden 2 |
| Haralson x Rescue | 2 | Brooks, Edmonton |
| Wealthy x Lobo | 2 | Morden 2 |
| Trail x McIntosh | 2 | Brooks, Morden |
| Columbia x Dr. Bill | 2 | Melfort, Saskatoon |
| Heyer #12 x (0-2312 x M-359) | 1 | Brooks |
| Haralson x Lobo | 1 | Brooks |
| Goodland x Rescue | 1 | Lacombe |
| Rosilda x Rescue | 1 | Saskatoon |
| Wealthy x Melba | 1 | Morden |
| Duchess x McIntosh | 1 | Morden |
| Blushed Calville x McIntosh | 1 | Morden |
| Duchess x Haralson | 1 | Edmonton |
| Cortland x Rupert | 1 | Morden |
| Tetofsky x Patricia | 1 | Morden |
| M-329 x Patricia | 1 | Brooks |
| Snow x Bedford | 1 | Morden |
| Lobo x Rosilda | 1 | Brooks |
| (Duchess x Winter Rose) x Anisim sdlg. | 1 | Morden |
| Heyer #12 x Haralson | 1 | Brooks |
| Unknown | 4 | Saskatoon 4 |

Table 3. Frequency of parents as males and females of 51 prairie fruit selections

| | <u>Female</u> | <u>Male</u> |
|------------------|---------------|----------------------------|
| Heyer #12 | 15 | 1 |
| Rescue | 11 | 4 |
| Haralson | 5 | 6 |
| Wealthy | 3 | 0 |
| Duchess | 2 | 0 |
| Melba | 0 | 10 ⁹ |
| Dr. Bill | 0 | 8 ⁷ |
| McIntosh | 0 | 4 |
| Goodland | 1 | 3 |
| Lobo | 1 | 3 |
| Patricia | 0 | 2 |
| Rosilda | 1 | 1 |
| Blushed Calville | 1 | 0 |
| Trail | 1 | 2 |
| Cortland | 1 | 0 |
| Tetofsky | 1 | 0 |
| Snow | 1 | 0 |
| Columbia | 1 | 0 |
| Mantet | 0 | 1 |
| Bedford | 0 | 1 |

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