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RAI HISTORY SURVEY

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# Co-op 27, 28, 29, 30, and 31: Five Disease-Resistant Apple Selections Released for Advanced Testing

S.S. Korban, P.A. O'Connor, S.M. Ries, J. Janick, J.A. Crosby, and P.C. Pecknold

Bulletin 789

Agricultural Experiment Station—College of Agriculture—University of Illinois at Urbana-Champaign in cooperation with the Agricultural Experiment Station of Purdue University, West Lafayette, Indiana.

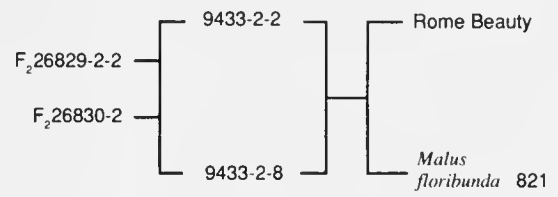
**F**ive new apple selections—Co-op 27, 28, 29, 30, and 31—are being offered for advanced testing. These selections have field immunity to apple scab caused by *Venturia inaequalis* (Cke.) Wint. and varying degrees of resistance to fire blight incited by *Erwinia amylovora* (Burr.) Winslow et al., to cedar-apple rust incited by *Gymnosporangium juniperi-virginianae* (Schw.), and to powdery mildew incited by *Podosphaera leucotricha* (Ell. & Ev.) Salm. This is the sixth in a series of releases from a cooperative breeding program at the agricultural experiment stations of Illinois and Indiana. This new series differs from previous ones in that all selections mature relatively late in the harvest season. They represent our continued efforts to increase resistance in apple to these diseases. The selections are identified by the designation, "Co-op," to emphasize the cooperation and joint effort of this program.

Co-op 1 through 5 were described in Purdue University Agricultural Experiment Station Research Progress Report 271 (1967); Co-op 6 through 11, in Purdue University Agricultural Experiment Station Research Progress Report 399 (1972); Co-op 12 through 18, in Purdue University Agricultural Experiment Station Bulletin No. 69 (1975); Co-op 19 through 22, in University of Illinois Agricultural Experiment Station Bulletin 755 (1977); and Co-op 23 through 26, in Purdue University Agricultural Experiment Station Bulletin No. 456 (1984).

Only a small amount of propagation wood is currently available; therefore, distribution must be limited. All distributions will be bound by an agreement in which further propagation of the material is prohibited without prior consent of the experiment station involved. It is our intention to patent worthy selections.

## PARENTAGE

Co-op 27 through 31 descend from crosses involving a small-fruited ornamental crabapple, *Malus floribunda* 821, made early in this century by the late C.S. Crandall of the University of Illinois. Co-op 27 derives from F<sub>2</sub>26830-2, and Co-op 28 through 31 are derived from F<sub>2</sub>26829-2-2.



The present program, initiated by J.R. Shay, formerly of Purdue University, and L.F. Hough, then of the University of Illinois, utilized these resistant selections derived from *Malus floribunda* 821 along with many other genetic sources of resistance. The fruit of F<sub>2</sub>26829-2-2 was the largest and highest in quality of the resistant material then available. Of the 31 Co-op selections released since 1967, 28 descend from this clone, and 3 descend from its sister seedling, F<sub>2</sub>26830-2.

## BREEDING SYSTEM

The "floribunda" resistance to apple scab is conditioned by a single dominant gene, *V<sub>f</sub>*. Both F<sub>2</sub>26829-2-2 and F<sub>2</sub>26830-2 are heterozygous for this gene. When crossed to susceptible genotypes, they produce seedlings, half of which are resistant. The susceptible progeny are identified by greenhouse screening tests and eliminated at the seedling stage. Seedling trees grown for first fruiting test in the field receive no fungicide protection, thus allowing for selection for field resistance to several other diseases. The breeding system that produces these selections involves a modified backcross program with the horticulturally most resistant selections of each generation crossed to high-quality susceptible types. In the illustrated pedigrees, the seed parent is the upper selection in each bracketed cross.

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## SELECTION DESCRIPTIONS

### Co-op 1 through 26

Seven selections from this group have been named: 'Prima' (Co-op 2), in 1970; 'Priscilla' (Co-op 4), in 1972; 'Sir Prize' (Co-op 5), in 1975;

'Jonafree' (Co-op 22), in 1979; 'Redfree' (Co-op 13), in 1981; 'Dayton' (Co-op 21), named in honor of D.F. Dayton in 1988; and 'Williams' Pride' (Co-op 23), named in honor of E.B. Williams also in 1988.

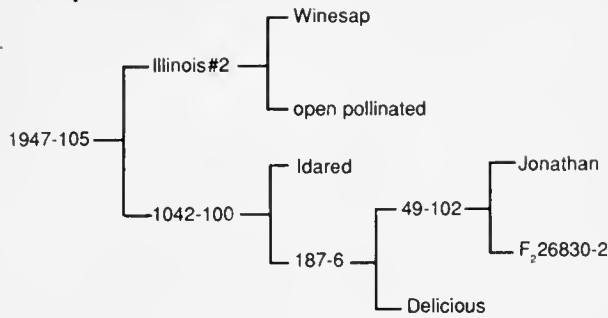
The distinguishing characteristics of all Co-op selections are summarized in the table.

### Co-op 1 through 31: Fruit Color and Maturity Season

Co-op	Progeny number <sup>a</sup>	Color	Maturity relative to	
			Prima	Delicious
			..... weeks .....	
1	1235-101	red	-2	-6
2 (Prima)	1225-100	red	0	-4
3	1686-1	red	-1	-5
4 (Priscilla)	1659-1	red	+2	-2
5 (Sir Prize)	673-20	yellow	+4	0
6	1500-100	red	-1½	-5½
7	2023-1	red	-1	-5
8	1326-1	red	+1½	-2½
9	1677-2	red	+3	-1
10	1659-10	yellow	+4	0
11	1947-104	red	+6	+2
12	2175-25	red	-4	-8
13 (Redfree)	2175-7	red	-3	-7
14	1325-101	red	-2	-6
15	1569-100	red	+1	-3
16	2174-3	yellow	+4	0
17	1689-110	yellow	+7	+3
18	1983-207	red	+5	+1
19	2318-104	red	-4	-8
20	1691-100	red	-2	-6
21 (Dayton)	2259-100	red	0	-4
22 (Jonafree)	2016-100	red	+3	-1
23 (Williams' Pride)	2845-1	red	-3	-7
24	2058-2	red	+3	-1
25	2712-4	red	+3	-1
26	1659-100	red	+4	0
27	1947-105	red	+5	+1
28	2929-104	red	+2½	-1½
29	2050-4	yellow	+6½	+2½
30	2693-1	red	+6½	+2½
31	2463-101	red	+6	+2

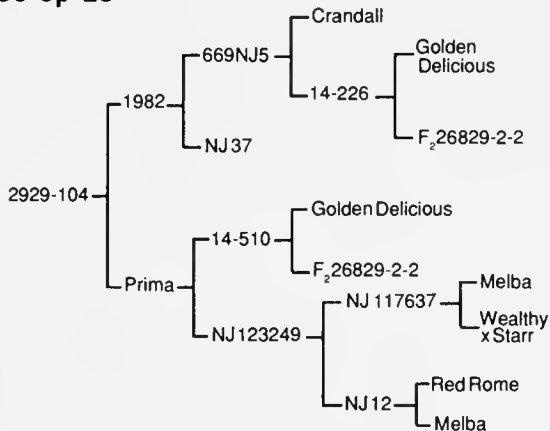
<sup>a</sup> Selections 1 to 99 selected at Lafayette, Indiana; 100 to 199, at Urbana, Illinois; 200 +, at Cream Ridge, New Jersey.

### Co-op 27



This selection ripens from October 5 to October 10 at Urbana, Illinois, about five weeks after 'Prima'. Fruit 2½ to 3 inches, round to roundish oblate. Color 90 percent medium to dark red, splashed over a pale yellow ground color. Flesh cream colored, fine grained, firm to crisp, and juicy. Mildly to sprightly acidic, spicy, and full flavored. Dessert quality is good to very good. Co-op 27 keeps well in refrigerated storage until late spring. Field immune to scab and cedar rust, Co-op 27 has a high level of resistance to fire blight and moderate resistance to mildew. Its spur-type growth pattern is similar in habit to that of 'Red Delicious' strains, and it blooms moderately early. First selected by D.F. Dayton and tested as PWR37T131.

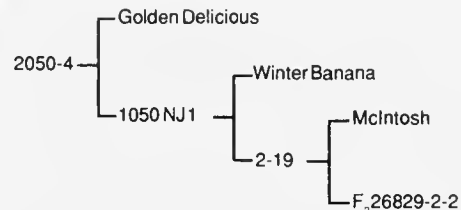
### Co-op 28



This selection matures from September 10 to September 18 at Urbana, Illinois, from 2 to 2½ weeks after 'Prima'. Fruit 2⅝ to 2¾ inches, oblate-conic. Color 75 to 99 percent medium red on a greenish yellow background, bright and attractive with conspicuous lenticels. Flesh white, crisp, medium textured, and moderately juicy. Mildly acidic, spicy, and full flavored. Dessert quality is very good to excellent. Fruit hangs well and retains texture and quality for several weeks. Co-op 28 is field

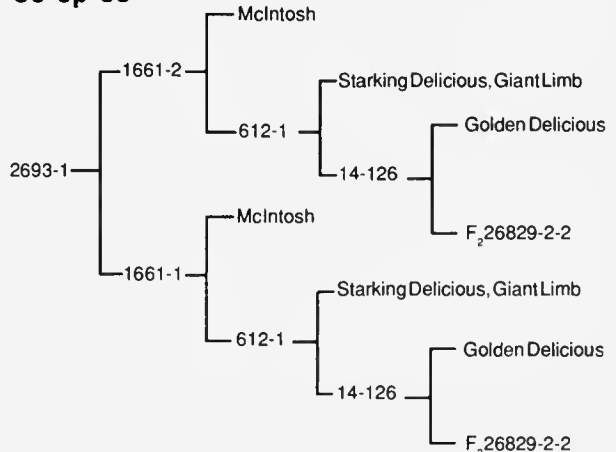
immune to scab and has good resistance to cedar rust and mildew. In 1989, this selection exhibited susceptibility to fire blight in the orchard at Urbana, Illinois, and therefore is not recommended for areas where fire blight is a problem. Its vigorous, upright spreading tree blooms early to mid-season. First selected by D.F. Dayton and tested as PSER8T19.

### Co-op 29



This selection matures from October 10 to October 18 at Urbana, Illinois, about 6½ weeks after 'Prima'. Fruit 3 inches, round to short-conic. Color is self yellow with a moderate pink blush. Russet on stem end and lenticels. Flesh cream colored, coarse textured, very crisp, breaking, and juicy. Mildly to sprightly acidic, spicy, and full flavored. Dessert quality is very good to excellent. Field immune to scab, cedar rust, and fire blight, and moderately resistant to powdery mildew. Co-op 29 has an upright tree type with limber wood and blooms early to mid-season. It retains its quality after 7 months in storage at 34°F (1°C). First selected by E.B. Williams and tested as HCR14T125.

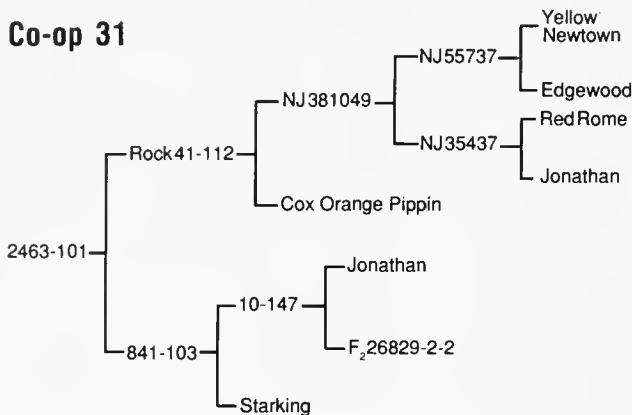
### Co-op 30



This selection matures from October 10 to October 18 at Lafayette, Indiana, about 6½ weeks after 'Prima'. Fruit 2⅝ inches, round. Color is 75 to 100 percent medium red to orange, washed over a greenish yellow background. The McIntosh-like

finish is very bright and shiny. Co-op 30 is attractive with inconspicuous lenticels. Flesh pale yellow to cream colored, medium textured, very crisp, breaking, and juicy. Mildly acidic, spicy, and very full flavored. Dessert quality is very good to excellent. Co-op 30 is field immune to scab and moderately resistant to cedar rust, fire blight, and mildew. This selection retains quality after 6 months in storage at 34°F (1°C). It blooms moderately late. First selected by E.B. Williams and tested as CLR4T38.

### Co-op 31



This selection matures from October 10 to October 15 at Lafayette, Indiana, about six weeks after 'Prima'. Fruit 2 3/8 to 3 inches, round. Color is 100 percent dark purple-red, striped and splashed over a greenish-yellow background. The finish is moderate to bright and tends to have scabby skin. Flesh cream colored, medium to coarse textured, very crisp, and juicy. Mildly acidic, spicy, and full flavored. Co-op 31 blooms in mid-season. Dessert quality is very good. Field immune to scab with good resistance to fire blight and moderate resistance to mildew, it is moderately susceptible to cedar rust. Co-op 31 retains its quality after about eight or nine months in storage at 34°F (1°C). First selected by D.F. Dayton and tested as PAR4T215.

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