

‘Co-op 31’ (WineCrisp™) Apple

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‘Co-op 31’ is a highly productive, late-season red apple (*Malus ×domestica* Borkh.) that ripens 2 weeks after ‘Delicious’. The tree produces fruit that is firm and crisp with outstanding fruit flavor and a very good storage life. The tree is moderately vigorous and semispreading with a desirable bearing habit (fruit is well distributed throughout the canopy) and crops heavily annually. In addition, the tree has sturdy wood with no blindwood.

Fruits are 100% dark red (striped/washed) with small yet conspicuous tan lenticels, a yellow–green background at harvest, up to 65 mm (2½ inches) in diameter (similar in size to ‘Gala’), attractive, and is round–oblate in shape (Fig. 1). The skin is moderately dull (not glossy) and in New Jersey has shown russeting, similar to ‘GoldRush’. The fruit is full-flavored and subacid to mild. Quality is excellent, and fruit maintains firmness and crisp texture in refrigerated storage for over 9 months at 1 °C, although flavor can become bland after 9 months in storage. It generates low levels of ethylene in storage (Goffreda et al., 1994). The fruit does not fall prematurely off the tree.

Co-op 31 is the 19th apple cultivar developed by the cooperative breeding program of the Illinois, New Jersey, and Indiana experiment stations (Korban et al., 1990). This high-quality dessert apple will be sold under the name ‘WineCrisp™’.

‘Co-op 31’ carries the *Vf* gene derived from *Malus floribunda* Sieb. clone 821 that provides a high level of resistance to apple scab incited by the fungal pathogen *Venturia inaequalis* (Cke.) Wint. (Korban et al., 1990). Resistance to apple scab (races 1 to 5) was first evaluated by controlled greenhouse inoculation of young seedlings followed by almost 30 years of field observations under natural conditions for infection in orchards in

Urbana, IL; Cream Ridge, NJ; and West Lafayette, IN; and in trials at various sites in the United States. Based on observations in the field, this apple has good resistance to the bacterial disease fire blight [incited by *Erwinia amylovora* (Burr.) Winslow] and moderate resistance to the fungal disease powdery mildew [incited by *Podosphaera leucotricha* (Ell. & Ev.) Salm.]. However, in New Jersey, mildew has been observed on fruit in 1996 and 1998. Under favorable environmental growing conditions in New Jersey, ‘Co-op 31’ is deemed susceptible to cedar apple rust incited by *Gymnosporangium juniperi-virginianae* (Schw.), although it has been rated as moderately resistant in Illinois and Indiana after several years of field observation.

Based on field observations of trees propagated on Malling 7 rootstocks at Illinois, the tree is quite productive on an annual basis, 15

kg/tree, and may require light fruit thinning. The tree bears fruit on spurs and also on lateral buds. The fruit is similar in shape and color to ‘Winesap’ but characterized by a firm and crisp flesh, and hence it is given the name ‘WineCrisp™’. Because the fruit can stay hanging on the tree even after ripening, it is important to pick the fruit at maturity when the background has turned greenish yellow in color. Under extremely hot temperatures that may occur later in the summer, the fruit may develop some slight water core. Over the course of over 20 years of field observations, the tree appears to be cold-hardy for winter temperatures in Illinois and Indiana.

Origin

The original seedling was produced from a cross made by L.F. Hough at Rutgers University in 1969 between the selection ‘Rock 41-112’ as the seed parent and ‘PRI 841-103’ as the pollen parent. The complete pedigree is shown in Figure 2. The seedling was screened for scab at Purdue University and was then planted in a permanent field location in 1970 at the Pomology Research Farm in Urbana, IL, where it was designated as PAR4T217. The seedling was selected in 1976 by D.F. Dayton, and it carried the progeny designation PRI 2463-100 in our breeding records. It was released for testing as ‘Co-op 31’ in 1990 (Korban et al., 1990).

Description

The following is a detailed description of the flowers, fruit, tree, and leaves based on Zielinski (1955) with color designations according to the Horticultural Color Chart issued by the Royal Horticultural Society of London (1966). Quantitative data, collected for at least 4 consecutive years (2002 to 2006),



Fig. 1. Fruit of ‘Co-op 31’ apple.

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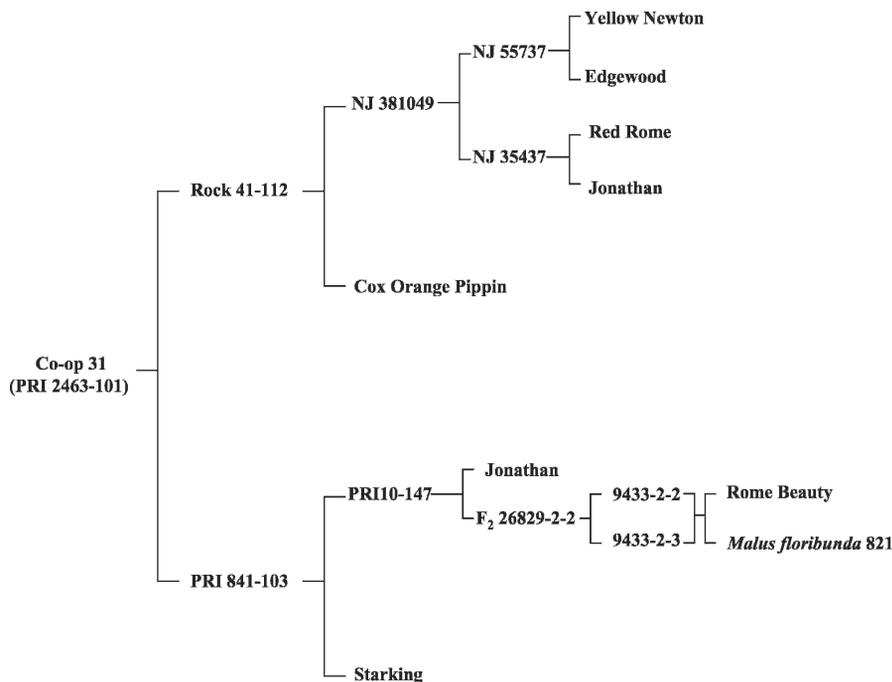


Fig. 2. Pedigree of 'Co-op 31' apple.

are based on at least 10 to 12 samples from each of five trees, unless stated otherwise.

Flower. Pedicel: 1.1 to 1.4 cm long, medium (1 mm in diameter), and flexible.

Corolla: Single (five petals); 4.0 to 4.6 cm in diameter when fully expanded.

Color: Tight bud, grayed purple (Plate 186A); balloon, grayed purple (Plate 186D).

Fully open: Red group (56D) with more pink along veins of petiole (red–purple, Plate 70C).

Flowering date: Full bloom on 21 Apr. (at Urbana, IL), similar to 'Golden Delicious'.

Fruit. Shape: Round–oblong.

Diameter: 6.0 to 6.5 cm.

Color: Almost 100% red (grayed purple, Plate 185A) washed/striped with small yet conspicuous tan lenticels; tends to have dull skin.

Undercolor: Green yellow.

Skin: Medium, semiglossy.

Cavity: Acute, medium (1.0 cm), narrow (1.0 to 1.5 cm) with a russet surface.

Basin: Medium wide (1.5 to 1.8 cm in width) with rounded sides.

Pedicel: 0.5 to 0.8 cm in length, short, not flexible, and 1 to 2 mm in width.

Mean fruit weight: 200 g (based on 10 randomly selected fruits from each of two individual trees).

Bearing habit: Fruit is not subject to pre-harvest drop, and it is well distributed in the canopy.

Ripening date: 10 Oct. (in Urbana, IL), 2 weeks after 'Delicious'.

Productivity: Heavy annual crop (similar to 'GoldRush').

Flesh. Flesh color: Yellow–white (Plate 158A).

Flesh: Crispy, juicy.

Calyx: Persistent, narrowly lanceolate.

Calyx tube: Conical-shaped.

Carpels: Round, ridged.

Seeds: Full complement, acute, nontufted (5 mm in length and 3 mm across).

Texture: Medium, firm, crisp, and breaking.

Quality: Full-flavored, fruity, sweet, mild-subacid, excellent. It maintains firmness (9.93 kg at maturity) and crisp texture. Mean fruit soluble solids (°Brix) at harvest is 12.75; juice pH is 3.34, and starch index (on a scale of 1 to 9 in which 1 = very ripe and 9 = immature) is 6.27.

Foliage. Leaves: Simple, mostly entire, ovate, tip acuminate, base obtuse; margins serrate.

Upper surface: Glabrous, lower surface slightly pubescent.

Young leaves: Green group (Plate 137C).

Mature leaves: Green Group (Plate 137B).

Tree. Habit: Moderately upright.

Vigor: Medium.

Bark and wood: Outer bark on 1-year-old shoots, grayed orange (Plate 166A) with tan conspicuous lenticels (≈ 1 mm in diameter).

Branch angle: 45° to 90°.

Availability

Budwood is available for test purposes to federal and state experiment stations from University of Illinois, Rutgers University, and Purdue University (by contacting any of the authors). A plant patent under the name 'Co-op 31' is currently pending. Trees will be made available for sale from licensed nurseries under the name 'WineCrisp™'. Licensing agreements for commercial propagation can be obtained from the University of Illinois (contact the senior author, Schuyler Korban).

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