'Empress' Apple

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'Empress' is an early ripening, good quality eating apple (*Malus domestica* Borkh.) well-suited for the home garden and for commercial apple growing. In shape and appearance it is similar to 'Empire'.

Origin

In 1969 L.F. Hough, fruit breeder at Rutgers Univ., crossed 'Jonamac' × 'Vista Bells' at Geneva, N.Y. Ninety-four seedlings from this cross were grown on their own roots in a first test at Geneva, and in 1977 when they were 6 years old, one seedling bore especially meritorious fruits. It was selected for further evaluation and was originally designated NY 651. The pedigree of 'Empress' is shown in Fig. 1.

Testing

During the winter of 1977-78, dormant scions from the original NY 651 seedling tree were bench-grafted onto Malling-Merton (MM.) 106 rootstock. After one growing season in the nursery, three of these NY 651/MM. 106 maiden trees were planted into a second-test orchard where tree growth and fruiting performance were evaluated for 10 years. Its performance was consistently superior to that of comparable apple cultivars ripening during the same general season. Additional nursery trees of NY 651 were distributed by the New York State Fruit Testing Assn. for 4 years, from 1985 to 1988, where they were grown and evaluated by home gardeners and commercial apple growers. These tests led to a decision in 1988 to name and introduce 'Empress' for use by the apple growing industry.

Description

Trees of 'Empress' have spurry branches and resemble trees of 'Jonamac' (Fig. 2). They are distinctly smaller than trees of most vigorous cultivars (i.e., ≈70% as large). This smaller stature makes 'Empress' trees culturally easier to manage in the orchard. They may be planted close in the row or propagated on more vigorous rootstock than most other cultivars. Trees of 'Empress' on MM. 106 rootstocks were precocious, begin-

ning to bear crops when young (4 to 5 years). It is a heavily cropping cultivar. Cropping records of three individual trees over 6 years suggest that 'Empress' is an annual cropper, with no tendency toward biennial bearing.

Virus tests of 'Empress' on woody indicators by P.S. Deth and G.M. Mittack were negative for chlorotic leaf spot virus, apple stem grooving virus, and apple stem pitting virus. Thus, 'Empress' trees are considered free of these and other viruses. Similar to its parents, 'Empress' trees do not carry any special resistances to diseases and insects, and 'Empress' plantings will require chemical sprays to control the full range of common pests.

'Empress' bloom period is midseason to 'late, i.e., between 'Delicious' and 'Golden

Delicious'. It blooms at the time the leaves have already developed to about two-thirds their mature size. Clusters of four to six flowers emerge from individual flower buds. 'Empress' buds are borne chiefly on spurs from 2-year-old or older wood but also emerge from terminal buds and from lateral buds on the previous year's twigs. Flower size is large (41 to 58 mm in diameter). Pedicels are medium long (30 to 35 mm), thick (1.3 to 1.5 mm), pubescent, light green with a reddish tinge on the side exposed to the sun. The ovary exterior is heavily pubescent. The calyx lobes are long (8.0 to 9.0 mm), medium broad (3.0 to 4.0 mm), lanceolate, and entire. The outer (abaxial) surface is heavily pubescent and the inner (adaxial) surface has a medium amount of pubescence. The calyx lobe tips are reflexed. Petals are large (20 to 25 mm long and 13 to 17 mm wide), elliptic, and entire. Petals are shallowly cup-shaped up to 1 day before they are fully expanded. Fully opened flowers are almost flat. The petals are pink at the balloon stage but after fully opened they are almost completely white with a faint tinge of pink persisting until petal fall. Petal claws are white and of medium width (1.0 mm). There are 18 or 19 stamens; they are large (9 to 12 mm long), shorter than the petals, but longer than the pistils. The anthers are light yellow and only a small portion of them are aborted. The calyx tube is medium broad (3.0 to 3.5 mm), light green,

Fig. 1. Pedigree of the 'Empress' apple.

Table 1. 'Empress' isozyme phenotype compared with the phenotypes of three standard apple cultivars.

Isozyme	Empress	McIntosh	Delicious	Northern Spy
6-phosphogluconate dehydrogenase-1	ab	ab	ac	bb
6-phosphogluconate dehydrogenase-2	nn	nn	nn	nn
Aspartate aminotransferase-1	cc	cd	bc	aa
Aspartate aminotransferase-2	ac	cc	cc	cc
Glucosephosphate isomerase-2	ac	cc	cc	cc
Triosephosphate isomerase-2	aa	aa	aa	ab
Phosphoglucomutase-1	bb	aa	ab	ab
Phosphoglucomutase-5	null	null	null	null

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Fig. 2. Tree of 'Empress' apple.

Fig. 3. Fruit of 'Empress' apple.

and campanulate. Pistils are of medium length (11 mm), the length from the ovary base to subdivision is 8 mm. Pistils are pubescent on the portion proximal from the subdivision point, but glabrous distal from that point. Stigmas are small (1 mm in diam) and have an asymmetrical configuration.

Chromosome counts by M. Goffinet showed that 'Empress' is diploid ($2n = 34$). Its pollen is viable and it is suitable for pollinating other cultivars that bloom during the same general period.

At Geneva, 'Empress' fruits ripen in late summer during a period in which few other good, commercially acceptable apple cultivars are ripening. The average harvest date is 25 Aug., a few days after 'Jerseymac', a few days before 'Paulared', and 6 weeks before 'Delicious'.

Fruit size is medium, mostly ≈ 70 mm in diameter (Fig. 3), but smaller when trees are overcropping; fruit sizes are exceptionally uniform. Fruit shape is round and symmetrical.

Skin color is nearly 100% blushed red without stripes. The skin color is comparable to the Red Group 53A (Cardinal Red) of the Royal Horticultural Society Colour Chart (1966). The skin is covered with a heavy waxy bloom. The overall appearance is attractive.

The light yellow flesh is semifirm in texture. The flavor is subacid, vaguely perfumed with a very pleasing aroma similar to that of the parent 'Jonamac'. In our opinion, the eating quality is very good. This high quality will enhance its commercial potential.

Electrophoretic analyses of isozyme patterns of 'Empress', conducted by B. Dickson in the laboratory of N. Weeden, showed that it has its own unique pattern (Table 1).

'Empress' is best-suited for late summer roadside marketing and probably will not be produced in large quantities for extended storage by commercial apple growers. Fruit should be consumed soon after harvest because it does not remain in a good marketable condition for more than a month when stored at -0.5°C . 'Empress' may be useful as a good quality, fully red, attractive, medium-sized, late summer apple for fresh markets but is not suitable for commercial processing into applesauce or apple slices.

In summary, 'Empress', with its many good horticultural characteristics, has potential for home and commercial production, as a good quality apple for late summer markets to fill a slot just after 'Jerseymac'.

Availability

A patent is pending for 'Empress'. Commercial nurseries that wish to propagate and merchandise trees of 'Empress' should apply for a license from the Cornell Research Foundation, Inc., 20 Thornwood Drive, Ithaca, NY 14850. Nursery trees can be purchased from the New York State Fruit Testing Assn., Geneva, NY 14456 and from any other licensed nursery.

Literature Cited

Royal Horticultural Society. 1966. Royal Horticultural Society colour chart. Royal Hort. Soc., London.