‘SJМ44’ Apple Rootstock

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Origin

‘SJМ44’ (St-Jean Morden 44) is a new dwarfing rootstock resulting from a cross made in 1960 between Malus baccata ‘Nerchinsk’ and ‘M.9’ (‘Malling 9’, clonal selection of Paradis jaune de Metz). It was developed at the Agriculture and Agri-Food Canada Horticulture Research and Development Centre, St-Jean-sur-Richelieu, Quebec. It produces trees smaller than ‘Malling 26’ (‘M.26’) but larger than ‘Malling 9’ (‘M.9’) (Table 1). It was released because of its infrequent burr knot and freedom from root suckers compared with ‘M.9’ (Table 1), superior hardiness (Khanizadeh et al., 2000), ease of propagation, and better yield efficiency (Table 2).

‘SJМ44’ was among 56 hybrid seedlings of ‘Nerchinsk’ x ‘M.9’ to which ‘McIntosh VC309’ was budded in 1971 and planted in 1974 at Frelighsburg, Quebec, where it was evaluated until 1984 for hardiness, tree size, and efficiency (Granger et al., 1991) along with other selected SJP84 and SJM series (Khanizadeh et al., 2005). ‘SJМ44’ was planted in 1997 in replicated trials in several plots at the Frelighsburg, Quebec, and L’Acadie, Quebec, substations and also at a grower site at Mont-St-Gregoire, Quebec (Khanizadeh et al., 2005).

Description of Self-rooted Trees

Own-rooted trees of ‘SJМ44’ are very prolific and began flowering in L’Acadie, Quebec, around 15 May compared with ‘M.26’, which begin flowering around 23 May based on average date during 1999 to 2004. The color of the buds in full balloon stage is white with medium pink along the petal outline; pedicels are green, and flowers are single with an average 5.7 cm diameter. Petals are large, overlapped, circular, and mainly white.

The mature leaves are fairly large with length between 7.8 and 9.2 cm, width between 4.5 and 5.5 cm, and a length to width ratio of 1:7. The leaves are dark green, glossy on the upper side, and pubescent on the lower side with an outward orientation. Petioles are between 1.8 and 2.5 cm long, and the shape of the leaf apex is cuspidate with serrated margins.

The reddish brown dormant 1-year-old shoot is 6 mm thick, and the length of internodes (at the middle third of the shoot) is 13 mm based on averages of at least four replicates during the evaluation period. Shoots have moderate flexibility and numerous small suckers.

Fruits are small (23 g) with 3.4 to 3.8 cm diameter, globose, symmetrical, and the ribbing is weak (Fig. 1). Fruit crowning is absent and the eye is large, closed, and the calyx is persistent with medium to long lobes. The stalk is very long (3.1 to 4.6 cm) and the stem cavity is shallow. The skin is smooth and partially (20% to 50%) covered with flecked, streaked, and faded pinkish red [Royal Horticultural Society (RHS) 50B] over a yellow ground color (RHS, 1995) with very little russet around the stalk cavity. The lenticels are small and inconspicuous and the fruit flesh is yellowish.

Table 1. Burr knots, sucker number, trunk cross-sectional area (TCSA), height, spread, and vigor of McIntosh Summerland apple trees at Mont-St-Gregoire, Quebec, on ‘SJМ44’ in comparison with ‘M.9’ and ‘M.26’ (1997 planting).

Table 2. Precocity, cumulative yield (1999–2004), yield efficiency, and average fruit size of McIntosh Summerland apple trees at Mont-St-Gregoire, Quebec, on ‘SJМ44’ in comparison with ‘M.9’ and ‘M.26’ (1997 planting).

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Table 1. Burr knots, sucker number, trunk cross-sectional area (TCSA), height, spread, and vigor of McIntosh Summerland apple trees at Mont-St-Gregoire, Quebec, on ‘SJМ44’ in comparison with ‘M.9’ and ‘M.26’ (1997 planting).

| Genotype | Burr knots*2004 | Suckers (no.) | TCSA (cm²) | Ht (cm) | Spread (cm) | Relative vigor 2004* |
|----------|----------------|--------------|------------|---------|-------------|---------------------|
| SJМ44    | 0.5            | 0.0          | 29.8       | 350     | 360         | 128                 |
| M26      | 1.7            | 0.0          | 40.8       | 367     | 357         | 150                 |
| M9       | 2.0            | 2.3          | 18.2       | 267     | 283         | 100                 |
| LSD0.05  | 1.5            | 5.8          | 11.0       | 65      | 75          | 17                  |

*Burr knots on a scale of 0 to 5: 0 = no burr knots; 5 = aerial section of rootstock is covered with burr knots.

*Relative vigor to M9 (circ. ‘SJМ44’/circ. of ‘M.9’)*100.

LSD = least significant difference.

Table 2. Precocity, cumulative yield (1999–2004), yield efficiency, and average fruit size of McIntosh Summerland apple trees at Mont-St-Gregoire, Quebec, on ‘SJМ44’ in comparison with ‘M.9’ and ‘M.26’ (1997 planting).

| Genotype | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 1999–2004 | Yield efficiency | Fruit size (g) 2004* |
|----------|------|------|------|------|------|------|-----------|-----------------|---------------------|
| SJМ44    | 0.3  | 5.5  | 20.3 | 31.4 | 84.9 | 48.7 | 190.9     | 6.7             | 123                 |
| M26      | 0.6  | 3.8  | 12.1 | 32.1 | 44.8 | 44.7 | 138.1     | 3.3             | 146                 |
| M9       | 0.5  | 6.7  | 10.5 | 25.5 | 39.4 | 103.7| 5.8       | 5.8             | 135                 |
| LSD0.05  | 1.3  | 4.8  | 11.5 | 14.4 | 27.8 | 25.6 | 72.2      | 3.2             | 31                  |

*Yield (kg) = includes weight of fallen, harvested, and sampled apples.

*Yield efficiency (kg/cm²) = (cumulative yield 1999 to 2004/trunk cross-sectional area 2004).

*Size (g): average fruit size obtained from a randomly selected sample of 25 fruits.

LSD = least significant difference.
Availability

A Canadian Plant Breeder’s Right (PBR) has been issued (PBR certificate number 2906) and limited quantities of indexed budwood are available for research purposes (universities and research centers) from Canadian Food Inspection Agency, Shahrokh Khanizadeh (for North America) or Meiosis (http://www.meiosis.co.uk) for Europe following a written request. Interested nurseries may inquire about “nonexclusive licenses” directly from Agriculture and Agri-Food Canada, office of technology transfer.

Fig. 1. Fruit of ‘SJM44’ rootstocks (fruits are 3.4 to 3.8 cm in diameter).

Table 3. Relative susceptibility of ‘SJM44’ rootstock compared with ‘M.26’ and ‘M.9’ based on the length of necrosis on excised apple rootstocks inoculated with four isolates of Phytophthora cactorum and two races of Erwinia amylovora.

| Rootstocks | Race of Phytophthora cactorum | Race of Erwinia amylovora |
|------------|-------------------------------|--------------------------|
|            | PC04-01 | PC04-02 | PC04-03 | PC04-04 | ST998 | ST1585 |
| M.26       | 34.67   | 41.48   | 36.28   | 29.18   | 63.17 | 66.40  |
| M.9        | 17.17   | 20.21   | 17.04   | 13.70   | 81.70 | 94.82  |
| SJM44      | 25.70   | 29.70   | 28.24   | 22.72   | 76.40 | 60.00  |
| LSD*       | 2.28    | 5.61    | 5.56    | 4.29    | 29.31 | 20.74  |

*Length (mm) of necrosis induced by Phytophthora cactorum isolates.

†Percentage of the shoot length with necrotic lesions after inoculation (Norelli et al., 2002).

LSD* = least significant difference at the 0.05 level.

Data collected from Carisse and Khanizadeh (2006), and http://www.cyberfruit.info/apple/apple-rootstocks/pdf/disease-susceptibility.pdf.

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