

## *Cultivar and Germplasm Release*

### **RELEASE OF 'SOLER' TROPICAL PUMPKIN<sup>1,2,3</sup>**

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*Cucurbita moschata* Duchesne 'Soler' is an open-pollinated tropical pumpkin cultivar released in June 2004 by the Agricultural Experiment Station of the University of Puerto Rico. Tropical pumpkin, locally known as *calabaza*, is an important vegetable crop in the humid tropics. It is widely grown in the Caribbean, including Puerto Rico and southern Florida (Maynard et al., 1995). In Puerto Rico, production of tropical pumpkin has remained fairly steady over the past 10 years, fluctuating around 16,000 t (350,000 hundredweight) (Alamo, 2003; Anonymous, 2002). Farm gate value has been between \$6 and \$10 million. Soler has been well received by growers in Puerto Rico and is already being widely grown.

#### *Origin*

Soler was developed from three cycles of mass selection. Cycle 0 was an open-pollinated seed sample obtained in 1989 from the farm of Mario Soler near Salinas, Puerto Rico. The original seed sample was given the experimental designation PRB-150. In February 1990, the seed of PRB-150 (cycle 0 seed) was planted in isolation at the Fortuna Substation, Juana Díaz, Puerto Rico. A total of 81 fruits were selected and their seed bulked (cycle 1 seed). Selected fruits had a dark green rind and thick yellow-orange flesh, and were flat and slightly ribbed. Seed from selected fruits was planted in isolation in May 1992 at the Isabela Substation. Seed was bulked from a total of 70 fruits (cycle 2 seed) that were mass selected as described above, except that all selected fruits weighed from 4.5 to 9 kg, measured 25 to 32 cm in diameter, and exhibited a blossom-end scar no larger than 3 cm in diameter. In December 1993, seed from selected fruit was planted in isolation at the Isabela Substation. Seed (cycle 3 seed) was bulked from fruits selected as described for cycle 2. In June 2003, approximately 1,800 plants were grown in isolation from cycle 3 seed. Approximately 5% of the fruit was deemed off-types or too immature to produce good quality seed. Except for these culls, all other fruit was harvested for seed. The seed was bulked and designated as breeder's seed.

#### *Botanical Description*

Fruits of Soler are flat and slightly ribbed. The skin (non-lignified rind) is dark green, although areas of the fruit exposed to the sun will turn orange at maturity. In samples

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taken in cycle 3 of selection, fruit weight averaged 6.7 kg, but ranged from 3 kg to as much as 20 kg (SD = 2.9 kg). Fruit diameter averaged 30 cm, ranging from 21 cm to 46 cm (SD = 3.8 cm). In a trial at Isabela, Puerto Rico, in the winter of 2002-03, Soler had an average fruit size of 7.5 kg (Table 1). Fruit tends to have large scars at the point where the flower corolla attaches to the ovary. Blossom-end scars averaged 5 cm, and ranged from 2 to 9 cm in diameter. Fruits have yellow to yellow-orange flesh averaging 5 cm thick, with some fruits having walls up to 9 cm thick. The flesh tends to be somewhat more course and fibrous and more yellow instead of orange than that of an older local cultivar Borinquen.

Fruits are produced on long trailing vines. The first fruit is typically set between the 25<sup>th</sup> and 40<sup>th</sup> node, at about 4 to 6 m from the crown of the plant. After the first fruit appears, vines continue to grow and set fruit and may reach a length of 10 m or more. Flowering usually begins 55 to 65 days after planting.

Most leaves of Soler exhibit silver mottling in the leaf axils typical of tropical types of *C. moschata*. However, since Soler is open-pollinated, it exhibits some segregation for the *M* locus. Greenleaf plants (*mm*) are present at a low frequency (<10%).

#### *Adaptability and Yield*

Soler has been successfully grown on Oxisols, Vertisols, and Ultisols in Puerto Rico (Chesney, 1994; Irizarry-Morales, 1994; Martínez-Garrastazú and Rivera, 1992) and on Spodosols and Entisols in Florida (Maynard et al., 1995). Thus, it has a wide range of adaptability. As with other cultivars of pumpkin, Soler does not tolerate acid soils.

Some fruits of this variety have a small opening at the blossom end allowing rain or overhead irrigation water to penetrate the interior cavity of the fruit, causing fruit rot. Therefore, this cultivar is best planted with drip irrigation during the dry season. However, yields can still be acceptable when planting is in the rainy season.

Yields in the above cited trials ranged from 17,000 to about 45,000 kg/ha. In trials at Isabela, Puerto Rico, in the winter of 2002-03 and 2003-04, the yield of Soler was within the range of previous trials (Table 1).

TABLE 1.—*Performance of Soler, long vine (Soler GL), and semi-bush (PRShortvine and TP411) experimental tropical pumpkins in Isabela, Puerto Rico.*

Cultigen	Yield (kg/ha)	Number of fruits per hectare	Average fruit weight (kg)
2002-2003 Trial:			
Soler <sup>1</sup>	42,626 a <sup>3</sup>	5,622 b	7.50 a
Soler GL <sup>1</sup>	34,028 ab	10,077 a	3.20 c
PRShortvine <sup>2</sup>	23,612 bc	5,083 b	5.29 b
TP411 <sup>2</sup>	18,051 c	5,799 b	2.60 d
2003-2004 Trial:			
Soler <sup>1</sup>	25,980 a	3,256 c	8.04 a
PRShortvine <sup>1</sup>	13,050 c	3,058 c	4.26 b
PRShortvine <sup>2</sup>	21,203 abc	5,572 b	3.81 b
Soler GL <sup>1</sup>	14,673 bc	5,910 b	2.49 b
Soler GL <sup>2</sup>	25,122 ab	9,712 a	2.58 b

<sup>1</sup>Within a plot, plants spaced 1.8 m × 1.8 m (equivalent to 2,964 plants per hectare).

<sup>2</sup>Within a plot, plants spaced 0.9 m × 1.8 m (equivalent to 5,928 plants per hectare).

<sup>3</sup>Within a trial, means followed by the same letter are not different at the  $\alpha = 0.05$  probability level according to Fisher's protected least significant difference test.

Soler can be direct seeded or transplanted, with or without the use of plastic mulch and raised beds. This cultivar responds best to a 1.8-m (6 ft) planting distance between plants and between rows. Poorer yields were observed with wider rows and narrower between-plant spacing, such as 3.6 m × 0.9 m (12 ft × 3 ft) (Irizarry-Morales, 1994).

#### *Reaction to Pests and Diseases*

The silverleaf disorder, induced by feeding of the silverleaf whitefly (*Bemisia argentifolii*), has not been observed in fruits of Soler (Wessel-Beaver, 1997; 1998). Soler is susceptible to leaf silvering. Its genotype is *ssl* (for silverleaf susceptibility) (González-Román and Wessel-Beaver, 2002). However, in commercial plantings this cultivar has been observed to be very tolerant of high levels of leaf silvering, thus producing good yields even under high levels of the silverleaf whitefly.

Complete resistance to the melonworm *Diaphania hyalinata* is not known in *C. moschata*; Soler, like other cultivars, is susceptible. However, recent trials involving a large collection of *C. moschata* germplasm suggest that Soler is less susceptible than most genotypes (unpublished data).

Control of this insect is essential if good yields are desired. Because of its vigorous growth, Soler tolerates symptoms of many foliar diseases, particularly powdery mildew (*Sphaerotheca fuliginea*), with little adverse effect on its yield. Pachner and Lelley (2004) found Soler to be resistant to zucchini yellow mosaic virus (ZYMV) and concluded that the resistance is controlled by a single recessive gene that is distinct from resistance genes of 'Nigerian Local' and 'Menina 15.'

#### *Use*

All uses normally expected for tropical pumpkin can be met by Soler, including consumption as a stand-alone vegetable, and as an ingredient added to stews, sauces, and desserts. The thin skin does not need to be removed for cooking.

#### *Availability of Seed*

Small samples of Soler (50 seeds) for testing are available from the author (Dept. of Agronomy and Soils, UPR-RUM, P.O. Box 9030, Mayagüez, PR 00681-9030). For commercial-sized seed lots, contact the Deputy Director, Agricultural Experiment Station, College of Agricultural Sciences, University of Puerto Rico, Jardín Botánico Sur, 1193 Calle Guayacán, San Juan, PR 00926-1118.

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