



‘O24-2-6’, A Promising Self-fertile Muscadine Breeding Line

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‘O24-2-6’ is a self-fertile muscadine breeding line developed at the Center for Viticulture, Florida A&M University, by crossing ‘Majesty’ × ‘Ison’ in 2009. This breeding line produces large fruit (15.7g in average), one of the largest fruit sizes ever found with self-fertile muscadine grapes, and sugar contents (SSC) of 15.6%. Its productivity, measured with spur productivity, was moderate high. The fruit are attractive with a elongated shape (1.09 L/D), dark red color, and smooth skin. Uniform ripening and size, high dry scar and low ripening rot rates, and a crunchy pleasant taste have been observed with the hybrids. Its small loose fruit cluster could help reduce the flower fruit rot rate during ripening. The vines are moderately vigorous. Fruit ripen from late August to early September in Tallahassee, FL.

Consumers of fresh market or “table” muscadine grapes look for large fruit size, sweet taste, and an attractive appearance. Muscadine grape growers, on the other hand, look for consistent good yield (moderate to high) of commercially acceptable fruit, satisfactory disease resistance and vine growth habit. Cultivars combined these required traits have been rare, almost all the very large fruited (about 13~15g or more) cultivars, such as ‘Supreme’, the newly developed ‘Majesty’ and ‘Onyx’ from the breeding program at Florida A&M University (FAMU), have only female flowers. The stamens of female (pistillate) flowers are not completely developed, requiring inter-planting with self-fertile pollinizer cultivars to set fruit. Fruit set is also adversely affected by unfavorable environmental conditions such as cool and wet weather during blooming which may reduce the activities of pollen transferring agents, prevent the stigmas of female flowers from receiving pollen, which in turn causes poor fruit set, and results in low yields. This commonly observed problem is responsible for the inconsistent and/or low yield tendency of pistillate cultivars. In addition, when commercial grape growers plant pistillate cultivars to produce highly desired very large fruit, one row of a self-fertile cultivar must be planted between every two rows of pistillate cultivars, which is inconvenient for vineyard management, and may cause economic problems. Self-fertile cultivars, on the other hand, may set fruit without a pollinizer, environmental influences are minimized and yields are stabilized. Vineyard management could be simplified if pollinizer were not needed. Self-fertile flowers, in combination with very large fruited cultivars, therefore, are always preferred by the grape industry, but this combination is rare. Most self fertile flower cultivars have not been recommended due to various reasons, such as low yield, un-uniform ripening, and disease problems. The latest new cultivar, ‘Paulk’ can produce very large fruit with perfect flowers (Conner, 2017), but the dynamic table muscadine industry should not depend only on one cultivar. To accomplish our mission of

“improving the quality of Florida’s grapes and wines”, FAMU’s grape breeding program has been working intensively on table muscadine grapes, especially those with self-fertile flowers for over 20 years. ‘O24-2-6’, is a recently acquired breeding line. It possesses two key traits essential for table grapes: it is self-fertile and produces large fruit. Together with other preferred horticultural characteristics, this breeding line shows good potential for the table muscadine grape industry.

Origin

‘O24-2-6’ originated from the grape breeding program at the Center for Viticulture and Small Fruit Research, FAMU. It is a hybrid of ‘Majesty’ × ‘Ison’ in 2009, and was selected in 2015. ‘Majesty’ is a newly patented muscadine cultivar (US PP21,965 P3) by the Center for Viticulture, FAMU, which produces very large black-red colored fruit, weighing about 3–4 g more than the largest muscadine variety. ‘Majesty’ bears female (pistillate) flowers and requires pollenizers to set fruit. ‘Majesty’ is a hybrid between ‘Supreme’ (U.S. Plant Pat. No. 7,267) and ‘Triumph’ (unpatented). ‘Ison’ was released by Ison’s Nursery in 1986 (Plant patent #5822, Dec. 9, 1986), it is self-fertile and is a leading cultivar for the muscadine grape industry.

The large fruit and high fruit numbers produced by ‘O24-2-6’ were first observed in 2014. Its self-fertile flowers were confirmed in 2015, and evaluations started in 2015. The top fruit size cultivars ‘Majesty’ and ‘Supreme’ and the leading cultivars ‘Fry’ and ‘Ison’ were compared with ‘O24-2-6’ on major characteristics.

Evaluations were conducted at the vineyard in the Viticulture Center, FAMU, Tallahassee, FL (30°47’67.87”N; 84°17’21.82”W). Vines were planted at 10 feet within rows and 12 feet between rows, trained into single-wire bilateral cordon system, vines were annually pruned with 3~4 buds spur-pruning technics. Commercial vineyard management was applied to the vines.

Spur productivity, based on total fruit weight of a spur, rather than the more commonly used vine yield, was used to evaluate. Spurs are the basic production unit of a vine, and total yield is

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the sum of fruit production of every individual spur of the vine. Spur productivity not only reflects the overall productivity of a vine, it might also reveal more detailed information about the vine, eliminating the influences of age, size, and spur number among the vines on vine yield.

Major Characteristics

FLOWERS. ‘O24-2-6’ bears hermaphroditic (perfect, self-fertile) flowers (Fig. 1), its self-fertility has been proven. Flower clusters typically grow at the 3rd and 4th nodes and there are an average of 60 individual flowers in a flower cluster.

FRUIT. *Large fruit.* ‘O24-2-6’ produces 15.7g fruit, which is larger than ‘Supreme’, the primary choice for very large muscadine grapes, and similar to fruit size of ‘Majesty’ in Tallahassee, FL (Fig. 1, Table 1). ‘Majesty’ and ‘Supreme’ are the largest fruit producing cultivars with pistillate flowers. This fruit size is significantly larger than the fruit size of leading cultivars ‘Fry’ and ‘Ison’.

Fruit SSC. The fruit SSC of ‘O24-2-6’ was 15.8%, which is similar to other cultivars grown in Tallahassee, FL, but a little higher than ‘Supreme’ (Table 1).



Fig. 1. Hermaphroditic (perfect/self-fertile) flowers and ripening fruit of ‘O24-2-6’.



Fig. 2. Shoot tip, obtuse-ovate (elongated) shaped fruit with smooth skin, and mature leaves of ‘O24-2-6’.



Fig. 3. The loose and small clusters of ‘O24-2-6’ during ripening in 2017.

Table 1. Fruit characteristics of ‘O24-2-6’ and leading table muscadine cultivars in Tallahassee, FL.

Cultivar	Color	Shape (L/D)	Size (g)	SSC (%)	TA (%)	pH	Seeds/fruit	Fruit rot rate (%) during 40 °F storage ^z			
								Day 7	Day 13	Day 21	Day 28
‘Fry’	bronze	0.99	10.3	16.2	0.40	3.36	3.5	0	4	33	87
‘Supreme’	black red	1.04	14.0	14.2	0.40	3.24	3.6	---	---	---	---
‘Majesty’	black red	0.95	16.5	15.4	0.37	3.58	2.9	0	0	17	47
‘Ison’	black red	1.10	9.3	15.0	0.41	3.27	3.8	0	2	12	46
‘O24-2-6’	black red	1.09	15.7	15.6	0.39	3.41	3.4	0	0	10	21.6

^zAccumulated rot rate, evaluated in 2016, all were dry scar fruit.

Table 2. Horticultural characteristics of ‘O24-2-6’ and leading table muscadine cultivars in Tallahassee, FL.

Cultivar	Flower	Vigor	Inter node length (cm)	Inter node circle (cm)	PD score (0–5)	Spur fruiting rate (%) ^z	Fruit cluster/ spur ^z	Fruit no./ cluster ^z	Spur productivity ^z (g fruit/spur)	Dry scar rate (%)	Ripe rot rate (%)
‘Fry’	female	m-w	4.0	1.5	0	65	1.5	7.3	111.8	84.5	18.9
‘Supreme’	female	m-w	3.8	1.5	0	90	2.0	6.3	175.7	83.1	5.6
‘Majesty’	female	m	4.6	1.8	0	90	2.3	6.0	228.5	84.6	6.4
‘Ison’	perfect	m-h	4.5	1.7	0	90	2.7	10.0	251.1	86.0	5.2
‘O24-2-6’	perfect	m	4.4	1.7	0	95	2.9	4.6	206.1	89.8	2.1

^zAverage of 20 random spurs.

Pleasant taste. “O24-2-6” fruit have very good taste characteristics such as firm flesh texture, edible skin, aromatic flavor, which combine to give an overall pleasant taste.

Uniform ripening and size. Uniform ripening and uniform fruit size have been consistent during the evaluation period.

Fruit appearance. The fruit of ‘O24-2-6’ are attractive with an obtuse-ovate (elongated) shape ($L/D = 1.09$, Table 1) and smooth skin (Fig. 1, Fig. 2). The color of ‘O24-2-6’ fruit is dark purple to near black at peak ripeness with inconspicuous lenticels.

Fruit dry scar. ‘O24-2-6’ showed a similar dry scar fruit rate to ‘Ison’ and ‘Majesty’, and it might be higher than ‘Supreme’ (Table 2).

Small and loose clusters. The clusters of ‘O24-2-6’ are small and loose with about 3~7 fruit generally (Fig. 2, Fig. 3). Ventilation could be better with this cluster characteristic than the compact clusters found with almost all other muscadine grapes, and could result less fruit disease. The peduncles of ‘O24-2-6’ fruit clusters are about 5~6cm in length, which is obviously longer than most muscadine grapes, which could make cluster-harvesting possible.

Ripe rot. The ripe rot of ‘O24-2-6’ was 2.1%, which seems to be lower than other table cultivars (Table 2). Its loose clusters allowing for better ventilation may contribute to this low ripe rot rate.

Storage quality. Fruit rot in ‘O24-2-6’ started later than that of ‘Fry’ and ‘Ison’, and was lower in total fruit rot rate than that of ‘Fry’, ‘Ison’, and ‘Majesty’ in a storage study at 40 °F (Table 1), which suggests that ‘O24-2-6’ fruit might have a longer storage life.

PRODUCTIVITY. ‘O24-2-6’ produces 206 g fruit per spur, which seems similar to the spur productivity of ‘Majesty’, higher than that of ‘Fry’ and ‘Supreme’, but lower than total fruit per spur by ‘Ison’ (Table 2).

GROWTH HABIT. ‘O24-2-6’ has a moderately vigorous vine. Its shoot internode length and circle are similar to that of ‘Ison’ (Table 2). Its shoots tend to grow horizontally with somewhat semi-erect growth.

ANNUAL GROWTH CIRCLE. In Tallahassee, FL, ‘O24-2-6’ bud break starts in the end of March to early April, blooms occur later in May, fruit veraison starts in late July, fruit ripen from late August to early September, leaves fall in late December.

SYMPTOMS OF DISEASE. Pierce’s disease (PD) symptoms have not been observed on ‘O24-2-6’, while few black rot symptoms on leaves were observed during or after harvest.

In brief, ‘O24-2-6’ has been able to produce very large muscadine grape fruit with self-fertile flowers. Its productivity has been satisfactory. Together with several other preferred horticultural traits, this breeding line demonstrates potential for the table muscadine industry.

Literature Cited

Conner, P. 2017. ‘Paulk’, a muscadine grape with hermaphroditic flowers and large berries. *HortScience* 51(11):1639–1641.