‘Sir Don’, ‘Sir Tom’, and ‘Dame Roma’ Sweet Cherries

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Sweet cherry (*Prunus avium* L.) plantings have increased in Australia, from 400,000 trees in 1980 to 1.6 million in 1999 (Cirillo, 2001). This is in response to increased demand from overseas markets, in particular, Hong Kong, Singapore, and Taiwan. Cherries are a high-risk crop and availability is highly dependent on seasonal weather conditions. The major problem is cracking of fruit caused by rainfall on ripening fruit. Losses of up to 60% have been recorded at Lenswood (Granger and Frensham, 1991) and 85% in the Pacific Northwest of the United States (Bullock, 1952). The above-mentioned markets require fruit >25 mm in diameter and a consistent supply from year to year. Self-fertile cultivars tend to be more consistent in crop production. Consequently, a breeding program was commenced in South Australia to develop cultivars with resistance to rain-induced fruit cracking, large fruit size (>25 mm in diameter), and with self-fertility for more consistent cropping. Two cultivars, ‘Sir Tom’ and ‘Sir Don’, meet all three criteria. ‘Sir Don’ has many small splits localized at the stylar scar (often referred to as nose checks), making it less attractive. ‘Dame Roma’ is not crack resistant; however, it is very large and self-fertile and harvests late in the season. Therefore, the decision was made to release it as a cultivar.

Origin

‘Sir Tom’, ‘Sir Don’, and ‘Dame Roma’ are all siblings from the same seedling family, from hybridizations between ‘Black Douglas’ and ‘Stella’ (Lapins, 1971) made in 1986 (Fig. 1). ‘Black Douglas’ is a selection from a group of seedlings found beneath a tree of the ‘William’s Favourite’ cultivar on the property of Mr. W. Bishop, Basket Range, South Australia (Steed, 1966) and is the result of a natural cross with ‘Beauchamp’s Black’, a local cultivar of unknown origins (Granger, 1995). ‘William’s Favourite’ was also discovered locally. This late, dark cultivar handles well, does not bruise easily, and fruit do not crack during summer rainfall. By 1964, it was the second most planted cultivar in South Australia behind ‘Napoleon’ (Steed, 1966).

Seedlings were grown at Lenswood Horticultural Centre in the Mt. Lofty Ranges of South Australia (34°57’S, 138°E, altitude 470 m). The soil is a shallow silt loam over yellow

clay (Dy 5.21, Northcote, 1979). Average chill units (Richardson et al., 1976) at Lenswood are 2400 per year. All three cultivars were selected in 1992 when 1600 mm of rainfall was received at Lenswood (average annual rainfall is 1000 mm).

At the seedling stage, ‘Dame Roma’ was designated FB1111, ‘Sir Don’ FB1138, and ‘Sir Tom’ FB1143. All three were selected because fruit size exceeded 25 mm in diameter and good crop levels indicated they were potentially self-fertile. Subsequent bagging of flowers, fruit set assessments, and observations of pollen tube growth using fluorescence microscopy (Martin, 1959) confirmed that all three cultivars are self-fertile. Incompatibility alleles were also determined using PCR and sequencing analysis (Wiersma et al., 2001). ‘Sir Don’ and ‘Dame Roma’ were found to be S4S13, and ‘Sir Tom’ S3S13. The genotypes of ‘Sir Tom’ and ‘Sir Don’ were confirmed by analyses conducted at East Malling (Sonneveld, personal communication). The PCR and sequencing analysis was unable to distinguish the self-fertile mutation, but the trait is usually associated with the presence of the S4 allele (Wiersma et al., 2001). In the case of ‘Sir Tom’, the S3 allele is present; isozyme analysis has suggested that the self-fertile characteristic is linked to the S3 allele (Granger, 1996).

‘Sir Tom’ and ‘Sir Don’ had little or no cracking.

Results presented here are from two trial sites on Lenswood Horticultural Center. In one of the evaluation blocks, two trees of each cultivar grafted on ‘Mazzard F12-1’ rootstock were planted in close proximity to ‘Bing OB260’, also grafted on ‘Mazzard F12-1’ in 1989. In a second block, ‘Sir Tom’, ‘Sir Don’, ‘Dame Roma’, and ‘Stella’ were all top-worked onto 10-year-old ‘Vega’ trees grafted to ‘Mazzard F12-1’ rootstock. This trial was a randomized block design with three replicates.

In both blocks, trees were spaced 3 m × 3 m and trained to an espalier system.

Evaluation of the cultivars was performed using the cherry descriptor list (Schmidt et al., 1985). This is a scoring system published by the International Board of Plant Genetic Resources. Each descriptor or characteristic is given a number of options with a corresponding score and related to a reference cultivar. For example, tree vigor is based on height and spread measurements of adult trees on their own roots, or relative to reference cultivars on the same rootstock. Weak vigor is scored as 3 and the reference cultivar used is ‘Tropischer’, while extremely strong is rated as 9 and the reference cultivar is ‘Schneiders Spate Knorpel’. Medium (5) and strong (7) fall in-between.

Trial trees were harvested separately and a random 100-fruit sample taken from each. Mean fruit weight was determined for each sample, as was the number of cracked fruit. The assessment of cracking included the small 1–3 mm splits that occur at the stylar scar on some varieties, often without the influence of rainfall. A 25-fruit subsample was then used to measure fruit firmness using a FirmTech firmness meter (BioWorks, Stillwater, Okla.). Five fruit were then destructively sampled for total soluble solids using an Atago handheld brix refractometer and acidity by measuring pH of the homogenate with a digital pH meter and general laboratory pH electrode model HI 8521 (Hanna Instruments, Singapore.)

Description and performance

‘Sir Tom’ matures late, has low to intermediate cropping efficiency, strong tree vigor, flowers mid-season, and has extremely large fruit size (100% >25 mm in diameter). Fruit shape is cordate with mahogany skin color at maturity, but fruit can be harvested when black, and firmness and taste still be acceptable. Eating quality is good. Fruit is firm and slightly susceptible to cracking (5% or less in the field). Stem length is long (>40 mm) and the stone is intermediate in size.

‘Sir Don’ carries some of the same characteristics as ‘Sir Tom’ but differs in that it has high cropping efficiency and shows medium tree vigor. The fruit are large with 75% >25 mm in diameter and are kidney shaped.

‘Dame Roma’ has similar fruit and tree characteristics to ‘Sir Tom’. However, it varies from ‘Sir Tom’ in that it has intermediate

Fig. 1. Pedigree of ‘Sir Tom’, ‘Sir Don’, and ‘Dame Roma’ sweet cherries.

cropping efficiency, and fruit is susceptible to cracking.

Data recorded over four seasons from 1998–99 to 2000–01, inclusive (Table 1), at Lenswood Horticultural Centre, compare the three cultivars to ‘Bing OB260’. In comparison to ‘Bing’, ‘Sir Tom’, ‘Sir Don’, and ‘Dame Roma’ had larger fruit, higher firmness, and later harvest date. ‘Bing’ had higher yields than the other three varieties. Bing was more susceptible to cracking than ‘Sir Tom’ and ‘Sir Don’ but less susceptible than ‘Dame Roma’.

Results from the replicated trial (Table 2) indicated that ‘Sir Tom’ is crack resistant while ‘Dame Roma’ is not. ‘Stella’ and ‘Sir Don’ had equivalent amounts of cracked fruit, but many of the cracks observed on ‘Sir Don’ were not induced by rainfall.

In both seasons, ‘Sir Tom’ and ‘Dame Roma’ had the largest fruit size. In 2000–01 ‘Sir Don’ produced approximately double the yields of ‘Dame Roma’ and four times that of ‘Sir Tom’. Consequently, this heavy crop probably reduced fruit size to such an extent that fruit was the smallest.

Availability

‘Sir Tom’ and ‘Sir Don’ have been granted Plant Breeder’s Rights in Australia, while ‘Dame Roma’ has provisional rights. Commercialization of the cultivars has been licensed to the Australian Nurseryman’s Fruit Improvement Company (ANFIC). ANFIC is a member of AIGN, the Associated International Group of Nurserymen and international commercialization of the cultivars will occur through this group. The North American representative of AIGN is Brandt’s Fruit Trees Inc., P.O. Box 10 Parker, WA 98939.

Budwood of all three cultivars is available for research purposes under a material transfer agreement from SARDI, Lenswood

Table 1. Average fruit characteristics of ‘Sir Tom’, ‘Sir Don’, and ‘Dame Roma’ sweet cherries compared to ‘Bing’ at Lenswood, South Australia.

Cultivar	Cracking (%)	Fruit wt (g)	Yield (kg/tree)	Fruit firmness (g·mm ⁻¹)	TSS ^z (%)	Acidity (pH)	Harvest date
Sir Tom	5	10.7	2.1	292	22	3.8	1/6
Sir Don	25	9.2	7.2	352	17.3	4.1	1/3
Dame Roma	36	10.4	2.5	278	17.6	3.7	1/3
Bing	27	8.6	9.6	259	23.2	4	1/2

^zTSS = total soluble solids.

Table 2. Average fruit cracking, fruit weight, and yield of ‘Sir Tom’, ‘Sir Don’, ‘Dame Roma’, and ‘Stella’ at Lenswood Horticultural Centre, South Australia in 1999–2000 and 2000–01.

Cultivar	TSS ^z (%)		Acidity (pH)		Cracking (%)		Fruit wt (g)		Yield (kg/tree)	
	99–00	00–01	99–00	00–01	99–00	00–01	99–00	00–01	99–00	00–01
Sir Tom	18.3	22.8 a	3.9 a	3.3	1.7	1.7 a ^y	10.7 a	10.5 a	0.7 b	2.9 a
Sir Don	15.9	15.7 b	4.2 b	3.6	6.3	34.7 b	8.9 b	8.3 c	9.2 a	14.3 b
Dame Roma	17.3	18.2 ab	4.0 ab	3.4	9	61.3 c	10.4 a	10.3 ab	3.4 ab	6.9 a
Stella	17.3	18.7 ab	4.1 b	3.5	8.3	20 b	9.3 b	9.4 b	5.0 ab	8.5 a
LSD _(0.05)	NS	5.8	0.2	NS	NS	17.7	0.7	0.9	5.9	5.7

^zTSS = total soluble solids.

^yMean separation within columns is by Least Significant Difference test = 0.05 (lower case letters).

^{ns}Nonsignificant.

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