‘Barbara’ and ‘Daniela’: Two Cultivars for Myrtle Berries Production

M. Mulas, A.H.D. Francesconi, B. Perinu and A. Fadda
Sassari University, Department of Economy and Tree Systems
Via De Nicola 9, I-07100 Sassari, Italy

Keywords: Myrtus communis, cultivation, selection, berries

Abstract
For a long time, many efforts have been done to cultivate myrtle as a possible alternative way to replace collection of berries from spontaneous sources. To promote cultivation, a research program was started in 1995, to study the genetic resources of myrtle and to select cultivars with pigmented fruits. The selection and characterisation of two cultivars ‘Barbara’ and ‘Daniela,’ are among others the outcomes of this research project. ‘Barbara’ can be characterised by shrub habitus, low vigour and medium-high yield. Its vegetation cycle starts in March and the plants grow until November. It shows an early bloom and early ripening of fruit and the plants are quite uniform in fruit maturation. Fruits are oval-shaped and medium-sized. They have a black-bluish peel and a white flesh with anthocyanin gradations. The number of seeds per fruit is medium-low (8.1) and the pulp/seed ratio is medium either (3.19). The cultivar can be propagation with cutting easily. ‘Daniela’ shows a medium-high vigour, a shrub habitus and satisfactory yield. Its vegetation cycle starts early in the season (February-March) and lasts until November. The length of its blooming period is intermediate and no reflorescence of plants occurs. Its fruits mature quite early, but the fruits are less uniform within the plant. Fruits are round, medium sized and black bluish. The number of seeds per fruit is high (13.7) and the pulp/seed ratio is medium (2.54). The propagation of plants with cuttings may be evaluated by medium aptitude.

INTRODUCTION
Myrtle (Myrtus communis L.) is a shrub used mainly for its medicinal and aromatic properties (Camarda and Valsecchi, 1983). Its essential oil, which is obtained mainly from the leaves but also from the fruit, is utilised in cosmetics and pharmaceutics (Magherini et al., 1988). The plant is also used as ornamental (Mulas et al., 1998) and has an important ecological role in the Mediterranean maquis (Bullitta and Spanu, 1976, Mulas et al., 2000a and 2000b).

In Sardinia, a typical myrtle liqueur is obtained by cold hydroalcoholic infusion of pigmented myrtle berries. Due to the success of the liqueur, the demand for raw material by the industry has increased, recently (Nuvoli and Spano, 1996). As a consequence, harvests from spontaneous plants have not been able to provide satisfactory amount of good quality material (Mulas et al., 1999). Therefore, myrtle cultivation has become one of the preconditions for development of liqueur products based on myrtle and for the protection of the biodiversity of the germplasm of the species.

To work out the effective cultivation methods of myrtle, knowledge on the biology, propagation and cultural techniques of the species are necessitated. In addition, cultivars of high productivity, adapted to the actual conditions have to be developed. Since 1995, the studies on myrtle domestication have given results on phenotypic variability of the spontaneous populations being present in the Sardinian region (Mulas and Cani, 1996, 1999, Mulas et al., 1996 1999). More than 120 myrtle mother-plants were identified in about 40 habitats of the Island. Morphological and production biological description of individuals as well as an ecological characterisation of each habitat was performed. After vegetative propagation in the nursery (Mulas and Cani, 1999), 40 clones of good propagation ability and survival rate (after 12 months) were planted in a field located at the Experiment Station of the University of Sassari in Fenosu (Oristano, Central-Western Sardinia). Since 1995, all the selected materials are under
characterisation, continuously (Mulas, 1998, Mulas et al., 2001). As an outcome of this work, several myrtle populations are about to registrate. In this paper, two myrtle cultivars, ‘Barbara’ and ‘Daniela’, particularly interesting for berry production, are described.

MATERIALS AND METHODS
Cultivars ‘Barbara’ and ‘Daniela’ were obtained by vegetative propagation using cuttings of two mother plants named CPT4 and CPT5, growing spontaneously in Capoterra, in Southern Sardinia. The original growing site is located at 54 m a.s.l. and has granite soil of alluvial origin, and is covered by Mediterranean maquis.

In 1996, the individuals of indigenous origin were planted in the field of Experimental Station of the University of Sassari, in Fenosu (Oristano – Central Western Sardinia). Plant spacing was 1.00 m within the row and 3.25 m between the rows. All plants were fertilised similarly and drip-irrigated during summer.

From 1998 to 2000, general characteristics, such as habitus and vigour, and phenological stages of twenty plants per cultivar were recorded. Based on the observations (made in two-week interval), the following data were analysed:

a) intensity of vegetative growth, including sprouting and shoot growth,
b) flower-biological observations: initiation of flowers, beginning of blooming (when 5% of the flowers opened), full bloom (50% of flowers opened), end of bloom (beginning of petal drop),
c) presence of immature and/or ripen fruits, yield, date of fruit skin colouring,
d) frequency and amount of leaf-fall.

In the laboratory, the following parameters were determined: length of the spring-shoots and number of internodes; leaf length, width, shape and colour; fruit number per shoot; fruit weight, volume, width, length, colour and shape of fruits; pulp colour and weight; seed number per fruit and seed weight; peduncle length; pulp/seed ratio; calyx appearance and diameter.

In 2000, the chemical composition of the mature fruits of both cultivars was analysed. Total acidity was determined by using titration with sodium hydroxide. The percentages of reducing and total sugars were determined by the method of Fehling. The content of anthocyanins, tannins and polyphenols of fresh fruits was analysed by spectrophotometry.

RESULTS
The information gathered during the evaluation of the two cultivars was elaborated following the descriptor list previously developed for myrtle cultivar characterisation (Mulas, 1998). In addition, phenological observations were summarised in a diagram elaborated for each cultivar in the years 1998-2000. The results of the production biological and agronomic evaluations presented here regard the fourth year of planting whenever no other specific information is given.

‘Barbara’
The cultivar can be characterised as a low-vigour shrub, with mean height of 0.50 m and width of 0.80 m, respectively. The plant habitus is shrubby-prostrate (Fig. 1a). Three years after planting, fruit yield is about 0.8 kg per plant.

Spring shoots are medium in length (about 11.4 cm). The length of shoot-internodes is 0.92 cm on average (Fig. 1b). Leaves are quite small and elongated, with mean length and width of 2.08 cm and 0.88 cm, respectively (the ratio of length and width is 2.36). The adaxial surface of leaf is dark green and the abaxial is light green one.

Mean fruit number per shoot is 3.83. Fruit is oval-shaped, with a dark-blue peel, and white flesh with anthocyanin gradations. Fruit peduncle is short (1.36 cm) and mean number of seeds per fruit is medium-low (8.1). Mean seed mass is 1.05 g and pulp/seed ratio is medium (3.19). Fruit fresh mass (0.37 g), volume (0.44 ml), length (1.15 cm) and width (0.84 cm) show medium values. The calyx is small (3.97 mm diameter) and is
closed or semi-opened. Fruit shows, on average, 0.06% of malonic acid, 3.59% of reducing sugars, 4.44% of total sugars, 785.4 mg/100g of antocyans, 45.65 mg/100g of tannins and 885.2 mg/100 g of total polyphenols (Table 1).

This cultivar blooming early (April-May) and has a small incidence for reflorescence. The fruits mature early (mid-October) and uniformly (Fig. 2).

The cultivar can be multiplicated by vegetative cuttings with high efficacy.

‘Daniela’

The habitus of plant is shrub of medium size, with moderate growth vigour, forming shrubs of 1.3 m height and 1.5 m width (Fig. 3a). Its yield is around medium as well, producing about 1.0 kg biomass per plant, in the third year.

Spring shoots are medium in length (11.6 cm). The length of shoot-internodes is about 0.90 cm (Fig. 3b). Leaves are medium-small in size (2.47 cm length and 0.98 cm width), elongated, showing 2.52 ratio of their length and width. Both abaxial and adaxial leaf surfaces are green.

In average 3.57 fruits were formed in one shoot. The fruits are round, with black-bluish peel, white flesh and short peduncle (1.71 cm). The number of seeds per fruit is high (13.7) and the pulp/seed ratio is medium (2.54). Fruit fresh mass (0.66 g) and volume (0.80 ml) are high, while fruit length (1.15 cm) and width (1.09 cm) are medium. The calyx is medium in size, with a diameter of 4.23 mm, and semi-opened. Fruit show, on average, 0.11 % of malonic acid, 4.36% of reducing sugars, 4.66% of total sugars, 582.9 mg/100g of antocyans, 120.6 mg/100 g of tannins and 960.6 mg/100 g of total polyphenols content (Table 1).

The length of blooming period is an intermediate one (May-June) and no reflorescence is observed. The vegetation period starts early in the season (February-March) and lasts until November. Fruit maturation is starting rather early in October, but there are a large inhomogenity within the plants. (Fig. 2).

This cultivar shows a medium ability for vegetative propagation.

DISCUSSION

From an agronomic point of view, both cultivars have quite precious characteristics.

The fruits of ‘Barbara’ has less acids and tannins, and more antocyans comparing to fruits of ‘Daniela.’ However, there are no differences in their sugar content. Thus, the fruits of c.v. ‘Barbara’ results final products with more advantageous organoleptic characteristics. Because of the low plant vigour of c.v., ‘Barbara’ it is not suitable for green biomass production, extraction of essential oils and to produce white myrtle liqueur. So ‘Barbara’ is particularly suitable for fruit production, due to its early ripening and low reflorescence, which leads to uniform maturation and good fruit quality. In addition, its low seed number per fruit and its equilibrated pulp/seed ratio help the fruit processing.

The cultivar ‘Daniela’ shows higher vigour, rather long vegetative period, and less intensive leaf fall. Because of these characteristics associated with good fruit yield and quality, early bearing and absent of reflorescence, ‘Daniela’ is a cultivar, which can be used for double purposes: can be cultivated for either fruit or biomass production.

ACKNOWLEDGEMENTS

The authors acknowledge the support of Region Autonoma della Sardegna and Ministero per le Politiche Agricole (Special Grant I.P.P.O.).

Literature Cited


**Tables**

Table 1. Chemical composition of fruit of myrtle cultivars ‘Daniela’ and ‘Barbara’ (2000)

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Malonic acid (%)</th>
<th>Reducing sugars (%)</th>
<th>Total sugars (%)</th>
<th>Antocyanins (mg/100g)</th>
<th>Tannins (mg/100g)</th>
<th>Total polyphenols (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Barbara’</td>
<td>0.06±0.01</td>
<td>3.59±0.03</td>
<td>4.44±0.81</td>
<td>785.4±58.18</td>
<td>45.70±5.65</td>
<td>885.2±94.52</td>
</tr>
<tr>
<td>‘Daniela’</td>
<td>0.11±0.01</td>
<td>4.36±0.57</td>
<td>4.66±0.18</td>
<td>582.9±29.64</td>
<td>120.6±5.98</td>
<td>960.6±93.62</td>
</tr>
</tbody>
</table>

Significance: **: p = 0.01; *: p = 0.05; n.s.: non significant
Fig. 1. Plant (a) and fruit bearing shoots (b) of ‘Barbara’ myrtle cultivar
Fig. 2. Phenology of ‘Barbara’ and ‘Daniela’ myrtle cultivars as observed at Fenosu in 1998, 1999 and 2000.
Fig. 3. Plant (a) and fruit bearing shoots (b) of ‘Daniela’ myrtle cultivar.