‘Mirlo Blanco’, ‘Mirlo Anaranjado’, and ‘Mirlo Rojo’: Three New Very Early-season Apricots for the Fresh Market

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‘Mirlo Blanco’, ‘Mirlo Anaranjado’, and ‘Mirlo Rojo’ are very early-season ripening apricot cultivars (*Prunus armeniaca* L.) with high productivity, excellent fruit quality, and an attractive red-blushed fruit for fresh markets. These cultivars are also characterized by their adaptation to climatic conditions in the southeast of Spain and their resistance to sharka [*Plum pox virus* (PPV)], a serious limiting factor for apricot fruit production in affected areas (Kölber, 2001). ‘Mirlo Blanco’, ‘Mirlo Anaranjado’, and ‘Mirlo Rojo’ are self-compatible. Their fruits have excellent organoleptic characteristics; they are freestone with a light orange skin ground color, extensive red blush, and light orange flesh color that make them very attractive.

Origin

‘Mirlo Blanco’, ‘Mirlo Anaranjado’, and ‘Mirlo Rojo’ resulted from a cross made in 2002 at Murcia, Spain, between the apricot cultivar Rojo Pasión (female parent), which was obtained from the CEBAS-CSIC breeding program (Egea et al., 2004), and the Spanish cultivar, of unknown origin, Búlida Precoz (male parent) (Fig. 1). This cross was made with the objective of obtaining very early-season ripening and sharka (PPV) -resistant cultivars as well as excellent fruit quality and optimal productivity level to replace traditional cultivars in areas affected by this viral disease (Egea et al., 1999).

Description

Tree characteristics

Tree description. ‘Mirlo Blanco’, ‘Mirlo Anaranjado’, and ‘Mirlo Rojo’ were originally selected as seedling trees on their own roots and then grafted onto 4-year-old apricot seedlings (three replicates each). Trees are vigorous with a medium spreading tree. ‘Mirlo Blanco’ has a bloom mainly localized on fruiting spurs of 2-year-old branches, whereas ‘Mirlo Anaranjado’ and ‘Mirlo Rojo’ have a moderate bloom with high fruit set. All cultivars are characterized by optimal productivity level in comparison with some traditional Spanish cultivars. They have a moderate need for thinning to obtain good fruit sizes. Tree architecture greatly facilitates pruning (reduced branching habit).

Plum pox virus resistance. Sharka disease caused by the PPV is a serious limiting factor for temperate fruit production areas that are affected (Kölber, 2001). All apricot cultivars traditionally grown in Europe are susceptible to this disease (Martínez-Gómez et al., 2000), whereas several cultivars from North America such as ‘Goldrich’, ‘Sunglo’, ‘Orange Red’, and ‘Stark Early Orange’ showed resistance to PPV and are frequently used as parents in breeding programs (Egea et al., 1999). Some of the new released apricot cultivars from the CEBAS-CSIC breeding program in Murcia, Spain, such as ‘Rojo Pasión’ (Egea et al., 2004) and ‘Murciana’ (Egea et al., 2005) also showed resistance to sharka [no visual symptoms on

fruit and leaves and no virus found by enzyme-linked immunosorbent assay (ELISA) test]. In the case of ‘Mirlo Blanco’, ‘Mirlo Anaranjado’, and ‘Mirlo Rojo’, ‘Rojo Pasión’ was used as the parent to obtain PPV resistance. The evaluation of PPV resistance was carried out in greenhouse conditions by grafting the trees to be evaluated onto infected ‘GF305’ peach seedlings growing in pots (Martínez-Gómez and Dicenta, 1999) and by grafting onto infected 5-year-old apricot trees growing in a commercial farm strongly affected by the disease. The field assays give the opportunity of evaluating the sharka incidence on fruits so as to ensure the tree behavior against sharka disease. Evaluation of PPV resistance both in greenhouse and field conditions showed the resistance of ‘Mirlo Blanco’, ‘Mirlo Anaranjado’, and ‘Mirlo Rojo’ to PPV Dideron-type isolates (no visual symptoms on fruit and leaves and no virus found by ELISA test).

Time of bloom and floral compatibility. ‘Mirlo Blanco’ and ‘Mirlo Rojo’ need ≈650 chill units and ‘Mirlo Anaranjado’ ≈700 chill units according to the Utah model (Richardson et al., 1974) to break dormancy under our conditions in Murcia (southeast of Spain, lat. 37° N, long. 1° W, and 350-m altitude). Therefore, these new cultivars show low-chilling requirement (Ruiz et al., 2007). Full blooms for ‘Mirlo Blanco’ and ‘Mirlo Rojo’ occur on 16 Feb., whereas for ‘Mirlo Anaranjado’, it occurs on 18 Feb. (± 3 d as average from 3 years), an early flowering season among reference apricot cultivars (Table 1).

These new cultivars are self-compatible as demonstrated in the field (by bagging branches) and in the laboratory (by observing pollen tube growth in 10 flowers) according to the methodology described by Burgos et al. (1993). In addition, the identification of their S genotypes by polymerase chain reaction using the consensus primers EM-PC2consFD and EM-PC3consRD (Sutherland et al., 2004) revealed that ‘Mirlo Anaranjado’ and ‘Mirlo Rojo’ are homozygous for self-compatibility ($S_c S_c$), whereas ‘Mirlo Blanco’ is heterozygous for self-compatibility, showing the band corresponding to the S_c RNase allele and a band of ≈650 bp also detected in the female parent (‘Rojo Pasión’) and in ‘Orange Red’.

Fruit characteristics

Ripening time. ‘Mirlo Blanco’, ‘Mirlo Anaranjado’, and ‘Mirlo Rojo’ are regarded

Fig. 1. Pedigree of ‘Mirlo Blanco’, ‘Mirlo Anaranjado’, and ‘Mirlo Rojo’ apricots.

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Table 1. Comparative analysis of tree and fruit characteristics of 'Mirlo Blanco', 'Mirlo Anaranjado', 'Mirlo Rojo', the traditional Spanish cultivars Currot and Búlida, and the North American cultivar Orange Red under experimental conditions in Murcia, Spain.

Characteristics	Mirlo Blanco	Mirlo Anaranjado	Mirlo Rojo	Currot	Búlida	Orange Red
<i>Tree</i>						
Vigor	Vigorous	Vigorous	Very vigorous	Vigorous	Very vigorous	Vigorous
Flower density	High	Medium	Medium	High	Medium	Low
Flowering date (full bloom)	16 Feb.	18 Feb.	16 Feb.	18 Feb.	8 Mar.	15 Mar.
Floral compatibility	Self-compatible	Self-compatible	Self-compatible	Self-compatible	Self-compatible	Self-incompatible
Fruit set (1–9)	9	9	9	9	9	4
Yield (1–9)	9	8	8	8	9	3
<i>Fruit</i>						
Ripening date	5 May	6 May	11 May	7 May	26 May	28 May
Fruit size (g)	67.5	75.2	70.0	53.8	63.8	61.0
Firmness (kg·cm ⁻²)	2.4	2.6	3.0	2.1	2.6	2.8
Skin ground color	Light orange	Light orange	Light orange	White	Light orange	Orange
Percent red blush	35.0	35.0	45.0	15.0	10.0	45.0
Flesh color	Light orange	Light orange	Light orange	White	Light orange	Orange
Sugar (°Brix)	14.1	13.4	13.2	13.1	11.6	14.2
Acidity ^a	1.24	1.28	1.34	1.20	1.29	1.23

^aTitrateable acidity expressed as grams of malic acid/100 mL of juice.

Fig. 2. Fruits of 'Mirlo Blanco' (left), 'Mirlo Anaranjado' (center), and 'Mirlo Rojo' (right) apricot. Scale bar in centimeters.

as very early-season ripening cultivars. In our experimental conditions in Murcia, the ripening date for 'Mirlo Blanco' and 'Mirlo Anaranjado' is ≈ 5 May and 6 May, respectively, similar to the earliest ripening Spanish cultivar Currot. The ripening date for 'Mirlo Rojo' is ≈ 11 May, ≈ 10 d earlier than 'Precoce de Thyrinte', 15 d earlier than the Spanish cultivar Búlida, and 17 d earlier than the North American cultivar Orange Red (Table 1). Fruits of 'Mirlo Blanco', 'Mirlo Anaranjado', and 'Mirlo Rojo' ripen uniformly. At that time in the season, there is very limited competition with apricots produced from other European countries. In addition, fruits are more attractive, firmer, and have better taste than 'Currot'.

Fruit size, firmness, and color. Fruits harvested from the original own-rooted seedling trees and from trees grafted onto 4-year-old apricot seedlings (three replicates) were studied over 3 years. 'Mirlo Blanco', 'Mirlo Anaranjado', and 'Mirlo Rojo' trees and reference cultivar trees ('Currot', 'Búlida', and 'Orange Red') were grown in the same orchard according to standard apricot orchard operations. Fruit characterization was made at commercial ripening on the basis of their visual skin ground color (degreening stage and fully colored). Three replicates of 10 fruits each were selected for each cultivar and year. Fruit characteristics of Mirlo Blanco, Mirlo Anaranjado, and Mirlo Rojo cultivars are quite similar (Table 1). They bear globose fruits with an average weight of 67.5 g, 75.2 g, and 70.0 g, respectively. Fruits

of 'Mirlo Blanco' and 'Mirlo Anaranjado' are characterized as firm (2.4 and 2.6 kg·cm⁻², respectively) and fruits of 'Mirlo Rojo' are characterized as very firm (3.0 kg·cm⁻²) at commercial ripening when they were harvested. They are skin cracking-resistant. Fruits of the three novel cultivars are freestone and not susceptible to pit burning (flesh browning close to the stone). 'Currot' is described as low firm and skin cracking-susceptible.

'Mirlo Blanco', 'Mirlo Anaranjado', and 'Mirlo Rojo' fruit have light orange skin ground color (hue value = 80.1 ± 1.5 with color space coordinates $L^* = 68.1$, $a^* = 8.5$, and $b^* = 48.4$ for 'Mirlo Blanco'; hue value = 79.7 ± 1.9 with color space coordinates $L^* = 69.6$, $a^* = 9.6$, and $b^* = 53.4$ for 'Mirlo Anaranjado'; hue value = 85.9 ± 1.6 , with color space coordinates $L^* = 71.3$, $a^* = 3.5$, and $b^* = 49.4$ in the case of 'Mirlo Rojo', as determined by a Minolta CR-300 Chroma Meter, Ramsey, NJ). 'Mirlo Blanco' and 'Mirlo Anaranjado' have $\approx 35\%$ of the fruit surface covered by an intense red blush, whereas it is $\approx 45\%$ for 'Mirlo Rojo' (Fig. 2). The flesh color is light orange (Fig. 2): hue value = 83.1 ± 1.3 with color space coordinates $L^* = 66.1$, $a^* = 5.0$, and $b^* = 41.7$ for 'Mirlo Blanco'; hue value = 84.9 ± 1.5 with color space coordinates $L^* = 68.5$, $a^* = 4.1$, and $b^* = 44.4$ for 'Mirlo Anaranjado'; and hue value = 87.7 ± 1.3 with color space coordinates $L^* = 73.5$, $a^* = 1.6$, and $b^* = 38.1$ for 'Mirlo Rojo'.

Organoleptic characteristics. At commercial-maturity stage, 'Mirlo Blanco', 'Mirlo Anaranjado', and 'Mirlo Rojo' fruits are sweet (14.1, 13.4, and 13.2 °Brix on average, respectively) with low acidity (1.24, 1.28, and 1.34 g of malic acid/100 mL of juice on average, respectively) and very good eating quality (Table 1).

Availability

'Mirlo Blanco' is registered in the European Union Community Plant Variety Office with the registration number 2009/2019. 'Mirlo Anaranjado' and 'Mirlo Rojo' are under registration process. Virus-free budwoods are available from CEBAS-CSIC (Spain). Budwoods have been tested as free of the following viruses: *Prunus necrotic ringspot virus*, *Apple mosaic virus*, *Apple chlorotic leaf spot virus*, *Prune dwarf virus*, and PPV.

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