‘Dama Taronja’ and ‘Dama Rosa’ Apricot Cultivars that are Resistant to Sharka (*Plum pox virus*)

Maria L. Badenes¹, Jose Martínez-Calvo, Helena Gómez,
and Elena Zuriaga

*Instituto Valenciano de Investigaciones Agrarias (IVIA), CV-315, Km. 10,7
Moncada, Valencia 46113, Spain*

Additional index words. fruit breeding, *Prunus armeniaca*, sharka resistance, fruit quality

‘Dama Taronja’ and ‘Dama Rosa’ are mid-early ripening apricot cultivars (*Prunus armeniaca* L.) from the apricot breeding program at Instituto Valenciano de Investigaciones Agrarias (IVIA). They have optimal productivity, excellent fruit quality, and self-compatibility, and are resistant to sharka *Plum pox virus* (PPV), a serious limiting factor for apricot fruit production in affected areas. Their fruits have excellent organoleptic characteristics and are notably larger than the traditional Valencian cultivars. In the last five crop years, the Valencia area had fewer chilling hours in winter and less rain than usual. These two varieties showed well adaptability to these climate conditions in the Mediterranean area and are good candidates for breeding and research under a climate change scenario.

Origin

‘Dama Taronja’ resulted from a 1998 cross made at Valencia, Spain, using the North American cultivar Goldrich (a cross between ‘Sunglo’ × ‘Perfection’ bred at Washington State University) as the female parent and ‘Katy’, a North American cultivar from Zaigers Genetics, as the male parent. ‘Dama Rosa’ is a cross between ‘Goldrich’ as the female parent and ‘Ginesta’, a traditional Valencian cultivar of unknown origin, as the male parent (Fig. 1). The cultivar Goldrich is self-incompatible, with genotype S₁S₂ (Vilanova et al., 2005), which prevents self-pollination and cross-pollination from genotypes with the same alleles and provides resistance to sharka (Moustafa et al., 2001). It is a medium-high-chilling requirement cultivar (700 h below 7 °C before flowering), which makes its cultivation difficult in Mediterranean areas. ‘Katy’ and ‘Ginesta’ are self-compatible (Muñoz-Sanz et al., 2017), early season cultivars with an estimated 400 chilling hours. Both are suitable for warm winters in the Mediterranean climate, but susceptible to sharka disease.

Both crosses were made with the objectives of obtaining early-mid ripening, self-compatible cultivars with good fruit quality that are resistant to sharka. ‘Goldrich’, the source of resistance to sharka disease, had good fruit size and shorter chilling requirements than other resistant sources, an important factor under our Mediterranean climate conditions. ‘Ginesta’ and ‘Katy’ were used as male parents because of their early ripening, excellent fruit quality, and self-compatibility.

Description

Tree characteristics

Tree description. ‘Dama Taronja’ and ‘Dama Rosa’ were selected originally as seedling trees on their own roots. After selection, they were grafted onto apricot rootstock and studied in different climate zones in the Valencia area (four replications each). All trees received the same standard apricot orchard management. The data presented are the average of four crop years in the experimental plot located at IVIA (Valencia, Spain) (lat. 39°34’N, long. 0°24’W, alt. 55 m; Table 1). Trees of ‘Dama Taronja’ are vigorous, with a spreading habit. Vegetative budbreak occurs at the end of March (28 Mar.) and yield averages 65 kg/tree. ‘Dama Rosa’ is also vigorous with a spreading habit. Vegetative budbreak occurs during the third week of March (26 Mar.) and yield averages 90 kg/tree.

Plum pox virus resistance. Sharka disease, incited by the PPV, is a serious limiting factor for apricot production in areas where the virus is present (Kölber, 2001). It spreads across Europe in the 1970s, but was detected for the first time in Spain and Portugal in

1984. Since then, quick spread among apricot orchards has affected apricot production seriously. The disease is causing significant losses in Spain, France, and Italy (Roy and Smith, 1994). All native apricot cultivars from European germplasm are susceptible to PPV. Eradication of infection foci remains necessary, but is insufficient for control of the disease (Llácer and Cambra, 1998). In recent years, apricot production based on varieties susceptible to sharka is not possible in Spain because of the virus presence. However, several cultivars from North America, such as ‘Goldrich’, ‘Sunglo’, ‘Orange Red’, and ‘Stark Early Orange’, show resistance to PPV (Soriano et al., 2012).

‘Dama Taronja’ and ‘Dama Rosa’ were tested for resistance to sharka under controlled greenhouse conditions as described by Moustafa et al. (2001). Seedlings were grafted onto peach GF-305, previously infected with Dideron strain 3.3 RB, and used as the source of inoculum (Candresse et al., 1995). After 2 months cold treatment, the diffusion of the virus into the new shoots on the scion was tested by enzyme-linked immunosorbent assay and reverse transcription-polymerase chain reaction (RT-PCR). No symptoms or presence of the virus was detected using either analysis method. In addition, three trees from both cultivars were planted in a production area heavily infected with PPV and surrounded by susceptible varieties inoculated with PPV. The presence of the virus was assessed every year using RT-PCR and visual symptoms. No PPV symptoms were observed and no presence of the virus was detected. The plants remained free of infection after 10 years.

Time of bloom and floral compatibility. Full bloom of ‘Dama Taronja’ occurred on 6 Mar., 15 d after ‘Ginesta’ and 20 d before ‘Goldrich’ (Table 1). ‘Dama Taronja’ has high flowering intensity, 80% of which is localized on fruiting spurs of branches two or more years old, with self-compatible flowers. Full bloom of ‘Dama Rosa’ occurred on 5 Mar., between the flowering dates of its parents (Table 1). ‘Dama Rosa’ has very high flowering intensity, 90% of which is localized on fruiting spurs of branches two or more years old, with self-compatible flowers. The self-compatibility of these cultivars was confirmed in the laboratory using molecular markers as described (Muñoz-Sanz et al., 2017; Vilanova et al., 2005).

Fig. 1. Pedigree of ‘Dama Taronja’ and ‘Dama Rosa’ apricots.

Received for publication 19 Apr. 2018. Accepted for publication 5 June 2018.

¹Corresponding author. E-mail: badenes_mlu@gva.es or mbadenes@ivia.es.

Table 1. Comparative analysis of tree and fruit characteristics of ‘Dama Taronja’, ‘Dama Rosa’, ‘Ginesta’, ‘Katy’, and ‘Goldrich’ in an experimental plot at Instituto Valenciano de Investigaciones Agrarias, Valencia, Spain.

Characteristics	Dama Taronja	Dama Rosa	Ginesta ^z	Katy ^z	Goldrich
Tree					
Vigor	High	High	Medium	Medium	High
Veg. budbreak	28 Mar.	26 Mar.	3 Mar.	11 Mar.	1 Apr.
Flowering date (full bloom)	6 Mar.	5 Mar.	20 Feb.	23 Feb.	24 Mar.
Flower intensity	High	Very high	High	Very high	Medium
Floral compatibility	Self-comp.	Self-comp.	Self-comp.	Self-comp.	Self-incomp.
Productivity (1–9)	8	9	7	8	6
Fruit					
Ripening date	1 June	7 June	26 May	30 May	16 June
Skin ground color	Orange	Yellow-orange	Yellow	Yellow-orange	Orange
% Red blush	15–30	30–45	55	40–50	—
Intensity over color	Medium	High	High	High	—
Flesh color	Orange	Yellow	Yellow	Orange	Orange
Fruit size (g)	80	80	40	50	70
Firmness (kgf)	2.5	0.8	0.6	0.55	0.8
Soluble solids (°Brix)	15.5	15	15	11	13.5
Acidity (g/L malic acid)	22.1	20.2	22	20.5	24

^zVarieties susceptible to *Plum pox virus*.

Fig. 2. ‘Dama Taronja’ (left) and ‘Dama Rosa’ (right) apricot fruits. Scale bars in centimeters.

Fruit Characteristics

Ripening time. ‘Dama Taronja’ and ‘Dama Rosa’ are mid-early ripening cultivars in comparison with native Spanish apricot cultivars. Under our experimental conditions, the ripening dates for ‘Dama Taronja’ and ‘Dama Rosa’ were 1 June and 7 June, respectively (Table 1). ‘Dama Taronja’ and ‘Dama Rosa’ ripen moderately uniformly with no cracking. Fruits are localized mainly on fruiting spurs (90%) of ‘Dama Taronja’ and only on fruiting spurs (100%) of ‘Dama Rosa’.

Fruit size, firmness, and color. Fruit was characterized at physiological maturity, using a sample of 25 fruits from each cultivar. Fruits of ‘Dama Taronja’ are symmetrically rounded, with a light suture and smooth and pubescent skin, yellowish-orange skin ground color, and an intense red overcolor that covers 15% to 30% of the surface, orange flesh color, and a non-free stone (Fig. 2). ‘Dama Taronja’ fruits have an average size of 52 mm, weight of ≈80 g, and firmness of 2.5 kgf (4.9 kg·cm⁻²). Fruits of ‘Dama Rosa’ are rounded, symmetric, with a light suture and smooth and pubescent skin, yellow-orange skin ground color, solid red blush, and intense

overcolor that covers 30% to 45% of the surface, yellow flesh color, and a free stone. ‘Dama Rosa’ fruits have an average size of 55 mm, weight of 80 g, and firmness of 0.80 kgf (1.6 kg·cm⁻²).

Organoleptic characteristics. At maturity, ‘Dama Taronja’ and ‘Dama Rosa’ fruits are sweet (15.5 and 15.0 °Brix on average, respectively) and slightly acidic (22.1 and 20.2 g/L malic acid on average, respectively) (Table 1). ‘Dama Taronja’ and ‘Dama Rosa’ fruits have an excellent taste, juiciness, and typical apricot aroma.

Availability

The ‘Dama Taronja’ and ‘Dama Rosa’ cultivars are protected by the Spanish Office of Protected Varieties with the registration numbers 2009/4890 and 2009/4891, respectively. Plants are available from authorized nurseries. The plants are tested and free of the following viruses: PPV, *Prune dwarf ilarvirus* (PDV), *Prunus necrotic ringspot ilarvirus* (PNRSV), *Apple chlorotic leaf spot closterovirus* (CLSV), and *Apple mosaic ilarvirus* (ApMV).

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