'Antoñeta' and 'Marta' Almonds

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Self-compatibility is an increasingly important characteristic of new almond [*Prunus dulcis* (Mill.) D.A. Webb] cultivars, especially when the prevailing climatic conditions during bloom (low temperatures, wind, mist) are unsuitable for bee activity. Under these conditions, self-compatibility, together with a high degree of autogamy, can compensate for the absence of bee pollinators. Another advantage of self-compatibility is that it permits single cultivar orchards, eliminating the need for inter-compatible pollinizers with overlapping bloom periods. These characteristics have been incorporated into two late-blooming, self-compatible cultivars, Antoñeta and Marta, with good horticultural qualities.

Origin

'Antoñeta' and 'Marta' originated from a cross between 'Ferragnès' and 'Tuono' in 1985 (García et al., 1985). The seedlings were planted in the field in 1987 and evaluated for important horticultural characteristics (García et al., 1996). The orchard was in an area with cold winters (averaging between 1.5 and 11.5 °C), with late spring frosts and hot summers (averaging between 21.3 and 34.1 °C). The annual rainfall averaged 350 mm and only 250 mm of supplementary irrigation was applied. The selections were subsequently grafted onto almond rootstocks for commercial evaluation in several locations.

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Description

Tree characteristics

Vigor and growth habit. Trees of both 'Antoñeta' and 'Marta' are very vigorous, similar to 'Ferragnès'. The original trees, although originally grown close together with the other seedlings, had developed trunk diameters measuring 20 and 25 cm, respectively, after 13 years. 'Marta' is very erect with vigorous branches that are easily adapted to the Italian vase, with three or four primary branches. It produces very few lateral branches during the first years, leading to the development of thick, erect, primary scaffolds. The later development of lateral branches gives it a more balanced, not excessively dense appearance. 'Antoñeta' is more open, with more lateral branches on the scaffolds during the first stages of growth, even on nonpinched primary branches. Concerning growth habit and branching, 'Nonpareil' is intermediate between 'Antoñeta' and 'Marta'.

Productivity. The harsh conditions (cold with frequent frost) under which the evaluation was carried out made assessment of long-term productivity difficult. During years without frost, the yield was greater than that of commercial cultivars and other selections from the breeding program grown in the same orchard. In spite of the drought in 1999, the yield for 'Antoñeta' and for 'Marta' was very high.

Disease resistance. The climatic conditions of the area are favorable for brown rot (*Monilia laxa* Aderh.) and polystigma (*Polystigma occhraceum* Wahl.) Both cultivars had a greater resistance to brown rot than did 'Ferragnès'. Resistance to polystigma was similar to that of other cultivars. Fusicoccum (*Fusicoccum amygdali* Del.) and rust (*Tranzschelia pruni-spinosa* Pers.) infections were rare for selections.

Bloom characteristics

Flower. 'Marta' has a large flower with smooth, white petals and a straight style, with the stigma at anther height at anthesis. 'Antoñeta' has small flowers with white, wrinkled petals and a pistil bent downward so that the stigma just reaches the anthers at anthesis. The position of the stigma relative to anthers in both cultivars facilitates self-pollination. Both cultivars have twin floral

buds, which increases flower density, and abundant flowers, in excess of those produced by 'Ferragnès' and 'Ferraduel'.

Time of bloom. 'Antoñeta' and 'Marta' bloom close to the late-blooming cultivars, such as 'Guara', 'Ferragnès', 'Glorieta', and 'Masbovera'. 'Antoñeta' flowers 1 or 2 d, and 'Marta' 5 or 6 d, before 'Ferragnès', respectively and 2 and 6 d later than 'Nonpareil', respectively.

Self-compatibility and autogamy. The self-compatibility of both cultivars both in the field (bagging branches) and laboratory (observation of pollen tube growth) was thoroughly checked. The natural autogamy of both 'Antoñeta' and 'Marta' was followed for 3 consecutive years by bagging branches just prior to anthesis and recording the fruit set. 'Antoñeta' showed an autogamy rate of 40%, 34%, and 37%, and 'Marta' 23%, 24%, and 38%, in 3 consecutive years, respectively. Because of the high flower density, the high levels of autogamy guarantee a good yield even in the absence of pollinating insects.

Frost resistance. Both cultivars resemble the 'Tuono' parent in having good resistance to frost and produced good yields even when freezes occurred during full bloom or after fruit set. In 1998, for example, 'Antoñeta' yielded 14 kg and 'Marta' 19 kg in-shell after frost, while neither of the other siblings exceeded 5 kg.

Fruit characteristics

Fruit (Figs. 1 and 2). Both cultivars are hard-shelled with a kernel percentage of ≈35% for 'Antoñeta' and 32% for 'Marta'. The kernel weight, as calculated from the most abundant crops, was between 1.2 and 1.5 g for both cultivars. The kernel of 'Antoñeta' is round ('Marcona' type) while that of 'Marta' is elongated ('Desmayo Largueta' type). Mean width, length, and thickness were 17, 25, and 8 mm ('Antoñeta') and 15, 26, and 9 mm ('Marta'). The kernels of both cultivars are attractive, with a light brown seed coat.

Fig. 1. Fruits of 'Marta' and 'Desmayo Largueta'.

Fig. 2. Fruits of 'Antoñeta' and 'Marcona'.

Neither cultivar produces double kernels.

Maturation time. The maturation dates of 'Antoñeta' and 'Marta' are practically identical with that of the two most widely grown late-blooming cultivars in Spain. Maturation of 'Antoñeta', coincides with that of 'Guara' and 'Nonpareil', while 'Marta' matures 15 d later, with 'Ferragnès'. In our experimental conditions, 'Antoñeta' matures about 15 Aug. and 'Marta' toward the end of August.

Ease of harvesting and hulling. Both cultivars freely dropped their fruit after the branches were tapped with a rubber hammer, indicating that fruits can be collected using shakers without undue damage to the trees. Fruits were not observed to fall before harvest in either cultivar even after ripening. The hull of both cultivars is easily removed.

These results suggest that 'Antoñeta' and 'Marta' may be good cultivars for frost-prone areas because of their self-compatibility, late bloom, frost resistance, high degree of auto-

gamy, high yield and good quality kernel. Both cultivars appear to be very promising and their introduction should stimulate almond production.

Availability

Budwood will be available in 2000 from Centro de Edafología y Biología Aplicada del Segura—Consejo Superior de Investigaciones Científicas (Spain). Both cultivars are patented.

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