‘Famoso’, a New Male Pistachio Cultivar to Replace ‘Peters’

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‘Famoso’ is a new male pistachio (*Pistacia vera* L.) cultivar developed to replace ‘Peters’ in California ‘Kerman’ plantings. ‘Kerman’ is the primary female pistachio cultivar grown in California. ‘Kerman’ does not always flower on the same dates as ‘Peters’, especially during the years when winter chilling is limited. ‘Famoso’ flowers at about the same time as ‘Peters’ in normal years, but it’s bloom better overlaps the receptivity of ‘Kerman’ female inflorescences in both low- and high-chill years. We released ‘Famoso’ because ‘Peters’ had irregular and nonsynchronous bloom in recent years. ‘Kerman’ and ‘Famoso’ typically bloom between 1 Apr. and 20 Apr. in San Joaquin Valley of California. ‘Famoso’ will also be a good pollinizer for other mid- to later season female pistachio cultivars in California. ‘Famoso’ produces a large quantity of high-quality pollen from many flowers.

Origin

‘Famoso’ is a clone, selected from a full-sib seedling population in the University of California’s pistachio breeding program led by D.E. Parfitt, J. Maranto, and C. Kallsen. The female parent, selection 2-35, was originally selected by J. Crane in the 1970s. The male parent, selection ES#4, is an early flowering male of unknown parentage. ‘Famoso’ was selected from a progeny of 32 seedlings in a selection plot near Famoso, CA (Chao et al., 1998).

Description

‘Famoso’ is being released to provide better pollination for ‘Kerman’ than is provided by the standard ‘Peters’ male. ‘Kerman’ is the primary female pistachio cultivar grown in California and ‘Peters’ is the standard male cultivar used to pollinize ‘Kerman’. ‘Famoso’ has a flowering period coincident with ‘Kerman’, whereas ‘Peters’ often flowers later than ‘Kerman’, and pollen shed

does not overlap the female receptivity of ‘Kerman’ in years with low chilling hour accumulation, such as 2014–15. Some growers have grafted ‘Randy’, an early flowering male, into ‘Kerman’ orchards, to help cover the pollination period of ‘Kerman’. However, during most years ‘Randy’ flowers too early to pollinize ‘Kerman’. ‘Famoso’ is more precocious than ‘Peters’ and produces flowers 3–4 years after budding compared with ‘Peters’, which typically takes 4–5 years (personal observation). ‘Famoso’ has a large number of flowers and produces large quantities of high-quality pollen over a long period of time.

Tree. The tree, grafted to UCB1 or PG1 rootstock, is similar in character to other pistachio male cultivars, 5–10 m tall, with multiple scaffold branches at 60°–80° angle from vertical. Trunks are 10–20 cm in diameter at 10 years (Fig. 1). Bark is gray (202C to 202D). Colors are referenced to the color samples of the Royal Horticultural Society Color Chart (R.H.S. color chart, 1966).

Leaves. Leaves are deciduous simple compound imparipinnate with one or two pairs of oppositely arranged lateral leaflets. Leaflet margins are entire to slightly crenate. Leaflets vary considerably in shape, but are generally oval to ovate, 5–8 cm long, with cuspidate to rounded tips and rounded base (Fig. 2). Margins of leaf blades are entire. Leaf surfaces are glabrous, smooth, and waxy. Color ratings from three or more mature leaves were 137B for the upper surface of mature leaves, 137B to 137C for lower surfaces, 137A to 137B for top surfaces of new leaves, 139C for lower surfaces, and 145C for midribs (Fig. 2), and for new leaves 138B to 139C, and 139C for the lower surface. Leaf midrib color was 143C.

Flowers. Inflorescences are similar to ‘Randy’ or ‘Peters’ male pistachios (Fig. 3), described in Parfitt et al. (2010). Male inflorescences are borne laterally on branches, rarely as terminal buds on 1-year-old wood. The flower buds form a branched compound panicle inflorescence. Panicles are 2–5 cm long when fully expanded and shedding pollen. Flowers develop from the base to tip of the panicle over a period of several weeks. ‘Famoso’ inflorescences have an

orange-reddish appearance 31B to 43A or 43B, especially on the outer surface. Individual flowers are 1–2 mm long. Tips and outside of individual male flowers are pinkish red 39B to 39C, changing to yellow 11C to 12D or 13C near the base of the panicles before the opening of individual flowers. Flowers do not have petals and have five to

Fig. 1. ‘Famoso’ in a cultivar trial on the east side of the San Joaquin Valley, showing tree size and large number of inflorescences.

Fig. 2. ‘Famoso’ leaves used for color evaluation.

Fig. 3. ‘Famoso’ inflorescences, showing typical arrangement of flowers at anthesis.

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Table 1. Midbloom flowering date of male cultivars at two locations in the southern San Joaquin Valley of California. Bloom dates are before (–) or after (+) ‘Kerman’ midbloom.

Location	Yr	Days before or after ‘Kerman’			
		‘Kerman’	‘Famoso’	‘Randy’	‘Peters’
Famoso, CA	2007	0	0	–1	
Tejon R., CA	2007	0	–4	0	
Famoso, CA	2008	0	–1	–9	
Tejon R., CA	2008	0	–2	–5	
Famoso, CA	2009	0	0	–6	
Tejon R., CA	2009	0	–3	–6	
Famoso, CA	2010	0	–2	–7	
Tejon R., CA	2010	0	–3	–7	
Famoso, CA	2011	0	–1	–4	
Tejon R., CA	2011	0	–2	–5	
Famoso, CA	2014	0	4		>5
Famoso, CA	2015	0	3	3	7
Famoso, CA	2016	0	–1	–7	0
Famoso, CA	2017	0	–4	–7	–4
Mean		0	–1.1	–4.7	2.0
SD		0	2.3	3.4	

Table 2. Pollen germination evaluated directly after pollen collection in 2014–16. General linear models analysis, cultivar by year means, and pairwise comparisons (Tukey and Bonferroni at 95% confidence level).

Source	df	MS ($\times 10^{-2}$)	F	P value
Year	2	21.27	0.40	0.694
Cultivar	2	6.91	1.42	0.340
Cultivar $\times$ year	4	5.37	11.30	0.000
Error	62	0.48		

Cultivar	Yr	Germination mean (%)	95% Tukey comparisons	95% Bonferroni comparisons
Famoso	2015	86.50	a	a
Peters	2015	84.00	a	a
Randy	2016	80.00	abc	abc
Famoso	2016	78.30	abc	abc
Peters	2014	78.00	ab	ab
Peters	2016	77.00	abc	abc
Famoso	2014	71.50	bc	bc
Randy	2014	67.50	cd	cd
Randy	2015	59.20	d	d

six stamens each with four lobes (Hormaza and Polito, 1996). Pollen is shed from the terminal ends of the stamens.

Performance

Flowering dates. Flowering was scored from the observation of the number of inflorescences shedding pollen and the relative number of flowers per inflorescence shedding pollen. Mean flowering dates relative to ‘Kerman’ are shown for ‘Famoso’, ‘Randy’, and ‘Peters’ (Table 1). The dates are the means of 10 years for ‘Famoso’ and ‘Randy’ and the most recent 4 years for ‘Peters’. ‘Randy’ flowered about 4 d before ‘Famoso’ and ‘Famoso’ flowered 1 d before ‘Kerman’. In years with normal-chill accumulation, ‘Famoso’ flowers 0–7 d before ‘Peters’. During low-chill year 2015, ‘Famoso’ and ‘Randy’ had similar flowering dates that overlapped the flowering period of ‘Kerman’, whereas ‘Peters’ flowered much later. Although the bloom of ‘Randy’ and ‘Kerman’ may overlap in low-chill years, ‘Randy’ flowers too early for good pollenization of ‘Kerman’ in years with normal chilling. ‘Famoso’ is intermediate to ‘Randy’ and ‘Peters’ for flowering date, but more similar to ‘Peters’ in normal-chill years and, thus, can overlap ‘Kerman’ in both higher and

lower chilling seasons. ‘Famoso’ also begins flowering more precociously than ‘Peters’ (1–2 years sooner), so that pollen is available when ‘Kerman’ first comes into production.

Pollen viability and durability. Pollen viability was evaluated from 2014 through 2016 for ‘Famoso’, ‘Randy’, and ‘Peters’ using hanging drop germination tests. Pollen was sprinkled onto cover slides with a drop of 18% sucrose and inverted to create a hanging drop for counting with a microscope. Four to 12 slides ($\mu = 8$) were counted per cultivar-year. Fifty to 80 pollen grains were counted per slide. A general linear models analysis was performed with MiniTab17.3.1 (Minitab, Inc., 2016); cultivars were fixed effects and years were random. Main effects were not significant but cultivar-by-year interactions were significant (Table 2). However, as shown by Tukey and Bonferroni pairwise comparisons, significant differences were primarily seen in 2015, which were conditioned by an unusually warm 2014–15 Winter. ‘Famoso’ pollen viability was high (from 71% to 86%) in all years, similar to ‘Peters’ and sufficient to ensure pollination of ‘Kerman’ or other female cultivars.

Pollen quantities. During Mar. 2015 and 2016, branches from several cultivars with dehiscing inflorescences were collected and brought to the laboratory for pollen collection.

Fig. 4. Pollen shed from inflorescences of ‘Famoso’ and ‘Peters’. All shoots were collected on the same date (20 Mar. 2014).

Three groups per cultivar of four to five shoots of length 8–12 inch with dehiscing inflorescences per group were placed on craft paper overnight. Pollen was collected the following morning (Fig. 4). Pollen from each group was collected and weighed. Pollen weights were normalized by dividing with the number of actively dehiscing inflorescences in each group. Data were subjected to analysis of variance with years considered random effects and cultivars fixed effects. Year and cultivar main effects were not significant at $P = 0.05$, but significant interaction effects occurred (Table 3). In 2016, ‘Famoso’ produced twice as much pollen as the other two cultivars. Pollen production was very low for all cultivars in 2015 (0.02 g/inflorescence vs. 0.11 in 2016), possibly due to lack of chilling in 2014–15 having a general negative impact on flower/pollen development. Therefore, the normal complement of 1:24 male:female tree ratio in orchards may not be sufficient if low chill years become frequent as suggested by Luedeling et al. (2009) and Luedeling (2012). Male:female synchrony could be even more important than it is at present if pollen quantities are reduced.

Pollen shed is dependent on day-to-day weather conditions and collection date vs. the mean flowering date as well as the number of flowers and tree size, so differences among cultivars on any particular date are expected to be highly variable. However, from our observation of adjacent trees, ‘Famoso’ appears to produce more abundant flowers and

Table 3. Mean weight of pollen (grams/inflorescence), adjusted for number of inflorescences sampled. General linear models analysis, cultivar by year means, and pairwise comparisons (Tukey and Bonferroni at 95% confidence level).

Source	df	MS ($\times 10^{-2}$)	F	P value
Year	1	3.50	6.05	0.133
Cultivar	2	0.46	0.80	0.556
Cultivar $\times$ year	2	0.59	6.70	0.011
Error	12	0.09		
Cultivar	Yr	Mean g/inflorescence ($\times 10^{-2}$)	95% Tukey comparisons	95% Bonferroni comparisons
Famoso	2016	17.47	a	a
Peters	2016	8.43	b	b
Randy	2016	6.53	b	b
Peters	2015	2.86	b	b
Randy	2015	1.62	b	b

pollen as a young tree than ‘Peters’. ‘Famoso’ produced more pollen over a reasonably extended period (19, 14, and 20 d, respectively, at the Famoso California test location, in 2009, 2010, and 2011).

Application and Use

‘Famoso’ has very good initial pollen viability and a flowering period that is highly coincident with the ‘Kerman’ flowering period during both low-chill and normal chilling years, whereas ‘Peters’ often flowers during the latter part of the ‘Kerman’ bloom period in years with marginal or low chill.

‘Famoso’ is a better pollenizer for ‘Kerman’ because its flowering times are synchronized in high-chill and low-chill years, whereas ‘Peters’ flowers much later in low-chill years. It should also be a superior pollenizer for ‘Kerman’ because pollen will be available when ‘Kerman’ first comes into bearing.

Availability

An application for a U.S. plant patent was submitted on 4 Apr. 2016. Budwood of ‘Famoso’ was distributed to California nurseries and commercial budders in 2016. Trees and budwood should be available in small

quantities from those sources beginning in 2018. Lists of nurseries producing ‘Famoso’ will be available at the UC Davis Technology Transfer Services, UC Davis Innovation Access, 1850 Research Park Drive, Suite 100, Davis, CA 95618-6159, www.research.ucdavis.edu/InnovationAccess.

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