'Tulare' Persian Walnut

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'Tulare', formerly UC67-11, is released as a new Persian walnut (*Juglans regia* L.) scion cultivar suitable for hedgerow and other high-density planting systems. This is a laterally fruitful cultivar that leafs out in mid-season and sheds pollen during most of its female bloom period. It has an upright growth habit and has produced excellent yields in high-density plantings.

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Origin

'Tulare' resulted from a controlled pollination in 1966 by Harold Forde between the Persian walnut cultivars Tehama and Serr. The female parent 'Tehama' originated from a cross in 1957 between 'Waterloo' and 'Payne'. The male parent 'Serr' originated from a cross between Plant Introduction 159568 and 'Payne' in 1958. Both parents were released by the Univ. of California in 1968 (Serr and Forde, 1968).

Description

'Tulare' was first evaluated in 1971 as a seedling in its fifth leaf. Two years later, because of its promising attributes, it was grafted on to two northern California black walnut [*J. hindsii* (Jeps.) Jeps.] and two Paradox walnut (*J. hindsii* × *J. regia*) rootstocks in the Univ. of California, Davis, selection block at 9.1 × 9.1 m spacing. These grafted

trees have been evaluated from their third leaf (1975) until the present. The traits and method of evaluation have been described (Forde, 1975).

In 1983, 'Tulare' was grafted on *J. hindsii* rootstock in a hedgerow trial at 3.0 × 6.1 m spacing with 14 other cultivars/selections arranged in a randomized complete-block design comprised of three blocks and nine trees of each genotype per block. The trial was located in Tulare County, Calif. Nut yields were measured annually from 1986 until the present. In 1985, a similar trial was initiated in Yolo County, Calif., with 13 cultivars at 3.7 × 7.3 m spacing on *J. hindsii* rootstock with four blocks and 10 trees of each genotype per block. Yields were measured annually beginning in 1988. Both trials included the four cultivars that are currently recommended for hedgerow systems (Greenfelder et al., 1989).

'Tulare' is characterized by an upright growth habit, moderate vigor, good male/female bloom overlap, and precocious and heavy nut production. Important phenological, fruiting, and nut traits, compiled for 10 years (1981-90), from the Univ. of California, Davis, orchards are summarized in Table 1. Data on 'Chico', a recommended hedgerow cultivar (Greenfelder et al., 1989), are included for comparison. Phenologically, 'Tulare' is a midseason cultivar, similar to 'Hartley' (i.e., later than 'Payne' and

Table 1. Comparison of 'Tulare' and 'Chico', 1981-90.

Trait	Tulare		Chico	
	Mean	Range	Mean	Range
Leafing date	28 Mar.	18 Mar.-9 Apr.	17 Mar.	6-24 Mar.
First female bloom	7 Apr.	27 Mar.-22 Apr.	23 Mar.	11 Mar.-4 Apr.
Peak female bloom	16 Apr.	6-28 Apr.	31 Mar.	18 Mar.-18 Apr.
Last female bloom	25 Apr.	19 Apr.-3 May	12 Apr.	2-22 Apr.
First pollen shed	1 Apr.	19 Mar.-18 Apr.	4 Apr.	24 Mar.-24 Apr.
Last Pollen shed	22 Apr.	11-29 Apr.	20 Apr.	11-29 Apr.
Harvest	22 Sept.	9 Sept.-4 Oct.	14 Sept.	2-20 Sept.
Lateral fruitfulness	78%	60%-90%	91%	70%-100%
In-shell yield ^z	6.0	5-7	6.4	5-8
In-shell wt (g)	13.3	11.2-14.8	10.7	9.1-12.1
Kernel wt (g)	7.1	5.5-8.0	5.0	4.2-5.6
Kernel (%)	53.3	48.7-56.2	46.6	43.7-51.4
Light-colored kernels	75%	30%-100%	69%	50%-100%
Shell texture	Medium	Medium-rough	Medium	Medium-smooth
Shell color	Medium	Medium-dark	Medium	Medium-light

^zBased on a 0-9 scale, with 9 being unusually high yield.

Table 2. In-shell nut yield of 'Tulare' walnut in comparison with 'Chandler', 'Howard', 'Chico', and 'Vina' from the fourth to eighth leaf after grafting (198690) in Tulare County.

Cultivar	Yield (kg·ha ⁻¹) ^z				
	1986	1987	1988	1989	1990
Tulare	2500 bc ^y	6490 a	7770 a	7100 a	6830 a
Chico	2920 ab	5990 ab	4650 b	7060 a	4010 b
Vina	3090 ab	4880 bc	4760 b	5490 b	3960 b
Chandler	3380 a	4240 cd	4340 b	3180 c	4990 b
Howard	2010 c	3390 d	3900 b	3430 c	4650 b

^zBased on 519 trees/ha.

^yMean separation in columns by Duncan's multiple range test, *P* = 0.05.

Fig. 1. 'Tulare' Persian walnut cultivar.

'Chico', but earlier than 'Cisco' and 'Franquette'). Male bloom consistently overlaps peak female bloom in mature trees and covers an average of 80% of the entire female bloom period. Nearly all shoots from terminal buds and >75% of the shoots from lateral buds produce pistillate flowers. Pistillate flower abscission (Catlin et al., 1987) has been low, ranging from an average of 5% in 1989 to 14% in 1990 (P. Catlin, personal communication). 'Tulare' is precocious with pistillate flowers appearing in the second leaf and male flowers in the fourth leaf from grafting.

The shell (Fig. 1) is rougher and somewhat darker than that of 'Chico'. Nut shape is almost round (36 × 40 mm) and slightly flattened on the stem end. Nut and kernel are large, ≈2 g heavier than those of 'Chico' (Table 1). Kernel color averages ≈75% "lights" according to the California Dried Fruit Assn. (Stockton) color chart.

A distinguishing attribute of 'Tulare' is its suitability to hedgerow systems, which are becoming increasingly popular in California. These are systems in which trees are planted more closely within the row than is standard practice and are mechanically pruned so as to produce a wall of fruit-bearing shoots. For optimum performance in hedgerow plantings, cultivars should exhibit upright growth, moderate vigor, lateral bearing habit, and precocity (Greenfelder et al., 1989). The most promising hedgerow cultivar in the past was 'Chico' (Greenfelder et al., 1989), but its small nut size has made it unpopular with processors. 'Tulare' combines the positive attributes of 'Chico' with a larger nut and later leafing date (Table 1). Yields of 'Tulare' in hedgerow trials also have been superior (Table 2). In the Tulare County trial, there were highly significant differences in yield due to cultivar every year. From the 4th year from grafting (1986) until 1990, 'Tulare' ranked higher in yield than any of the four cultivars heretofore recommended for high-density plantings (Table 2). In the Yolo County trial, 'Tulare' ranked higher than those four in 1990 (6th year from graft) but lower than 'Chico' in 1989 and lower than either 'Chico' or 'Vina' in 1988.

Availability

Small amounts of grafting or budwood are available from the authors.

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