New Walnut Cultivars: Maras 18, Sutyemez 1, and Kaman 1

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Walnuts are one of several fruit species indigenous to Turkey, which has a long history of fruit cultivation (Şen, 1986). Turkey has 11 million walnut trees with an annual production of 210,000 t, and is

ranked fourth among the walnut-producing countries of the world (Sutyemez, 2015). Three new walnut cultivars with superior fruit yield and quality were developed through positive mass selection using

selected genotypes from the Kahramanmaras and Kaman regions of Turkey.

Origin

In the first phase of the breeding program, 170 genotypes were selected among 200,000 genotypes grown from seed in the Kahramanmaras and Kaman regions. In the second phase, an orchard was created using the 170 genotypes and grafting studies were conducted. Of the genotypes studied in the second phase, 25 were determined as promising. Through further selection, three genotypes were selected and patented. The other promising genotypes are still under study. This study was carried out between 1994 and 2010 (Sutyemez, 1998). The Walnut Breeding Program of Kahramanmaras Sutcu Imam University released the three new cultivars as Maras 18, Sutyemez 1, and Kaman 1 in 2009 and 2010.

Method

Phenological and pomological evaluations were carried out according to the International Plant Genetic Resources Institute criteria during each step of the breeding program. (Anonymous, 1994; Hendricks et al., 1985; UPOV, 1999).

Description

Maras 18. This cultivar is characterized by a high yield after 8 years of growth and by an early harvest date ≈3 weeks before ‘Chandler’ (Table 1). The cultivar is resistant to codling moth (*Cydia pomonella*). Leafing occurs 2 weeks before ‘Chandler’. Male and female flowers are borne mostly on lateral shoots. Lateral buds are 75% fruitful. ‘Maras 18’ is protandrous with a large percentage of male and female overlap (Table 1; Fig. 1). Potential pollinizers include ‘Bilecik’, ‘Chandler’, and

Table 1. Tree and phenological characteristics of walnut cultivars.

Characteristics	Maras 18	Sutyemez 1	Kaman 1	Chandler ^z
Date of budbreak	4–8 Apr.	2–6 Apr.	6–10 Apr.	13–16 Apr.
Harvest date	9–12 Sept.	11–14 Sept.	18–20 Sept.	3–10 Oct.
Defoliation date	1–4 Nov.	3–5 Nov.	5–9 Nov.	3–10 Dec.
Seedling vigor	High	High	High	Intermediate
Tree vigor	High	High	High	High
Growth habit	Semierect	Semierect	Spreading	Semierect
Branching	Intermediate	Dense	Dense	Dense
Leaflet shape	Broad elliptic	Broad elliptic	Broad elliptic	Broad elliptic
Leaf color	Green	Green	Green	Green
Rachis color	Yellow	Yellow	Yellow	Yellow
Shoot pubescence	Glabrous	Glabrous	Glabrous	Glabrous
Shoot color	Green	Green	Green	Green
Leaf and rachis pubescence	Glabrous	Glabrous	Glabrous	Glabrous
Leaf and/or rachis persistence	Intermediate	Intermediate	Intermediate	Intermediate
Dichogamy	Protandry	Protogyny	Protogyny	Protandry
Duration of female bloom overlapped by the staminate bloom (%)	10	20	10	10
Catkin abundance	Intermediate	Heavy	Heavy	Heavy
Lateral bud flowering (%)	75–80	70–75	75–80	85–90
Female flower abundance	Intermediate	Intermediate	Heavy	Heavy
Stigma color	Yellow	Yellow	Yellow	Yellow
Hull persistence after nut fall	Slight	Slight	Slight	Slight
Hull dehiscence	Dehiscent	Dehiscent	Dehiscent	Dehiscent
Estimated yield	Intermediate	Intermediate	High	High

^zReference cultivar: Chandler.

Fig. 1. Relationship of pollen-shedding period to time of peak pistillate bloom.

‘Sutyemez 1’. Nuts are light colored, smooth, large, and round with good seal strength. Dehydrated nut weight is around 13–15 g. Kernels of ‘Maras 18’ are light colored, easy to remove from the shell, and at 7–9 g, make up 53% to 57% of the whole fruit (Table 2). Nuts are harvested around the 2nd week of September in Kahramanmaraş region. The kernel is easily removed from the shell as a whole or as two halves, resulting in a very high ratio of intact kernels (Table 2), which is considered as an important quality characteristic of a walnut cultivar (Fig. 2). The kernel is edible even before full maturation, which is preferred by some consumers and classified as “fresh walnut.” According to consumer opinions, ‘Maras 18’ has a more pleasant aroma and taste compared with ‘Chandler’.

Sutyemez 1. This cultivar bears flowers mostly on laterals (70%) and fruit yield is high. Leafing out occurs 20 d earlier than ‘Chandler’ and harvest date is 23 d earlier than ‘Chandler’ (Table 1). The cultivar is moderately resistant to the codling moth and walnut blight disease. ‘Sutyemez 1’ is protogynous (Fig. 1) and suggested pollinizer is ‘Sebin’. The cultivar has high quality and very large nut size averaging 25–27 g (Fig. 2). Kernels make up $\approx 49\%$ to 51% of the total nut weight and are extra light colored with a smooth surface (Table 2). Sensory analyses have given high scores to ‘Sutyemez 1’. Consumers appreciate the cultivar also because it has a smooth and very large nutshell (Fig. 2).

Kaman 1. The cultivar was produced by selective breeding (Sutyemez, 1998) in the region of Kırşehir, Kaman, Turkey. The cultivar has a high kernel percentage, and bears flowers mostly laterally (80%). The cultivar leafs out 10 d before ‘Chandler’ and fruits are harvested 15 d before ‘Chandler’ (Table 1). The cultivar has a small ratio of a leaf blight scores. ‘Kaman 1’ is protogynous (Fig. 1) and suggested potential pollinizers are ‘Franquette’, ‘Bilecik’, ‘Pedro’, and ‘Şen 2’. The nut shape of the cultivar is very unique and can be easily distinguished from the other cultivars (Fig. 2). Nuts of this cultivar weigh around 13–14 g, and have a medium-rough surface. The kernel is light colored, weighs around 7–8 g, and makes up $\approx 52\%$ to 57% of the total nut weight (Table 2). Sensory analyses have given high scores to ‘Kaman 1’ as well.

Availability

The cultivars are recommended for all walnut-growing regions in Turkey except for where early spring frost risk is high.

Grafts, budwoods, and saplings of cultivars Maras 18, Sutyemez 1, and Kaman 1 are

Table 2. Nut characteristics of walnut cultivars.

Characteristics	Maras 18	Sutyemez 1	Kaman 1	Chandler ^z
Nut shape	Ovate	Long trapezoid	Other	Ovate
Nut diameter (mm)	35.10	42.39	31.38	33.28
Nut length (mm)	41.50	51.04	36.90	35.47
Shell texture	Smooth	Smooth	Medium	Rough
Shell color	Very light	Very light	Medium	Medium
Shell seal	Intermediate	Intermediate	Intermediate	Intermediate
Shell strength	Intermediate	Intermediate	Intermediate	Intermediate
Shell integrity	Complete shell	Complete shell	Complete shell	Complete shell
Shell thickness	1.36	1.52	1.48	1.42
Packing tissue thickness	Medium	Medium	Medium	Medium
Nut: shape in longitudinal section through suture	Broad ovate	Broad trapezium	Broad ovate	Ovate
Nut: shape in longitudinal section perpendicular to suture	Broad ovate	Broad trapezium	Broad trapezium	Broad trapezium
Nut: shape in cross section	Circular	Elliptic	Circular	Circular
Nut: shape of base perpendicular to suture	Rounded	Truncate	Truncate	Truncate
Nut: shape of apex perpendicular to suture	Pointed	Emarginate	Truncate	Emarginate
Nut: prominence of apical tip	Strong	Medium	Medium	Weak
Nut: depth of groove along pad on suture	Medium	Shallow	Medium	Medium
Nut: structure of surface of shell	Slightly grooved	Slightly grooved	Slightly grooved	Slightly grooved
Nut: thickness of primary and secondary membranes	Thin/thin	Thin/thin	Thin/medium	Thin/thin
Nut: adherence of two halves of shell	Medium	Medium	Medium	Weak
In-shell nut weight (g)	13–15	25–27	13–14	12–14
Kernel weight (g)	7–9	12–14	7–8	6–7
Kernel percentage (%)	53–57	49–51	52–57	48–51
Kernel veins (%)	Smooth	Smooth	Intermediate	Smooth
Kernel flavor	Very satisfactory	Satisfactory	Satisfactory	Satisfactory
Kernel fill	Well	Well	Well	Well
Kernel plumpness	Plump	Plump	Plump	Plump
Ease of removal of kernel halves	Very easy	Very easy	Very easy	Very easy
Kernel shrivel (%)	0	0	0	0
Kernel color	Light	Light	Light	Extra light

^zReference cultivar: Chandler.

Fig. 2. Fruits of ‘Maras 18’, ‘Sutyemez 1’, ‘Kaman 1’, and ‘Chandler’ walnut cultivars.

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