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

**Mehmet Sutyemez**[1]
*Department of Horticulture, Faculty of Agriculture, University of Kahramanmaras Sutcu Imam, Kahramanmaras, Turkey*

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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 (Sütyemez, 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.

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 |

[z]Reference cultivar: Chandler.

## 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 (Sütyemez, 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

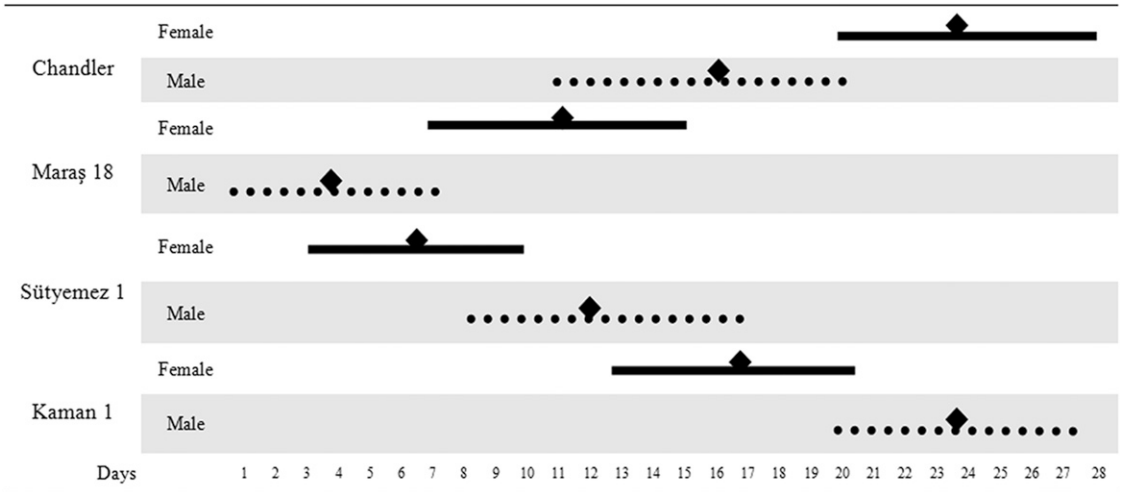


Fig. 1. Relationship of pollen-shedding period to time of peak pistillate bloom.

'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 Kahramanmaras 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 ≈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 (Sütyemez, 1998) in the region of Kırsehir, 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 ≈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 grove 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 |

[z]Reference cultivar: Chandler.

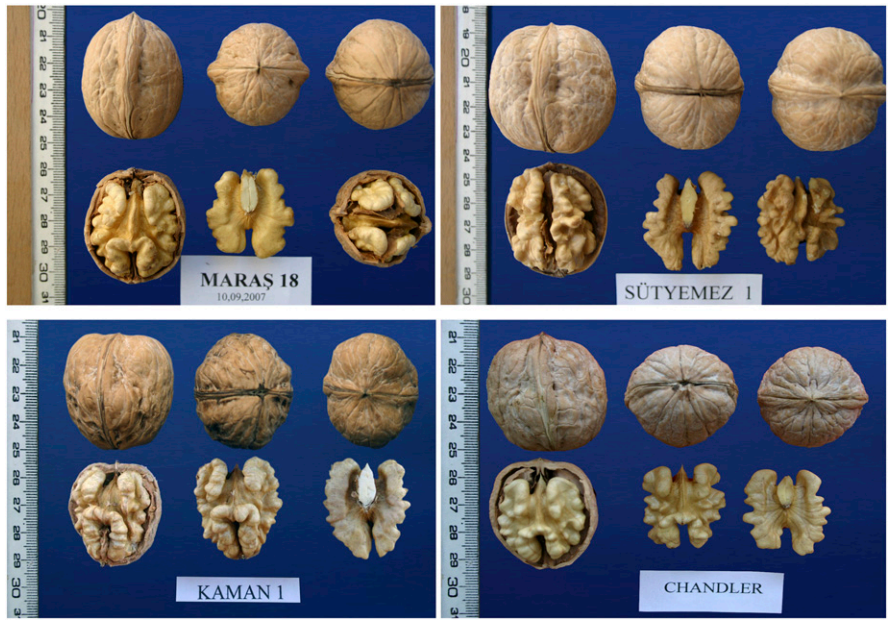


Fig. 2. Fruits of 'Maras 18', 'Sutyemez 1', 'Kaman 1', and 'Chandler' walnut cultivars.

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[1]Corresponding author. E-mail: sutyemez@ksu.edu.tr.

available through the Foundation Seed and Plant Materials Service of Kahramanmaras Sutcu Imam University, Kahramanmaras, Turkey.

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