

‘Ourania’ Walnut

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In the Department of Nut Trees of the Hellenic Agricultural Organization (HAO)-Dimitra, a significant effort has been made, from 1985 until today, to create new, remarkable walnut varieties with high productivity and good fruit quality that are suitable for the soil and climatic conditions of Greece. Through these endeavors and specific crosses, a lateral-bearing cultivar has emerged with satisfactory characteristics: ‘Ourania’. This is a new walnut (*Juglans regia*) cultivar of Greek origin created by a cross between ‘Hartley’ and ‘Gustine’. It is a mid-to-late cultivar, with pomological characteristics similar to ‘Hartley’, but it presents a high, lateral bearing habit. It is a walnut cultivar of high importance not only for the region of Greece, but also for other countries. It is suitable for cultivation in semimountainous and mountainous areas, where the last spring frost occurs in mid-April.

Origin

‘Ourania’ is a new walnut cultivar, a cross between ‘Hartley’ (maternal parent) and ‘Gustine’ (paternal parent). The cross was made in 1993 at the Department of Nut Trees of the Institute of Plant Breeding and Genetic Resources of HAO-Dimitra by researcher Dimos Rouskas. ‘Hartley’ was selected because of its high productivity, although it presents a low (5% to 10%) lateral bearing habit, whereas ‘Gustine’ was selected because of its high, fruitful lateral bearing habit (85% to 90%). The objective of our research is to provide information about the new lateral cultivar Ourania and to evaluate it in comparison with ‘Chandler’, the top-selling walnut cultivar, and its high-yielding paternal ‘Hartley’, in regard to its pomological and phenological characteristics.

Method

The study was carried out at the Department of Nut Trees in Lamia, Fthiotida, Greece (lat. 38°49’36”N; long. 22°26’27”E; eleva-

tion, 15 m; slope, ≈1%). The experimental orchard was planted on clayey soil (clay, 52% to 56%; silt, 32% to 36%; sand, 8% to 14%). All cultivars studied are kept in collections at the department for systemic evaluation. Phenological and pomological traits (Tables 1 and 2) of the cultivars included in the trial were collected between 2010 and 2019, and were evaluated according to the International Plant Genetic Resources Institute (1994) and the International Union for the Protection of New Varieties of Plants (1999) criteria. ‘Chandler’ and ‘Hartley’ established in the same collections of the Department of Nut Trees were included in the trial as reference cultivars.

Description

Phenological evaluation. ‘Ourania’ is a high-yield cultivar when it comes to full production at 9 years of age, with an estimated yield of 29.00 kg/tree. This cultivar presents 80% lateral bearing habit, whereas that of its maternal ‘Hartley’ has been found to be 5% to 10%, and its paternal ‘Gustine’, 85% to 90%. ‘Ourania’ trees present intermediate vigor, a semierect growth habit, and dense branching, similar to ‘Chandler’ and ‘Hartley’ (Table 1). Budbreak occurs on 6 Apr. ± 8.22 d, depending on climatic conditions, at the same date as ‘Chandler’ and 1 d earlier than ‘Hartley’. Its first female flowers bloom on 24 Apr. ± 6.15 d, 3 d and 1 d earlier than ‘Chandler’ and ‘Hartley’, respectively. The last female flowers bloom on 6 May ± 4.76 d, 3 d earlier than ‘Chandler’ and on the same date as ‘Hartley’. The first male-flower bloom date is the same as ‘Chandler’ (18 Apr. ± 7.82 d) and 1 d later than ‘Hartley’. The last male-flower bloom date occurs on 28 Apr. ± 5.66 d, the same date as ‘Hartley’ and 1 d earlier than ‘Chandler’. Harvest of nuts occurs ≈29 Sept., similar to ‘Hartley’, and 4 d earlier than ‘Chandler’ (Table 1). Flowering of ‘Ourania’ is protandrous, with the first catkins appearing at 4 years and the first female flowers appearing at 1 year. It presents easy hull dehiscence (similar to ‘Chandler’ and ‘Hartley’) low sunburn susceptibility of the hull, intermediate susceptibility to the codling moth (*Cydia pomonella* L.), and a very low susceptibility to walnut blight (*Xanthomonas campestris*) (Table 1).

Pomological traits. Fruit characteristics are presented in Table 2 and were collected over 10 consecutive years. Measurements concerning nut dimensions and weights are

presented as mean ± SD. The ‘Ourania’ nut has a medium size and a triangular shape, similar to ‘Hartley’. The shell texture is rough and light in color, with intermediate shell integrity. The nut shape in a longitudinal section through the suture and in a longitudinal section perpendicular to suture is triangular. The shape in cross-section is oblate; the shape of the base perpendicular to the suture is truncate. The shape of the apex perpendicular to the suture is pointed; the prominence of the apical tip is medium. The position of the pad on the suture is found on the upper two-thirds of the nut, the prominence of the pad on the suture is strong, the width of the pad is broad, and the depth of the groove along the pad on the suture is medium. The structure of the surface of the ‘Ourania’ nutshell is slightly grooved. Nuts present medium adherence of the two halves of shell, and a thin thickness of primary and secondary membranes. All these nut characteristics are the same as those for ‘Hartley’ nuts, except for the prominence of the apical tip and the depth of the groove along the pad on the suture, which differ. Most of these characteristics differ from those of ‘Chandler’, as shown in Table 2. The mean weight of the ‘Ourania’ nut in the shell is 14.38 ± 0.77 g, the mean kernel weight is 6.43 ± 0.36 g, and the mean kernel percentage is 44.74% ± 2.14%. Although ‘Ourania’ in-shell nuts are heavier than the reference cultivars, the percentage of the kernel is less than that of ‘Chandler’. ‘Ourania’ nuts have a light kernel color, with well kernel fill and easy removal of the kernel halves, similar to ‘Hartley’ nuts (Table 2; Supplemental Fig. 1).

In conclusion, the new cross-bred walnut cultivar Ourania combines the high yield and good nut traits of ‘Hartley’ with the high lateral bearing habit of ‘Gustine’. Its phenological characteristics reveal that it is suitable for the climatic conditions of Greece, in mountainous areas, and even more in lowland areas of North Greece. Its nut traits are comparable to that of one of the top walnut cultivars (Chandler), making it a promising cultivar not only for Greece, but also for other regions with similar climatic conditions.

Availability

‘Ourania’ has not yet been registered in the official list of the Greek Ministry of Agriculture, but this is expected in the near future.

Literature Cited

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Table 1. Average phenological characteristics of ‘Ourania’ walnut compared with the reference cultivars Chandler and Hartley.

Characteristics ^{z,y}	Ourania	Chandler	Hartley
Lateral bud flowering (%)	80	90	5–10
Tree vigor	Intermediate (5)	Intermediate (5)	Intermediate (5)
Growth habit	Semierect (2)	Semierect (2)	Semierect (2)
Branching	Dense (7)	Dense (7)	Dense (7)
Date of budbreak	6 Apr. ± 8.22 d ^x	6 Apr. ± 8.03 d	5 Apr. ± 7.95 d
First female bloom date	24 Apr. ± 6.15 d	27 Apr. ± 6.13 d	25 Apr. ± 5.93 d
Last female bloom date	6 May ± 4.76 d	9 May ± 6.31 d	6 May ± 5.09 d
First male bloom date	18 Apr. ± 7.82 d	18 Apr. ± 6.26 d	17 Apr. ± 5.37 d
Last male bloom date	28 Apr. ± 5.66 d	29 Apr. ± 5.81 d	28 Apr. ± 5.61 d
Harvest date	29 Sept. ± 4.87 d	2 Oct. ± 6.29 d	29 Sept. ± 3.22 d
Dichogamy	Protandry	Protandry	Protandry
First catkin-bearing year	Fourth	Fourth	Fourth
Flowering precocity (years to first female flower)	First	First	Third
Hull dehiscence	Dehiscent (3)	Dehiscent (3)	Dehiscent (3)
Sunburn susceptibility of hull	Low (3)	Low (3)	Low (3)
Susceptibility to codling moth (<i>Cydia pomonella</i> L.)	Intermediate (5)	Intermediate (5)	Intermediate (5)
Susceptibility to walnut blight (<i>Xanthomonas campestris</i>)	Very low (1)	Low (3)	Very low (1)

^zAccording to the International Plant Genetic Resources Institute (1994) descriptors for walnut.

^yWhen given, numbers in parenthesis refer to the respective description according to the International Plant Genetic Resources Institute (1994).

^xData are presented as date ± SD.

Table 2. Average nut and kernel traits of ‘Ourania’ walnut compared with the reference cultivars Chandler and Hartley.

Characteristics	Ourania	Chandler	Hartley
Nut size ^z	Medium (5)	Medium (5)	Medium (5)
Nut shape ^y	Triangular (2)	Ovate (4)	Triangular (2)
Nut height (mm) ^z	42.03 ± 1.07 ^x	41.94 ± 1.80	40.65 ± 1.51
Nut width (mm) ^z	34.26 ± 0.86	33.20 ± 1.42	33.24 ± 0.95
Nut thickness (mm) ^y	34.73 ± 0.88	35.44 ± 0.93	32.98 ± 1.04
Shell texture ^y	Rough (7)	Smooth (3)	Rough (7)
Shell color ^y	Light (3)	Medium (5)	Light (3)
Shell integrity ^y	Intermediate (2)	Complete shell (3)	Intermediate (2)
Shell thickness (mm) ^y	2.21 ± 0.18	1.91 ± 0.29	2.06 ± 0.15
Nut, shape in longitudinal section through suture ^z	Triangular (2)	Ovate (4)	Triangular (2)
Nut, shape in longitudinal section perpendicular to suture ^z	Triangular (2)	Ovate (4)	Triangular (2)
Nut, shape in cross-section ^z	Oblate (1)	Circular (2)	Oblate (1)
Nut, shape of base perpendicular to suture ^z	Truncate (3)	Rounded (2)	Truncate (3)
Nut, shape of apex perpendicular to suture ^z	Pointed (1)	Rounded (2)	Pointed (1)
Nut, prominence of apical tip ^z	Medium (5)	Weak (3)	Strong (7)
Nut, position of pad on suture ^z	On upper two-thirds of nut (2)	On upper half of nut (1)	On upper two-thirds of nut (2)
Nut, prominence of pad on suture ^z	Strong (7)	Medium (5)	Strong (7)
Nut, width of pad on suture ^z	Broad (7)	Narrow (3)	Broad (7)
Nut, depth of groove along pad on suture ^z	Medium (5)	Shallow (3)	Deep (7)
Nut, structure of surface of shell ^z	Slightly grooved (1)	Slightly grooved (1)	Slightly grooved (1)
Nut, adherence of two halves of shell ^z	Medium (5)	Weak (3)	Medium (5)
Nut, thickness of primary and secondary membranes ^z	Thin (3)	Thin (3)	Thin (3)
In shell nut weight (g) ^y	14.38 ± 0.77	13.68 ± 1.25	12.76 ± 0.68
Kernel weight (g) ^y	6.75 ± 0.38	6.81 ± 0.73	5.61 ± 0.58
Kernel percentage (%) ^y	46.92 ± 0.82	49.78 ± 1.88	43.92 ± 2.99
Kernel color ^y	Light (3)	Extra light	Light (3)
Kernel fill ^y	Well (7)	Well (7)	Well (7)
Ease of removal of kernel halves ^y	Easy (3)	Very easy (1)	Easy (3)

^zWhen provided, numbers in parentheses refer to the descriptions according to the International Union for the Protection of New Varieties of Plants (1999) for walnut.

^yWhen provided, numbers in parentheses refer to the descriptions according to the International Plant Genetic Resources Institute (1994) for walnut.

^xData are presented as mean ± SD.



Supplemental Fig. 1. Nuts of 'Ourania', 'Chandler', and 'Hartley' walnut cultivars.