

## Walnut (*Juglans regia L.*)

French: Noyer; Spanish: Nogal; Italian: Noce; German: Walnuss

### Crop data

Perennial. Harvested part: nuts

Transplanted in dormant season.

Flowers 4-5 years after transplanting.

Harvested 4 1/2-5 months after flowering.

Plant density: 120-172 trees per ha. As trees increase in size, they are systematically removed and the density is eventually reduced to 30 trees per ha. Preferably grown on a deep well-drained silt loam soil, pH 6-8.

Adapted to wide climatic conditions, but the economically important Persian walnut is best adapted to long, warm, dry summers and mild winters. Irrigated in arid climates. Persian walnut is grown primarily in California (USA) and Europe.

### Nutrient demand/uptake/removal

Nutrient removal - Macronutrients						
Yield	Source	kg				
		N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	MgO	CaO
0.9 t hull	0.9 Painter & Raese, 1965	7.6	1.6	10.4	1.5	6.2
0.9 t shell	Painter & Raese, 1965	2.0	0.2	4.8	0.5	2.8
0.9 t kernel	Painter & Raese, 1965	28.3	8.9	6.0	2.7	0.8

### Plant analysis data

Plant analysis data - Macronutrients							
Plant	Stage of growth	Source	% of dry matter				
			N	P	K	Mg	Ca
Leaf	Mid-season	Serr, 1961b	>2.5 (OS)	>0.11 (OS)	>1.0 (OS)	0.30 (OS)	-
			≤2.5 (D)	≤0.10 (D)	≤1.0 (D)	0.20 (D)	-
Leaf	Mid-season	Serr, 1961a	-	0.12 (OS)	-	-	1.25 (OS)
			-	0.09 (D)	-	-	-
Leaf	Mid-season	Proebsting & Tate, 1964	-	-	-	-	0.21 (OS)
Leaf	Mid-season	Proebsting & Serr, 1966	2.5 (D)	-	1.3 (OS)	-	-

D = Deficiency; OS = Optimum supply

Plant analysis data - Micronutrients						
Plant part	Stage of growth	Source	ppm dry matter			
			Mn	Cu	Zn	B
Leaf	Mid-season	Serr, 1961b	30 (OS)	>4 (OS)	20 (OS)	>35 (OS)
			20 (D)	3 (D)	15 (D)	≤35 (D)
Leaf	Mid-	Vanselow, 1945	35 (OS)	-	-	-

	season					
			7 (D)	-	-	-
Leaf	Mid-season	Proebsting & Serr, 1966	-	-	-	44 (OS)
D = Deficiency; OS = Optimum supply						

## Fertilizer recommendations

Walnut plantations may be clean cultivated or gussed down, so it may or may not be practicable to incorporate the fertilizer into the soil. Fertilizer is usually applied in a single application. The time of application is often a matter of convenience, but it should be before budbreak.

Generally, only N is applied on an annual basis. In California, Zn is the second most common problem followed by lime-induced chlorosis: boron toxicity (400-1 000 ppm B in the leaf) is fairly common.

## Preferred nutrient forms

N is preferably applied as ammonium sulphate (for alkaline soils) or ammonium nitrate (for acid soils), P as triple superphosphate and K as sulphate.

## Present fertilizer practices

### USA

Age (years)	kg/tree			
	N*	P2O5	K2O	B
<b>Young trees</b>				
1 - 2	0.03	5	6	0.05
3 - 4	0.45	5	6	0.05
5 - 7	0.68	5	6	0.05
<b>Mature trees</b>				
	kg/ha resp. tree			
	170	10/tree	280	6

\* N is applied annually, other nutrients only when problems occur.

Foliar sprays of Mg (4 g MgSO<sub>4</sub>/liter water) and Mn (4 g MnSO<sub>4</sub>/liter water) are applied late May/early June (California) where required

## Further reading

PAINTER, J.H.; RAESE, J.T.: Mineral content of walnut (*Juglans regia L.*) hulls, shell, and kernel. Proc. Amer. Soc. Hort. Sci. 87, 226-228 (1965)

SERR, E.F.: Response of Persian walnut to superphosphate. Proc. Amer. Soc. Hort. Sci. 77, 301-307 (1961)

SERR, E.F.: Nutritional deficiencies and fertilization practices in California walnut orchards. Ann. Rep. Northern Nut Growers Asscn. 52, 69-74 (1961)