

## Hazelnut or Filbert (*Corylus avellana* L.)

French: Noisetier; Spanish: Avellano; Italian: Nocciolo; German: Haselnuss

### Crop data

Perennial. Harvested part: fruits.  
Planted in late autumn (propagated by suckers).  
Flowers in winter. Fruits 4 years after being planted.  
Harvested in late July and early August.

Plant density: 400-600 trees ("Ocak" with 6-8 suckers) per ha.  
Preferably grown on light to medium soils, pH 5.5-7.

The root system is shallow.

Filberts are generally grown in humid conditions. Irrigation is needed in dry summers. The crop is not grown economically where temperatures fall below - 7 °C; it is much affected by late frosts in spring.

Trees are generally not self-fertile and pollinating varieties are required.

Major commercial production is along the Black Sea coast of Turkey.

### Nutrient demand/uptake/removal

Nutrient demand/uptake - Macronutrients					
Yield kg/ha	Source	kg/ha			
		N	P2O5	K2O	CaO
1 200	Carpentieri	19	9	12	16

### Plant analysis data

Plant analysis data - Macronutrients								
Plant part	Stage of growth	Source	% of dry matter					
			N	P	K	Mg	Ca	S
Mid-terminal leaves	20-30 July	Genc, 1987	2.3 (OS)	0.15 (OS)	0.7 (OS)	-	-	-
			1.9 (CVD)	0.10 (CVD)	0.3 (CVD)	-	-	-
Mid-terminal leaves	20-30 July	Aydeniz et al, 1980	2.2 (OS)	0.19 (OS)	1.0 (OS)	0.37 (OS)	1.5 (OS)	0.22 (OS)
Mid-terminal leaves	14 July-14 August near harvest time	Painter, 1963	2.4 (OS)	0.15 (OS)	0.9 (OS)	0.24 (OS)	1.4 (OS)	-

OS = Optimum supply; CVD = Critical value (deficiency)

Plant analysis data/Optimum supply - Micronutrients								
Plant part	Stage of growth	Source	ppm dry matter					
			Fe	Mn	Cu	Zn	B	Mo

Mid-terminal leaves	20-30 July	Aydeniz et al, 1980	550	330	13	52	33	0.09
Mid-terminal Leaves	14 July - 14 August	Painter, 1963	410	495	10	34	27	-

Special attention must be given to N and K application rates to obtain good vegetative growth and high yield with good quality. Annual shoot growth of 25 cm is enough for mature trees. High nitrogen applications increase shell thickness and reduce nut size. Correct potassium application diminishes the proportion of empty nuts.

## Fertilizer recommendations

### Prior to planting and young trees

Prior to planting and up to bearing age, organic and inorganic fertilizers should be applied according to soil analysis as follow:

Organic fertilizer like farmyard manure should be applied at around 30 ton/ha if the soil organic matter is below 2 per cent.

Where the soil pH is under 5.5, it should be raised to 6.5 by liming but not more than 5 t/ha should be given in a single dressing.

pH	Application rate of lime or dolomite (t/ha)	
	On clay loam	On clay
4.0	8	11
5.0	5	7
5.5	4	5

Mineral fertilizers and/or organic materials should be applied on the basis of soil analysis (as indicated below) broadcast and ploughed under before planting:

Phosphorus - Soil P - ppm	Application rate - P <sub>2</sub> O <sub>5</sub> kg/ha
0- 7	40-50
7-14	30-40
> 14	Nil

Potassium - Soil K - ppm	Application Rate - K <sub>2</sub> O - kg/ha
0-100	150-200
100-200	100-150
> 200	Nil

Magnesium should be added in the form of dolomite at the rate of 3-4 t/ha where the soil Mg is less than 110 ppm.

Nitrogen should be applied annually at 100 g N per tree ("Ocak") to trees up to 5 years of age, in May in the first growing season and thereafter half in March and half in May.

### Mature Trees

Fertilizer applications to mature trees should be based on leaf and soil analysis. Leaf samples should be taken at 3-year intervals and soil samples every 5 years.

Nitrogen fertilizer should be applied in March each year in a band 30-60 cm wide under the branches, an acidic or alkaline form being selected according to the soil pH.

Leaf N - % of dry matter	Application rate - g N per tree
< 1.5	500
1.5-2.1	400
2.2-2.4	300
> 2.4	Nil

Phosphate fertilizer may be applied at any time of the year, preferably in a band at the drip line of the tree (which is often better than broadcast application). A single application is usually effective for 2-3 years on soils slightly deficient in phosphorus.

Leaf P - % of dry matter	Application rate - g P <sub>2</sub> O <sub>5</sub> per tree
< 0.14	500
0.14-0.16	300
> 0.16	Nil

Potassium fertilizer may be applied in a band together with nitrogen. A single application is effective for 2 years. Sulphate is preferable to muriate.

Leaf K - % of dry matter	Application Rate - g K <sub>2</sub> O per tree
< 0.5	1 000
0.5-0.8	750
> 0.8	Nil

Other important nutrients are boron and iron (deficiencies of these elements occur in the growing area in Turkey).

Where needed, a single application of 0.1 % boric acid or borax at 125 g/tree reduces the proportion of empty nuts. Iron deficiency may be remedied by applying Fe-EDDHA at 100 g/tree in March.

### Further reading

FREGONI, M.; ZIONI, E.: The effect of increasing rates of fertilizer elements on yield, fruit quality and foliar nutrition in Hazelnut. Hort. Abstr. 42(4), 7412 (1972)

HART, J.: Soil acidity, liming and nitrogen fertilization. In: Growers handbook. Nut Growers Society of Oregon, Washington and British Columbia (1986)

PAINTER, J.H.; HAMMER, H.E.: Effect of differential levels of applications of K and B on Barcelona filbert trees in Oregon and Washington. Nut Grow. Soc. of Oregon and Washington 49, 6-8 (1963)

STEBBING, R.L.: Leaf analysis, boron and foliar feeding. In: Growers handbook. Nut Growers Society of Oregon, Washington and British Columbia (1977)

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