

Avocado (*Persea americana* Mill.)

French: Avocatier; Spanish: Aguacate; Italian: Avocado; German: Avocado

Crop data

Woody perennial.

Harvested part: fruits.

Flowers 2-3 months in spring.

Harvested 6-18 months after flowering (depending on cultivar).

Plant density: 200-400/hectare.

Preferably grown on light to medium soils; on heavy soils only when well-drained; pH 5-8.

The crop is adapted to tropical conditions (West Indian race) or to subtropical (Mexican or Guatemalan race).

Nutrient demand/uptake/removal

Nutrient removal (based on yield of 10 t/ha) - Macronutrients									
Cultivar	Source	kg/ha							
		N	P2O5	K2O	MgO	CaO	S	Cl	Na
Fuerte	Lahav, 1980	11.3	3.9	23.5	8.3	2.9	8.0	1.5	0.8
Lula	Marchal, 1980	28.0	8.0	54.6	1.8	3.3	-	-	-

Nutrient removal (based on yield of 10 t/ha) - Micronutrients						
Cultivar	Source	g/ha				
		Fe	Mn	Zn	Cu	B
Fuerte	Lahav, 1980	90	20	40	10	40

Plant analysis

Leaf analysis data (optimum supply) - Macronutrients								
Country	Cultivar	Source	% of dry matter					
			N	P	K	Mg	Ca	S
California	Fuerte	Goodall et al., 1978	1.6-2.0	0.1-0.25	0.75-2.0	0.25-0.80	1.0-3.0	0.2-0.6
Martinique	Lula	Bertin, 1976	1.8-2.2	0.1-0.3	0.5-2.4	0.3-0.5	1.0-3.0	-

Leaf analysis data (optimum supply) - Micronutrients								
Country	Cultivar	Source	ppm dry matter					
			Fe	Mn	Cu	Zn	B	Mo
California	Fuerte	Goodall et al., 1978	50-200	30-500	5-15	30-150	50-100	0.05-1.0

Fertilizer recommendations:

Added N benefits the avocado almost universally. It is, therefore, regularly applied in four or more dressings annually, often broadcast or preferably via the irrigation system. P and K are applied only when leaf analysis indicates low levels.

Zn deficiency is second to N in its frequency of occurrence. It can be corrected by applying a Zn-containing fertilizer to certain types of soil or as a foliar spray. Foliar application is most effective when spring cycle leaves are expanded. It may be induced or aggravated by application of P-fertilizers or poultry manure.

Fe may be deficient when the crop is grown on calcareous soils or on soils with low oxygen content. The most effective application is chelated iron solution injected into the root zone.

Preferred nutrient forms:

N: as ammonium sulphate, or ammonium nitrate for alkaline soils; urea; calcium nitrate or calcium ammonium nitrate for acidic soils.

P: as superphosphate, before planting; or phosphoric acid, via the irrigation system.

K: as potassium chloride, when Cl in irrigation water is not high; or Potassium sulphate, in high Cl conditions especially when the plants are grafted on the chlorine-sensitive Mexican rootstocks.

Zn: as zinc sulphate, oxide or chelate.

Fe: as chelated compounds.

Present fertilizer practices

N application is based on foliar analysis and the cultivar:

Cultivar and race	N in leaves (%of dry matter)	Recommended N application (kg/ha)
Fuerte, Ettinger, Zutano	< 1.6	200
Other mostly Mexican	1.6-2.0	100
	> 2.0	-
Hass, Nabal	< 1.8	250
Other mostly Guatemalan	1.8-2.2	150
	> 2.2	-

The above amounts should be reduced on certain soils and when N is present in the irrigation water; they should be increased when trees have little new growth and pale leaf color, or heavy fruit set (over 10 t/ha for Fuerte or 15 t/ha for Hass).

USA, California: 375 kg/ha P₂O₅ every 3-5 years
(in shallow hillside soils)
7.5-20 l/ha/year Zn (as ZnO or ZnSO₄)

USA, Florida: 200-250 kg/ha/year P₂O₅
240-380 kg/ha/year K₂O

Israel: 500 kg/ha K₂O

South Africa: 270 kg/ha/year P₂O₅
190 kg/ha/year K₂O
Sometimes boron is also applied.

Further Reading

GOODALL, G.E.; EMBLETON, T.W.; PLATT, R.G.: Avocado Fertilization. Div. Agric. Sci. Univ. California, Leaflet 2024 (1979)

LAHAV, E.; KADMAN, A.: Avocado fertilization. Intern. Potash Inst. Bull. 6, Worblaufen-Bern, Switzerland (1980)

MARCHAL, J.: Avocado. In: MARTIN-PREVEL, P.; GAGNARD, J.; GAUTIER, P. (eds.): Plant analysis as a guide to the nutrient requirements of temperate and tropical crops. Lavoisier publ. New York (1987)

WHILEY, A.W. et al.: Manage avocado tree growth cycles for productivity gains. Queensland Agric. J. 114, 29-36 (1988)

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