

3-5 year-old tree yields 300-400 kg fruits per hectare while a tree older than 5 years yields 800-1000 kg fruits (80,000-100,000 fruits per hectare).

Harvesting

Avocado is harvested between April and September in Kenya. Since most varieties do not change colour on maturity, a few fruits should be picked and stored at room temperature for 7-10 days. If they soften without shrivelling, then the fruit is ready for harvesting. Fruit should not be pulled from the stalk but be cut off leaving a 3-cm stalk.

Postharvest

The following treatment, processing and packaging methods should be used to prolong shelf life:

* Precooling

After harvesting, avocados must be cooled as quickly as possible to the optimum storage temperature of 5°C for Fuerte and Hass varieties; within 5 h of harvesting.

* Hot water treatment

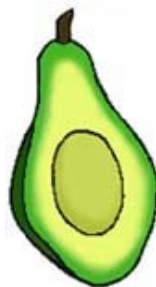
This treatment is used to kill fungal spores on and in the skin of the fruit. The avocados should be immersed in water heated to a temperature of 50°C for 3-5 min. Treatment of fruit using fungicides such as Bavistin (Carbendazim) and Sporta K Brochlura z improves the effectiveness of this treatment.

Grading and packaging

Avocado fruits are graded according to size and weight. Injured and diseased fruits should be removed. The fruits are packed as per the orders and quality standards in 4 kg cartons after all debris, soil and foreign particles are removed using a water bath. This water must be changed periodically to avoid cross contamination. A fungicidal treatment (Thiabendazole) at 300 ml per 100 L of water is used. The fruits are waxed, and dried in hot air. Avocado fruits are stored in cold storage (5°C).

Market

The most important factors ensuring successful marketing are quality, packaging, rapid adaptation of exports to seasonal fluctuations and changing market situations (supply and demand), an intact logistical chain (including proper cooling along the marketing chain and competitive prices).



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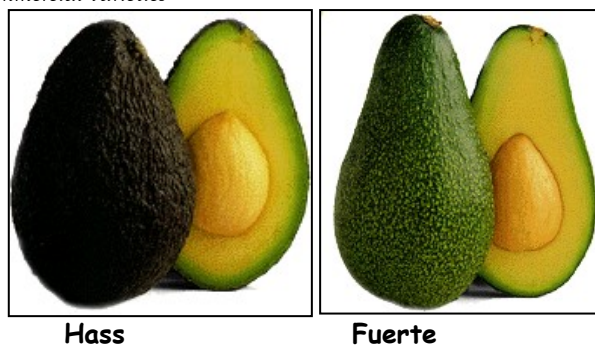
AVOCADO CULTIVATION



Introduction

Kenya has over 40 varieties of avocado. Hass is the main export variety and Fuerte is preferred for processing. Other commercial varieties are Keitt, Reed, Booth 8, Simmonds, Pinkerton, Nabal, Puebla, Tonnage, Ettinger, Hayes, G6 and G7. Varieties used as rootstocks include Puebla, Fuerte, Duke, G6, and G7.

Commercial varieties



Climatic range

Avocado performs best between 1500-2100m a.s.l. with 1000 mm of well-distributed rainfall.

Soil type

Avocado thrives in deep (about 1 m of topsoil), permeable and free draining soil with adequate moisture retention and a pH of 5.5-6.5. Mulches and manure should be added to soils low in organic matter. Waterlogged soils favour the development of Phytophthora root-rot (see diseases). It has very low tolerance to salinity. If the pH is above 6.5, Gypsum (CaSO_4) may be used to lower it.

Land preparation

When laying out the field, one should consider the type of soil and climatic conditions, tree type and size, irrigation, and farm machinery access. The initial cultivation should be deep to allow better and faster root proliferation. Aggressive perennial weeds such as Kikuyu grass should be eliminated before planting.

Spacing

Fuerte and Hass are typically spaced at 9 x 9m (120 plants/ha).

Phosphate and manure

Prepare holes 60 x 60 x 60 cm (length x width x depth) a month before planting. Separate the top and sub-soils. Mix the top soil with 20 kg (*debe*) of decomposed Farm Yard Manure (FYM) and 120 g of Double Superphosphate (46% P_2O_5) with the top soil.

Planting

Carefully remove the plant from the container with the soil intact and place it in the centre of the hole and cover firmly with the mixture of top soil and FYM. Make a basin around the seedling for holding water. Transplanting is more successful when carried out during the long rains either early morning or evening. Plant the seedlings at the same depth as it was in the nursery and water the plant immediately after planting. In hot areas, shade the seedlings after transplanting.

Pollination

The type of avocado cultivars planted in an orchard will contribute to the expected yield. There are two types of avocado that flower at different times of the year (type A and type B). Mix both types in an orchard so that type A pollinates type B and *vice versa* (Table 1). Hence cross pollination leads to higher yields than self-pollination. The presence of bee hives within the orchard is recommended as bees are the main pollinators of avocado. One should avoid applying chemicals that are harmful to bees.

Fertilizer

"A" Varieties	"B" Varieties
Hass	Bacon
Gwen	Ettinger
Lamb	Fuerte
Pinkerton	Sharwil
Reed	Sir Prize
GEM	Walter Hole
Harvest	Zutano

Soil analysis must be done to determine the type and rate of fertiliser to be applied before any recommendation is given. Quantity of manure and fertiliser application is dependent on the soil fertility and the age of trees. Nitrogen is the most important nutrient in avocado.

Irrigation

Irrigation should be done when necessary to increase yield and spread production.

Table 2. Fertiliser requirements per avocado tree

Age (years)	CAN (g)	DSP	Muriate of potash (g)	FYM (kg)
1-3	125	225	-	15
4-5	225	450	-	15
6-7	450	650	225	30
8-9	650	650	450	30
10-14	900	1000	635	-
15+	1300	1200	650	-

Bearing

Avocado starts bearing within 3 years after transplanting. Peak harvest occurs between July-August.

Mulching and Weeding

Mulching is undertaken to conserve moisture and to add organic matter to the soil. Mulching will therefore improve water retention of soil and subsequently promote avocado growth. The most common mulch for avocado is well-dried grass that is pest free. Sawdust should be avoided as it decomposes and ties up nitrogen. Dry leaves may also be used as mulch. Cultivate around the trees to keep them weed free. Note that use of herbicides is not recommended.

Pruning

Apical bud of young plants should be nipped to slow growth and lead to a compact tree. Lower branches that interfere with cultural activities including irrigation should be pruned. Heavy pruning should only be carried out to reduce the size of the tree after 12 to 15 years of bearing.

Intercropping

Avocado orchards may be intercropped with other crops such as beans, peas, kale, or cabbage during the first 3-5 years to get economic returns from the land before the trees start bearing or produce economic returns.

Yield

An avocado tree yields 230-320 kg (7.5-11 t ha⁻¹) of fruit per year. Grafted trees start bearing after 3-4 years after planting but economical crop is obtainable from the sixth year.