REPUBLIC OF KENYA

KALRO
Kenya Agricultural & Livestock Research Organization

NAVCDP
NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT

Avocado Nutrient Deficiencies and their Management

KALRO E-mimea Plant Clinic

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Introduction

Avocado in Kenya is mainly cultivated for its fruit which is often consumed ripe, as a salad. It has of late become a major export crop. The avocado fruit is a good source of vitamin E and folate. Avocado can be processed into jam and jelly. It is emerging as a popular crop grown in Kenya. The growing popularity of avocados makes them a valuable food and cash crop for smallholder farmers.

Climate requirements

Avocado performs well in hot and humid conditions. The ideal conditions are found in the altitudes of between 1500 to 2100 m above sea level. It requires adequate moisture with an annual rainfall of 1,000 –2,000 mm well distributed throughout the year, and a mean monthly rain of 200 –220 mm. Avocado is extremely sensitive to waterlogging.

Soil Requirements

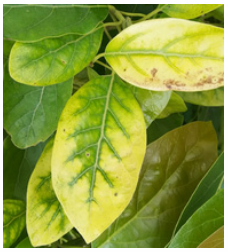
Avocado does well in fertile, deep friable loam soils rich in organic matter with a pH range of 5.5-6.8. As a rule of thumb, always have your soil tested in a reputable soil fertility analysis laboratory before commencing the production of avocado crop.

Salinity

Avocado has a low tolerance to soil salinity, displaying a 25% yield reduction when EC >1dS/m. A pre-plant soil analysis should be done six months before planting, as this forms the basis for planning and the fertilizer use program. The soils should be analyzed for Electrical conductivity (EC) to determine the salinity levels. It is also advisable to analyze the irrigation water quality, as it can contribute to increasing the soil salt content.

Avocado Nutrition

Avocado exhibits nutrient deficiency symptoms, therefore management to correct the deficiencies is best guided by soil and plant tissue analysis.

Nutrient	Growth Stage	Function	Deficiency Symptom	Management
Potassium   *Avocado fruit and leaves showing potassium deficiency*	• Helps in cell division during all growth, is crucial during fruit development • Controls nutrient and water uptake • Moves sugar from leaves to fruit	• Concentrate leaf tissue • Improve flowering, quality fruit, healthy fruit	• Yellowing of old leaves from leaf tips • Downward curling of leaves • Reduced fruit size	• Test soil before planting • Lime acid soils • Potassium is the most important nutrient and is required in large quantities, especially at the onset of fruiting
Phosphorus  *Avocado leaves showing phosphorus deficiency*	• Helps in cell division and new tissue development • Involved in sugar formation	Maximise root development, continued growth and fruit development	• Short, dull dark green leaves • Purple/brown flecks	• Test soil before planting • Increase the use of organic manure • Use neutral fertilizers and lime in acid soils
Magnesium  *Avocado leaves showing magnesium deficiency*	• Component of chlorophyll • Supports photosynthesis • Activates plant enzymes	Maximise crop development and leaf expansion	Yellowing of leaves in between the veins, starting from the margin of leaves and progressing towards the centre, and from the tip towards the leaf base in older leaves	• Test soils before planting • Increase application of organic materials • Apply adequate water during crop life

Zinc  *Avocado fruits showing zinc deficiency*	• Helps in leaf expansion and growth • Increases fruit length and diameter • Helps in stem elongation and expansion	Robust leaf expansion, Stem expansion, and elongation	Rounded fruits, and leaves show a mottled pattern and are narrower than normal	• Most important trace elements and common deficiency • Test soils before planting • Apply organic manure at planting • Use acid residue fertilizers
Manganese  *Avocado leaves showing Manganese deficiency*	It plays important roles in photosynthesis, pollen germination, and growth of the pollen tube	• Maximize flower set, development and fruiting • Involved in the breakdown of carbohydrates, and as a cofactor of enzymes reducing nitrate to nitrite	Yellowing of leaves in between the veins, small reddish brown spots, appears near the mid-rib in young leaves and then spread	• Test soils before planting • Apply lime on acid soils, • Provide adequate watering during crop life, • Increase the dosage of organic manures
Boron  *Avocado fruit showing Boron deficiency*	• Supports new cell growth and cell division, • Involved in plant hormone and carbohydrate movement, • Essential for fruit set, size and shape	• Ensure even ripening and good calcium supply to the fruit, • Ensure good skin finish, • Maximize flower set development and fruiting	Yellowing and deformation of leaves, veins split and become corklike, thickening of nodal regions on branches	• Avoid over-application of irrigation, • Always use organic manure at planting • Apply adequate water

Major Avocado producing counties	Kiambu, Muranga, Kisii, Bungoma, Meru, Nyamira, Kericho, Kisii, Vihiga, Busia, Siaya, Migori, Homabay, Trans Nzoia, Elgeyo Marakwet, Baringo, Nyandarua, Laikipia, Nakuru
Mandate Centres for Soil Fertility and Plant Nutrition:	KALRO-Kabete (Laboratory Analytical Services), KALRO-Alupe (Food Crops Research Institute), KALRO-Muguga South (Food Crops Research Institute)
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