

SOIL PH AND SALT CONTENT:

How do these affect plants?

What is pH?

pH is a measure of how acidic or alkaline soil or water is. The pH scale ranges from 0 to 14, with a pH value of 7 indicating a neutral condition (i.e. not acidic or alkaline).

- pH less than 7: Acidic
- pH above 7: Alkaline

Effects of pH on plants

Plants react to soil pH differently. Generally plants grow well in soils having a pH ranging from 5.5 to 7.0. When soil pH is outside this range, nutrient availability (availability of elements like phosphorus and magnesium that are necessary for plant growth) is affected.

As such, depending on the pH, the soil could be deficient in plant nutrients or even toxic to plants. Soil with very high or very low pH may also damage roots.

Tropical soils are generally found to be acidic. In these soils, phosphorus, potassium, magnesium and calcium are in low amounts while aluminum and iron are in higher amounts. In highly acidic soils, the aluminum and iron content may reach toxic levels.

Changing the pH of soil

Soil pH can be “corrected” by using certain materials to change the pH.

- To “correct” low soil pH (acidic condition): Apply liming materials, such as calcium carbonate, calcium oxide and dolomite.
- To “correct” high soil pH (alkaline condition): Add organic matter, humic acids and/or sulphur.

What is salt content?

In horticulture, the term salt refers to the total salt content in planting media such as soil, resulting from the accumulation of sodium, chloride, sulphate, potassium, calcium and magnesium. Electric conductivity is one way of measuring salt content (i.e. salinity).

Effects of salts in soil on plants

Different plant species have different levels of tolerance to salts. In general, an electrical conductivity of lower than 2mS/cm in soil is acceptable for most plants.

Excessive salt in soil affects microbial activities and soil properties. Affected plants may have leaf edge burns or scorching (browning). In severe cases, the plants may dry up and even die.

Improving soils high in salt content

- Leaching the soil with water helps to drain away excess salts.
- If the soil is too high in sodium salts, calcium sulphate may be applied, followed by leaching with water.

Avoiding salt build-up in soil

- Always check the salinity of any new planting media considered for use. For example, sand can be quite “salty”.
- Be careful when applying fertiliser, as this may change the overall salt level of the soil. Take note of the fertiliser type and the amount used. For instance, certain composts and poultry manure are usually quite high in salt content, so using these may affect soil salinity.

A GUIDE TO PLANT FERTILISERS

Soil in the tropics is generally low in essential nutrients (elements) necessary for plant growth. Applying fertilisers to the soil helps make it more fertile for plants to grow and fruit well.

Essential nutrients

Plants obtain carbon, hydrogen and oxygen from water, air and sunlight to make food for growth. They also require the following:

- Macronutrients, which are required by plants in relatively large amounts [namely nitrogen (N), phosphorus (P), potassium (K), sulphur (S), calcium (Ca) and magnesium (Mg)]
- Micronutrients (also known as trace or minor elements), which are required by the plants in minimum quantities [e.g., copper (Cu), manganese (Mn), zinc (Zn), iron (Fe), boron (B) and molybdenum (Mo)]




Fertiliser types

Applying fertilisers can help counter soil fertility problems and enhance plant growth, by increasing the amount of nutrients in the soil. There are two broad categories of fertiliser:

- Organic fertilisers, from decaying plant and animal matter (e.g. compost, plant extracts, seaweed, chicken manure, bone and blood meal)
- Inorganic fertilisers, from minerals of the earth's crust or made by chemical processes (e.g., urea, ammonium sulphate, super phosphate, potassium chloride, compound fertilisers and mixed fertilisers like 15:15:15)

Common nutrient deficiencies

The amount and type of fertiliser to be used depend on the soil condition and the plant type. Here are some common nutrient deficiencies to note.

	NITROGEN (N)	PHOSPHORUS (P)	POTASSIUM (K)	MAGNESIUM (Mg)
USE IN PLANTS	<ul style="list-style-type: none"> • Needed for vegetative growth and production of lush foliage 	<ul style="list-style-type: none"> • Formation of lateral and fibrous roots • Promotes flowering • Increases plant stem strength 	<ul style="list-style-type: none"> • Fruit formation and enlargement • Increases disease resistance 	<ul style="list-style-type: none"> • Forms a structural part of chlorophyll • Needed for plant enzyme function
SYMPTOMS OF NUTRIENT DEFICIENCY	<ul style="list-style-type: none"> • Leaves turn pale yellow (chlorotic) • Poor, stunted growth 	<ul style="list-style-type: none"> • Underside of leaves turns reddish brown or purplish (occurs first in lower leaves) 	<ul style="list-style-type: none"> • Older leaves has brown or yellow scorching at the edges and tips 	<ul style="list-style-type: none"> • Older leaves has yellowing between leaf veins (interveinal chlorosis) 