Te Pànui
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Soil nutrition

Plants need carbon (from carbon dioxide in the air) and water (from the soil) to grow and develop. They turn these into chemicals for growth such as sugars, proteins and fats. However, to make these complicated chemicals plants also need some simple chemicals from the soil – we call these mineral nutrients. Macronutrients are minerals that plants need quite a lot of and micronutrients are minerals that they need only a small amount of.

How much nutrient is in the soil?

Measuring nutrients can be tricky. Not all nutrients in the soil are in forms that plants can use. When you send a sample to a laboratory the results they send back will be estimates of the available nutrients in your soil – the amount that plants can use.

Plants take most nutrients up through the roots, but only if they are dissolved in water.

Macronutrients

Macronutrients include nitrogen (N), phosphorus (P), potassium (K), sulphur (S), magnesium (Mg) and calcium (Ca).

Nitrogen

Plants need a lot of N to avoid losing yield. Plants take up N from the soil although legumes like beans and peas can use bacteria to take up N from the air. Conventional farmers can supply more N to the soil using fertilisers. For organic management most N comes from organic matter which is broken down in the soil. Gains in N can come from growing legumes like clover in the pasture part of a rotation or peas and beans as cover crops, or by adding composts or fertilisers. The soil loses N when you harvest a crop, or if nitrate leaches out of the soil when it is wet.

The first sign of N deficiency is early yellowing and death of the oldest leaves. Some labs can do a "potentially mineralizable N" test, which tells you how much will be available to the next crop. An easy rule is that less than 70kg of N per hectare in the topsoil will limit yield (there are exceptions).

Phosphate

In plants and soils most P is in chemicals called phosphates. Phosphate doesn't dissolve easily so only a small amount is available to plants and its availability depends on how tightly the soil holds onto it. A measure of available phosphate is the "Olsen P", which is measured in MAF units in New Zealand. For most crops a value of less than 20 MAF units will limit yield, and less than 10 MAF units will strongly limit yield. Many sites around the East Coast have P levels around 6.

Potassium and others

Plants need a lot of K, but many New Zealand soils already have a lot of it available. They also need Ca and Mg but in smaller amounts. K, Mg and Ca are all metals which are slowly released from the soil by weathering. The amount of these minerals in your soil can be measured by a lab.

Micronutrients

Micronutrients (also called trace elements) include iron, boron, zinc and copper among others. Their availability to plants is dependant on things like soil acidity and water content. Micronutrients are only needed in very small amounts – too much boron or copper for example is poisonous to the plant. It's a good idea to get advice before putting micronutrients on your soil. If in doubt, don't do it!

'*Te Pànui Tips*' are simple fact sheets that cover topics designing organic crop production systems on the East Coast.

Te Pànui is edited and produced by Page Bloomer Associates for Crop & Food Research under FRST Funded Project C02X0305 Science for Community Change.

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