African Organic Agriculture Manual Booklet Series
No. 5 | Soil fertility supplements

HOW DO I SUPPLEMENT MY CROPS' NUTRIENT REQUIREMENTS?

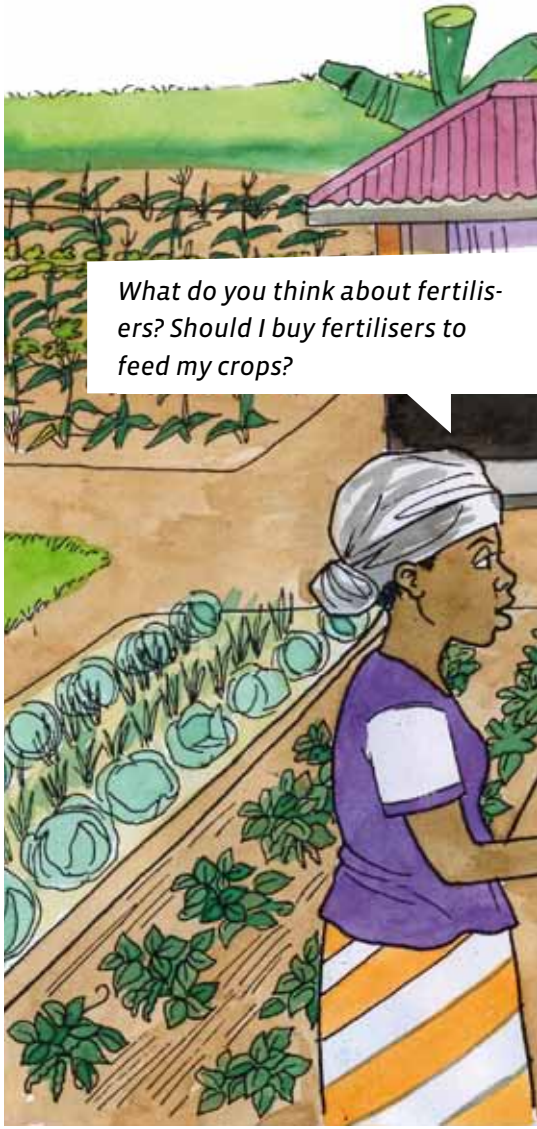
FiBL

What do I need to know about fertilisers?

Fertilisers can be helpful to meet short term nutrient needs of crops and to stimulate plant growth, but they should be a last resort.

Where proper soil and water conservation and addition of organic matter are practiced regularly, fertilisers from outside the farm are not normally needed. However, in case of signs of nutrient deficiencies or slow plant growth, use of fertilisers may be necessary to boost growth. But introduced fertilisers should only be used as a supplement and not an alternative to proper soil and water conservation and organic matter management. The use of introduced fertilisers is a last resort for the organic approach to soil fertility management. Without underlying measures for conservation of soil and water, and improvement of soil organic matter content, fertilisers do not lead to sustainable soil fertility.

Organic farmers can use farm-made liquid fertilisers such as plant tea and manure tea, introduced organic and commercial mineral fertilisers. As far as possible, priority is given to farm-made fertilisers.




As a sole measure, fertilisers rarely bring the expected results. And reliance on the wrong fertiliser may be a waste of money. Therefore, before choosing a specific fertiliser, you should know what is lacking in the soil and practice proper soil and water conservation and organic matter management.

How do I make my own liquid fertiliser?

Liquid fertilisers are easy and cheap to make using locally available farm materials.

Use of liquid fertilisers is an efficient method of supplementing crop nutrients, for example to stressed crops that are not efficient at picking up nutrients from the soil during the dry season.

Liquid manures can be made out of fresh nitrogen-rich plant materials (plant tea), compost (compost tea) or fresh animal manure (manure tea). Manure tea and plant tea are both quick sources of nitrogen, while compost tea is a more nutritionally balanced liquid fertiliser. Liquid fertilisers are mostly used on smaller plots with vegetables, but can also be used for other crops.

While plant and compost tea are mostly applied to the leaves, manure tea is generally applied to the base of the plants. In cases of nutrient deficiencies, application to the leaves is a better option as plants absorb nutrients about 20 times faster through the leaves than through the roots.

How to make plant tea

To make plant tea, fresh and green material is soaked in water for several days or weeks to undergo fermentation.

To make plant tea only green plant materials like tithonia, velvet bean or other sappy materials are used. These materials are nutrient or nitrogen rich, and are easily broken down by microorganisms.

The fresh materials are chopped into small pieces and put in a drum or any sizeable container until it is

Making of plant tea

1. Collect and chop sappy leaves.

about three quarters full. There is no need to put the materials in a bag. Then, the container is filled with water and kept under shade or covered to prevent excessive eva-poration.

Stir the mixture every three days. Frequent stirring encourages microorganisms to break down the materials faster.

After about 15 days the mixture is ready to apply. Remove the remains of the plant materials, sieve the mixture and dilute the tea with 2 parts water for every 1 part tea.

Apply ½ to ¼ litres of the diluted mixture as a top dressing to the leaves of each plant. Apply in the early morning to avoid burning of leaves by the sun. Repeat the application for as long as needed.

Cover the remaining undiluted mixture in a cool place.

2. Immerse the plant material in fresh water and cover the drum. Stir every three days.

3. After 15 days, sieve the mixture and dilute it with two parts water.

Many farmers find manure tea to be one of the most effective and beneficial liquid fertilizers.

How to make manure tea

To make manure tea, fresh manure from cattle, chicken, goats, sheep, rabbits or a mixture of any of these is used. Human manure should not be used to avoid spreading serious illnesses.

For a 200 litre capacity drum about 50 kg of manure are filled into a bag. The bag is then tied securely with a rope, hung to a pole and suspended into the drum. The drum is placed under shade and filled with water. To prevent nitrogen from escaping, the drum is covered with a polyethene sheet.

Every 3 to 5 days the mixture in the drum is stirred by partially lifting the bag in and out of the water several times using the pole.

After 2 to 3 weeks, the water will have turned dark and most of the nutrients will have been dissolved into the water. The darker the colour is, the more concentrated the mixture is.

When the mixture is ready for use, the bag with manure is removed. The remains from the drum are diluted with 2 parts water for every 1 part manure tea. However, if the manure tea is very dark, 3 parts water should be used to every 1 part tea.

The manure tea should be applied in the early morning or on cloudy days only. Application at full sunshine bears high risk of leaf burn and nutrient losses. The manure tea is applied around the stem of the crops. Each plant is given between

How to make manure tea

1. Fill a bag with manure.

½ to ¼ litres starting 2 to 3 weeks after planting. The application is repeated every 3 to 4 weeks.

How to use and make compost tea

Compost tea is made in a similar way as manure tea. However, it can be used unfiltered by applying it directly to the soil area around the plant. If it is sprayed onto the leaves, it must be first filtered through a fine mesh cloth and diluted with good quality water at a ratio of 10 parts water to 1 part tea, to the colour of weak tea. Adding a 1/8 tablespoon of vegetable oil or mild liquid soap helps the spray stick on the leaves.

Note: In case manure tea is applied to the leaves, a period of at least 100 days is needed to avoid the risk of transferring animal infections.

2. Immerse the bag into a drum with fresh water and cover it. Stir the mixture every 3 to 5 days.

3. After 2 to 3 weeks, dilute the mixture with 2 to 3 parts water and apply it to the foot of the plants.

Which organic fertilisers can I use?

Organic manures are a slow source of nutrients, but supply several nutrients at once and improve the quality of the soil.

Organic fertilisers include all natural nutrient sources derived from plant or animal origin. They contain organic matter, which makes them very different from chemical or mineral fertilisers.

There are a number of valuable organic sources that can be used, especially if they are available at a low cost. Commercial organic fertilisers are mostly by-products from agro-processing or food industry waste. They may not be easily accessible and quite expensive. Therefore, their use may be limited to situations where green manuring and application of compost is not feasible and may, therefore be justified only for crops which bring high revenues such as vegetables.

Organic fertilisers are best mixed with other organic materials from the farm including farmyard manure and composted together so as to become a balanced fertiliser.

Some farmers and companies recommend application of micro-organisms to the soil to enhance decomposition processes and control diseases. Most of the bacteria, fungi and other microorganisms are

Manure	Fertilisation effect
Guano	N, P
Pelleted chicken manure	N, P
Hoof and horn meal	N, P
Hair, wool, feathers	N
Oil-cakes	N, P
By-products from agro-processing	N, P, K
Algae	Minerals

naturally present in the soil and can be enhanced by proper application of compost. Even if they may give positive results, microbial fertilisers cannot substitute good soil management practices.

Organic manures are often underestimated sources of nutrients. Are there any organic sources locally available that can be used?

	Availability of nitrogen	Origin	Comments
	●●●	Dried droppings of seabirds and bats	P content higher than the plant's demand
	●●●		
	●●●	Slaughterhouse waste	The finer it is grinded, the faster the nitrogen is available.
	●●(●)		
	●(●)	By-products of oil production	Seed oil cakes like soybean, sunflower, neem or peanut
	●●	By-products from brewery, fruit peels, coffee husks, wood shavings and dust, rice husks	The nutrient content varies depending on the product.
			Depending on their origin algae may contain heavy metals.

Which mineral fertilisers can I use?

Mineral fertilisers allowed in certified organic farming are based on ground natural rock. They include lime, stone powder, rock phosphate, gypsum, potassium magnesium sulphate, sodium nitrate, vermiculite and other natural reserves.

Mineral fertilisers may only be used as a supplement to organic manures. If they contain easily soluble nutrients, they can disturb soil life and result in an unbalanced plant nutrition. In some cases, mineral fertilisers are ecologically questionable as their collection and transport is energy consuming and in some cases natural habitats are being destroyed.

In some areas, addition of lime in the case of acidic soils and sulphur in the case of alkaline soils is needed. But considering that access to fertilisers is generally limited to African farmers, large-scale liming or addition of sulphur is not possible.

Natural mineral fertilizers are ideally mixed with organic materials from the farm or composted together for better results.

Manure	Origin
Plant ashes	Burned orga
Lime	Ground lime
Stone Powder	Slaughterho
Rock Phosphate	Pulverised r

	Characteristics	Comments
anic material		P content higher than the plant's demand
estone, algae	Buffers low pH; the content of Ca and Mg is secondary. Algae are rich in trace elements.	Every two to three years, when soil-pH is low. Avoid excessive use, as it reduces availability of P and increases deficiency of micronutrients.
ouse waste	Trace elements. The finer the grinding, the better the adsorbance.	Apply to farmyard manure, as it reduces volatilisation of N and encourages the rotting process of N.
rock containing P	Easily adsorbed to soil-minerals. Weakly adsorbed to organic matter. Slow reaction.	To compost. Not to redish soils, as it is irreversibly adsorbed.

This booklet is an outcome of the African Organic Agriculture Training Manual project and was conceived as a handout for farmers.

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