

The Organic Farmer

The magazine for sustainable agriculture in East Africa



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Crop rotation reduces bacterial wilt



TOF - Farmers in potato growing areas of Kinangop and other areas in Nyandarua region have discovered one thing: If you grow potatoes this season followed by cabbages the next season, the chances of your next potato crop being affected by bacterial wilt are reduced.

Farmers across the country are faced with a serious problem of bacterial wilt disease. Apart from lack of clean seed, one of the reasons for the fast spread of the disease is the practise of growing potatoes on the same piece of land



season after season. The best crop for rotation with potatoes is maize or cabbages. *See page 3*

Use trees more efficiently

TOF - A lot of our remaining trees are being wasted through poor use of firewood, charcoal, timber and other tree by-products. Research shows that more than 90 of wood is lost in charcoal production when charcoal producers use



More about
compost

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traditional earth kilns. The use of power saws to produce timber wastes up to 50 per cent of wood much of which ends up as saw dust.

These figures do not include the daily loss of millions of trees in the burning of firewood in open hearths for cooking purposes by more than 90 per cent of Kenya's households. For sustainable use of our forest resources, the government needs to put in place tight regulations and set standards on the methods used in production of various tree by products to reduce the wastage. *Page 2*

Cattle need minerals

TOF - Minerals and vitamins account for a very small proportion of daily dry matter intake in cattle diet. But they are very important in nutritional programs for proper animal function. On page 5, we show you how to make licks for your cattle, sheep and goats. *Page 5*

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Dear farmers,

Since we started the publication of this magazine back in the year 2005, we have continuously highlighted the dangers posed by the bacterial wilt disease to potato production in the country. The crop is the second most important in Kenya after maize. More than 800,000 farmers grow it.

The disease is now present in every part of the country, as a result of the exchange of diseased potato seed among farmers, second, farmers do not practise crop rotation. Indeed, as we write this, many farmers have nowhere to grow potatoes because the soil in every part of their farms is contaminated with the disease-causing bacteria.

For the last two decades, KARI with assistance from a number of donors, has trained more than 200,000 farmers and extension staff from the Ministry of Agriculture on methods of controlling bacterial wilt. But the disease is still spreading to areas that were not affected before.

It is now clear that the government cannot be able to supply clean seed to farmers because corrupt senior government officials and politicians grabbed the land that was previously used for seed multiplication. The only hope at the moment is in training selected farmers to grow clean seed, which they can then sell to fellow farmers, as KARI has already started doing. But before this is done, there is need to conduct a study to establish the reasons why many farmers are unable to follow simple measures that can control the disease and stop it from spreading. After the review is done, there is need to embark on a nationwide campaign to create awareness among farmers on the disease.

All the stakeholders in the potato industry need to come together and formulate a strategic plan that would look into areas such as seed multiplication, support to on-farm seed production and even value addition and marketing of potatoes in the country. In all these efforts, the Ministry of Agriculture and KARI should lead the way.

With the establishment of a common market in East Africa, potatoes are now being imported into Kenya from the other East African countries. Research institutions need to work together to control the transfer of diseases from one country to the other.

Every piece of wood is valuable, save it

Due to the decreasing forest resources, it is important to use the available trees and their by-products efficiently.

Peter Kamau

When the Kenyan government imposed a ban on cutting of trees in government forests, many timber merchants and a few saw millers who did not close their saw mills, turned to farming areas as their major source of trees. But the worst problem now facing forest resources in the few farms with trees is the poor harvesting methods used by timber traders.

Indeed, it is not only the timber merchants who are using the wrong methods in timber sawing and use of wood by-products: Charcoal dealers, furniture makers and even farmers themselves unknowingly waste a lot of their valuable trees through poor methods of exploitation and use of trees as well as their by-products. Below we show how trees are wasted and provide tips on how to use them in the right way, in order to improve efficiency in the use of wood products to reduce wastage, increase income and save our environment.

Use of power saws

The power saw is the tool of choice for all people cutting fuelwood and timber production in Kenya. What many users do not know is that the power saw is one of the most wasteful tools especially in timber production. The cutting chain in this machine is designed for cross-cutting (felling down trees).

When used for sawing timber, the cutting chain removes a lot of saw-dust along the saw path (or the kerf). Compared to other saws, the power saw has the highest kerf. This wastes a lot of wood that would have been saved. Another problem with the power saw is that while cutting timber, it vibrates, therefore creating an irregular path along the log being sawn- as a result any timber produced using a power saw has uneven dimensions, which is to blame for more wastage and even poor timber quality. People using power saws lose up to 50 per cent of timber they would have obtained. They are also dangerous due to kickbacks when they come across hard parts such as nodes of the tree, at times causing injuries to people using them.

To reduce timber wastage when using powersaws, lumberjacks should use split saws, which are meant for timber



production. To produce uniform size timber all split saws should be fitted with chain saw frame (see picture), the chain saw frame helps guide the split saws along the cutting path to produce quality timber that is uniform in size from one end to the other. Lumberjacks using the chain saw frame have managed to recover up to 57 per cent of timber that would have been wasted during production.

Charcoal making

Charcoal production is the main economic activity within a large section of the population especially in rural areas. The main mode of production is the use of the traditional earth kilns. However earth kilns waste up to 90 per cent of charcoal that would have been produced. The main process in charcoal making is to enable wood to be converted into carbon. The process of carbonisation can only take place when there is less oxygen in the kiln. To achieve this, the wood for charcoal making should be arranged properly such that there is very little or no space between the various pieces of wood in the kiln. The wood that has spaces allows oxygen to go into the kiln converting the wood into ash as it cannot be carbonised to form charcoal.

Using improved earth kilns

The only way to reduce waste of firewood when making charcoal is to use improved earth kilns. This can be achieved when the wood for charcoal making is well covered. It is important to ensure that soil does not filter into spaces between the wood as this prevents carbonisation.

Improved earth kilns use pipes made of iron sheets- when installed in a char-

Using a power saw with a split chain reduces wastage (above). Modern charcoal kilns produces charcoal more efficiently compared to earth kilns.



coal kiln, the pipes allow smoke from the burning charcoal to go out; since the air from the kiln is hot, oxygen cannot go into the burning charcoal resulting in efficient carbonisation. The charcoal kiln produces a dense white smoke at the beginning, then brownish and finally blue. When the smoke turns blue, this is a sign that the carbonisation is almost complete inside the kiln. At this stage the kiln compresses, an indication that the charcoal is ready. The use of improved earth kilns results in the saving of up to 25 per cent of the wood used.

Drum kilns

Drum kilns are more efficient than earth kilns but in this case special drums with pipes are used for charcoal burning. Wood for charcoal making is put into the drum which is then covered. Fire is introduced through the pipes on the sides of the drum. Carbonisation in the drum is more efficient than in the earth kilns. Research shows that drum kilns can achieve a wood recovery rate of up to 35 per cent.

Brick kilns

Brick kilns are made using the same principle as both drum and earth kilns, the only difference is that bricks are used to make the kiln. Brick kilns are the same as drum kilns in terms of wood recovery.

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Bacterial wilt a big threat to potato growing

Adoption of crop rotation is the main solution in the fight against the destructive potato disease.

The Organic Farmer

Although it continues to destroy potatoes countrywide, very many farmers are yet to understand what bacterial wilt is, how it is spread and how to control it. Most farmers have stopped growing potatoes altogether because their soils are already contaminated. Farmers are opening up new fields in an attempt to control the disease but only end up spreading it further because the seeds they use are already infected. The best way to stop bacterial wilt in your shamba is to know what it is, how it is spread and how to control it.

Causes of the disease

Bacterial wilt is caused by a bacterium called *Ralstonia solanacearum*. The disease is mainly spread in two ways: When infected seed is planted in healthy soil or when clean seed is planted on soil that is already infected. The major source of seed for many Kenyan farmers is usually seed that was planted the previous season. If the potatoes are infected, they spread the disease.

Other farmers buy potato seed from their neighbours; if the seeds are infected, the disease is introduced into their farms. The disease can also spread if infected crop residue is transferred



Cabbages planted in rotation with potatoes eradicates bacterial wilt from the soil.

into an area with healthy soil. If contaminated water from surface run-off flows into an uninfected farm, it can spread the disease. The water used for irrigation can also introduce the disease to a farm, if it is contaminated with the disease-causing bacteria. Farm tools such as jembes or forks can transmit the disease when contaminated soil attaches itself to the tools. Soil pests such as nematodes and insects can also spread the disease from one area to another.

How to identify the disease

Any signs of drying or wilting of one or more potatoes in your shamba is an indication that your potato crop could be infected with bacterial wilt. All a farmer needs to do is to dig up potatoes from such plants. If the potato tuber has a black ring with white spots, then it is a clear sign that it is infected with bacterial wilt. Potato leaves that turn yellow may also be having the disease. Stunted potatoes or sections of a potato plant drying may also be a sign that bacterial wilt is present.

How to control bacterial wilt

Crop rotation: Bacterial wilt has no known cure, but farmers can control it by practising crop rotation. One of the biggest problems facing the control of many diseases including bacterial wilt is that farmers are unable to practise crop rotation mainly due to lack of knowledge on its benefits. Farmers in Kinangop region have successfully managed to control bacterial wilt through crop rotation especially with cabbages, recording increased potato yields.

Farmers should never rotate potatoes with any other plants in the potato family such as tomatoes, bananas, eggplants, capsicums, chillies or groundnuts. Suitable crops that can be rotated with potatoes include cabbages, beans, peas, onions, carrots or grass. Crop rotation has other benefits such as pest control and even maintaining soil fertility.



A potato plant infected by bacterial wilt (above). Diseased potato root and tuber.

Buy certified seed: Farmers should never buy potatoes meant for planting from their neighbours, if the potatoes are infected, the disease is transferred to your shamba. It is important to buy certified seed or from reputable potato growers who know more about bacterial wilt. New potato seeds should be planted in a field that has not been planted with potatoes the previous season.

Uproot diseased plants: All diseased plants should be uprooted together with the surrounding soil. The affected plants and tubers should be buried far away from the potato field or even burnt. Do not put diseased plants in a compost heap. Instead, you should burn them.

Select a good planting field: Potatoes should never be planted in low-lying or waterlogged areas. Upper sections of the farm where drainage is good are ideal for potato planting.

Remove volunteer potatoes: Potatoes that grow on their own after the previous crop are carriers of bacterial wilt and even pests. Such potatoes should be uprooted, burnt or buried far away from the shamba.

Proper weeding: Many weeds serve as hosts to bacterial wilt. Regular and proper weeding is important to prevent such weeds.

KARI now adopts *sangi* potato variety

Peter Gitau, a farmer from Karati area in Kinangop, introduced *sangi* potato variety into Kenya from Tanzania seven years ago. The government, however, classified it as a potato variety

of "unkown" origin. The classification meant that research institutions including the Kenya Plant Health Inspection Service (KEPHIS), could not touch it.

Sangi has become the most popular potato variety with farmers due to its high yielding quality and resistance to some viral diseases, forcing the government to rethink its earlier view. But *sangi* cannot resist bacterial wilt. It is now the main carrier of the disease in the country because every farmer wants it.

The Kenya Agricultural Research Institute (KARI) is producing clean seed and selling it to farmers. However, the cleaning process for this variety is tedious and only a few bags have reached farmers this year.



Sorghum can give you food and fodder

Due to changing weather patterns drought tolerant crops such as sorghum can feed people and their animals.

The Organic Farmer

Before the onset of the current rains, many farmers, especially those keeping livestock, had a hard time getting fodder to feed their animals, having exhausted all their pastures and stored fodder. This lack of feed led to a decrease in milk production and less income for farmers. It is not only feed for livestock that is in short supply when the rains are inadequate, even food for people decreases. Farmers have abandoned traditional food crops that could grow even with less rain. Such crops could withstand pests and even diseases.

In view of the changing weather patterns, it is such food crops that people can turn to ward off food shortages and famine. Farmers need to change their attitude and start growing drought resistant crop varieties that can do well within a range of climatic conditions. One such crop is sorghum!

A nutritious food crop

Sorghum is one of Africa's ancient food crops. Due to its ability to grow in many regions and soils, sorghum holds the key to Kenya and Africa's food security. The crop is full of energy-giving nutrients, unlike other cereal crops such as maize and wheat. Sorghum has a high concentration of potassium and starch, it is less acidifying and is easily absorbed and tolerated by the sick and diabetics, adults and even children. Traditionally sorghum is used to make *ugali* and fermented porridge.

It needs less rain

Sorghum can grow in areas with as little as 250 mm of rainfall although it can do better in areas with an average of 600 mm. But in its use as fodder for livestock that we shall look at in this issue. Changes in weather patterns have led to the failure of both maize and Napier grass as the source of fodder for livestock. In order for farmers to meet their fodder requirement they have to rely on drought resistant fodder crops, for instance sorghum. KARI, in collabo-



ration with the ministry of agriculture has developed better varieties that can be grown as fodder and for human consumption.

It makes good silage

Sorghum can do well in both high and low potential areas where crops such as maize and Napier grass cannot grow well. As fodder, it can be used in place of maize for making silage. The grain can be used for human consumption. When freshly chopped, this crop can be given to cows, goats, sheep, pigs, and even chickens because it has the same energy levels as maize and other cereals. Unlike old varieties, new varieties of sorghum are not poisonous to livestock but it is important to let it dry for one day before feeding it to livestock.

Sorghum can remain green in dry season when most of the other crops dry up because it can survive when the moisture levels are very low for any plant to grow. It can give farmers an adequate source of fodder when other fodder sources such as maize or even Napier grass fail.

Sorghum produces much more forage than maize. Unlike maize, its lower leaves do not dry out, as the plant matures—they remain green and have a higher crude protein content. The magic crop grows again after it is cut for use as fodder and harvesting of the grains, it therefore reduces the costs of replanting, land preparation and time.

How to grow sorghum

Sorghum is easy to plant. For a farmer to get a good crop, they can follow the following simple steps when planting:

Land preparation: For both forage and food varieties of sorghum, it is important to start preparing the land early before the rains following a crop season. The crop does well in fine soils. It can also be grown under minimum tillage conditions where the land is not ploughed and still grow well.

Seed rate and spacing: Farmers can plant sorghum at a seed rate of 2.4–3.3 kg per acre (6–8 kg/ha). Fodder varieties of sorghum should be planted at a spacing of 75 x 10 cm. Varieties meant for feed and grain (those meant for both human consumption and also for fodder) require a spacing of 60 cm x 20 cm. The spacing allows for a higher grain-fodder ratio.

Planting: Sorghum is planted at the beginning of the long rains. Plant the seeds along the trenches (furrows). Seeds should be 3 cm deep when dry planting to avoid germination in false rains, but 2 cm deep if the ground is wet.

Manure application: Well composted manure should be applied during land preparation and worked into the soil. Organic foliar feeds can be applied when the plant is knee high.

Thinning: The crop should be thinned when it is 30 cm high or 30 days after planting, whichever comes first, to ensure a spacing of 10 cm between the rows for fodder sorghum and 20 cm between rows for sorghum meant for both fodder and food.

Weeding: Hand weeding should be done at least twice during growing. A sorghum field should be kept weed-free especially at the early stages of growth.

Pest and disease control: It is important to control cutworms, aphids, shoot fly and stalkborer. Birds like sorghum especially when it is at milky stage, they prefer mostly the white-grained sorghum. Apart from pests, sorghum is fairly tolerant to diseases.

Harvesting: Sorghum meant for feed should be harvested at maturity stage. That meant for fodder can be cut when still green and fresh. Leave it in the sun to wilt for at least 12 hours then chop and feed the animals. For sorghum meant for silage, start harvesting at dough stage (between milky and hardening stage). For dual-purpose sorghum cut the head with a knife or use a combine harvester.

Sorghum varieties and their qualities

Variety	Maturity period	Height in metres	Grain yield Bags per acre	Dry matter Bags per acre
E 6518	230	3.0	33.3	289
E 1291	160	1.7	66.7	200
Ikinyaruka	160	1.7	77.7	200
Bj28	110	1.7	33.3	156
BM30	2.5	2.5	66.6	244

All sorghum varieties except E6518 can be grown for food and fodder. Farmers interested in buying sorghum seed can contact KARI, Lanet P.O. Box 3840-20100, Nakuru Tel. 0729 883 276. A kg of each variety costs Ksh 250.

Cattle need minerals for good performance

Minerals are essential in animal nutrition to ensure normal and proper functioning of their bodies.

The Organic Farmer

Minerals are chemical elements, which form an important component of animal feed ingredients; they are an important component of licks (for mineral premix, see grey box, right). They account for a very small proportion of daily dry matter intake in cattle diets and can sometimes be overlooked in a herd's nutritional program. But they are very important for proper animal nutrition. Cattle growth and reproductive perfor-



Fodder trees such as *Gliricidia* (picture) or *Leucaena* and *Sesbania* contain adequate levels of macrominerals to cover animal requirements. Farmers should use these fodder trees much more.

mance can be compromised if a good mineral program is not in place.

Cattle require at least 17 different mineral elements in their diets. Required minerals are classified either as macrominerals (major minerals) or microminerals (trace minerals), based on the quantities required in beef cattle diets. Macrominerals are required in larger quantities (grams per day) than microminerals (milligrams or micrograms per day). Nutrient requirements of specific mineral elements vary, depending on animal age, weight, stage of production, lactation status, breed, stress, and availability after administration.

Macro-minerals

Dairy cows require more of the macrominerals (calcium, phosphorus, magnesium, sodium, potassium, Chlorine, sulphur) than the micro-minerals (iodine, iron, cobalt, copper, manganese, molybdenum, zinc, selenium). If cows do not consume enough of the macrominerals, this will cause reduced milk yield, infertility problems, weakness

How to make livestock lick blocks

TOF - Livestock feed blocks are high-energy feed and mineral supplement blocks made from affordable and readily available materials. The blocks are currently not commercially available in Kenya but the technology for making them is readily available.

Benefits

The feed blocks provide supplementary nitrogen, minerals and energy to the animals. This is particularly useful in times of prolonged feed shortage.

Ingredients

Molasses

- 1) Urea (fertiliser grade)
- 2) Mineral premix (available in agrovets)
- 3) Maize germ (or other bulking agent)
- 4) Cement
- 5) Common table salt

The preparation method is the same as that of making concrete blocks. Ingredients should be thoroughly mixed, preferably using a motorized concrete mixer or similar equipment. The procedure of making 20 blocks each weighing 5 kg is as follows:

Step 1: Pour 5 litres of water in a concrete mixer and add 10 kg of urea in the running concrete mixer. Run the mixer until all the urea is dissolved.

Step 2: Weigh out 12 kg of cement and slowly mix in 3 litres of water until a homogeneous paste is attained. Pour this into the running mixer. Add 3 kg of common salt and 5 kg of mineral premix.

Step 3: Measure 25 kg of molasses and put in the running mixer. Use 2 litres of hot water to rinse the cement and molasses containers and add this to the mixer.

Step 4: Measure 35 kg maize germ or any other bulking agent and put this in the concrete mixer. Let the mixer run until the thick paste is uniformly mixed. The resulting paste is ready for moulding into any preferred shapes and sizes.

Step 5: Oil the inside of the moulding bowls or other suitable mould for ease of removal of the blocks after setting. Any edible salad oil can be used for this purpose. Pour the paste into 20 moulds of 5 kg each. The blocks should be left



Licks last longer if placed in a holder.

in the sun for about two hours. After this, they should be removed from the moulds and left to dry indoors for 1-2 weeks depending on the weather.

Precautions: If animals (especially sheep) lick the mineral blocks too much, they can suffer from urea poisoning. It is important that blocks are introduced gradually and that the block is not made too soft, otherwise the animals may eat too much. Suspending the blocks instead of putting them on a flat surface also prevents animals from biting on the block.

NOTE: According to organic standards, the mineral lick above should not be given to animals raised under organic farming. Unlike conventionally raised livestock, organic animals are not fed formulas containing urea or manure, growth enhancers or slaughterhouse by-products.

Source: KARI Technical notes

of the bone and increased incidences of non-infectious diseases such as milk fever (due to insufficient calcium).

Phosphorus and calcium are of particular importance when formulating rations. Phosphorus is needed for bone and teeth formation, building body tissue (growth of animals), and milk production, calcium is the most important constituent of the skeleton (bones) and teeth.

Micro-minerals

In this group of important microminerals belong chromium, cobalt, copper,

iodine, iron, manganese, molybdenum, nickel, selenium, and zinc. Deficiencies

For various minerals and their functions, see page 6

in micro-minerals (trace elements) can cause a variety of diseases and conditions depending on which mineral is missing.

NOTE: It is important for farmers to know that all the macronutrients and micronutrients mentioned here are usually present in all commercial animal feed concentrates (dairy meal) and mineral licks.

Group makes cakes from sweet potato flour

An innovative farmers' group in Kagio makes money by adding value to their produce.

Anja Bengelstorff, Kagio

Have you ever considered doing something else with your sweet potatoes other than just boiling them for dinner and eating what is left for breakfast – for example, making money through food processing? If not, you might want to think again. Because that is what Uzima Food Processors and Caterers are doing in Kagio, Kirinyaga county.

The 15-member group has on average 2 acres each, on which they grow maize, beans, tomatoes and bananas. But it is on sweet potatoes that the group has learnt to do value addition recently. In January 2011 TOF issue we covered their work on fruits and vegetable drying. "We want to make farming a business," says chairman Charles Murimi who managed to convince his fellow members to raise money to set up a solar drier, with which they process sweet potatoes and mangoes.

The group washes the sweet potatoes, peels them, cuts them into pieces, lets them dry and eventually takes them



Murimi shows the mango pieces in the newly constructed solar drier

to the mill for grinding. The members describe the sweet potato flour, which they sell locally for Ksh 500 per kilo as very soft and nutritious. It has a shelf life of about six months. "We also make cakes and buns from this flour, and you don't need to add any sugar," Charles Murimi points out. It can also be used for making porridge or the chips processed into crisps.

However, as the flour is not certified by the Kenya Bureau of Standards (KEBS),

it can only be sold locally and for a low price. Multiplying and selling the vines of sweet potatoes is another source of income for the Uzima group. They also do catering at public functions in Kagio and its environs, says Murimi proudly, as the women of the group nodding in approval.

Profit with Moringa

The lack of certification by KEBS also poses a problem for the processing of the medicinal Moringa trees to the farmers "The demand is high." According to the chairman Charles Murimi, the group has orders for hundreds of Moringa tree seedlings from as far away as Isiolo, but are unable to supply due to transport problems – the group has no means of transport. The seedlings are sold for Ksh 50 per piece.

The dried and ground leaves of the Moringa tree are packed and sealed and fetching up to Ksh 400 in Nairobi – but due to lack of KEBS certification, they can only be sold locally for Ksh 100. Moringa leaf powder is good for people with high blood pressure. And it restores appetite to the sick. Leaf juice, among other benefits, cleans the body, stabi-

continued on page 8

Minerals are very important in animal nutrition (from page 5)

Mineral	Functions	Deficiency symptoms	Food sources for cattle
Calcium (Ca)	Bone and teeth formation, blood clotting, muscle contraction, 12% in whole milk	Rickets, slow growth and poor bone development, easily fractured bones, reduced milk yield	Alfalfa and other legumes, ground limestone, dicalcium phosphate, steamed bone meal
Phosphorus (P)	Bone and teeth formation, involved in energy metabolism, part of DNA and RNA, 0.09 per cent in milk	Fragile bones, poor growth, low blood phosphorus, deprived appetite, poor reproductive performance	Phosphates, steamed bone meal, cereal grains, grain by-products, oil seed meal
Sodium (Na)	Acid-base balance, muscle contraction, nerve transmission	Craving for salt, reduced appetite, in coordination weakness, shivering	Common salt and butter products
Magnesium (Mg)	Enzyme activator, found in skeletal tissue and bone	Irritability, tetany-increased excitability	Magnesium oxide, forages and mineral supplements
Sulfur (S)	Rumen microbial protein synthesis, found in cartilage, tendons, and acids	Slow growth, reduced milk production, reduced feed efficiency	Elemental sulfur, sodium and potassium sulfates, legume forages
Potassium (K)	Maintenance of electrolyte balance, enzyme activator, muscle/nerve function	Decrease in feed intake, loss of hair glossiness, lower blood potassium	legume forages, potassium chloride, potassium sulfate
Iodine (I)	Synthesis of thyroxine	Big neck in calves, goitrogenic (enlargement of thyroid gland) substances may cause deficiency	Iodized salt, trace mineralized salt and commercial supplements
Iron (Fe)	Part of haemoglobin and many enzyme systems	Nutritional anemia, pale mucus membrane	Forages, grains, trace mineralized salt, ethylene diamine dihydroiodine
Copper (Cu)	Needed for manufacture of haemoglobin, co-enzyme	Severe diarrhea, abnormal appetite, poor growth, coarse, bleached hair coat	Trace mineralized salt and commercial supplements
Cobalt (Co)	Part of vitamin B ₁₂ , needed for growth of rumen microorganisms	Failure of appetite, anemia, decreased milk production, rough hair coat	Trace mineralized salt and commercial supplements
Manganese (Mn)	Growth, bone formation, enzyme activator	Delayed or decreased signs of oestrus, poor conception	Trace mineralized salt and commercial supplements
Zinc (Zn)	Enzyme activator, wound healing	Decreased weight gains, lowered feed efficiency, skin problems	Forages, trace mineralized salt, zinc methionine



All about compost

Most of the questions received from farmers are about making compost. This shows that farmers are willing and eager to improve their soil fertility.

Lost elements

What elements of nutrients are likely to get lost quickly if my compost is poorly handled?

The element that is lost most easily is nitrogen. Too much sun and too much rain or waterlogging makes it to disappear quickly. Yet it is very essential for the composting process. Without nitrogen from animal manure or green plant material, you will never obtain compost.

Potassium leaks out easily with rain and water. Phosphorus disappears less easily.

Keep the right temperature

- Should I use a dry stick or wet stick as a thermometer in my compost for testing whether the process is on or off?

- Apart from the stick, what other method can we use to test whether the process is on or not?

You do not need to use a stick at all. Just use your hand to feel the warmth. The heat producing phase takes place in the first two to three weeks after you have set up the heap for composting. If you feed your heap continuously, the heat will be just in the top layer. The heat production shows that the material mix is favourable for the microorganisms and that there is enough nitrogen and humidity for them to work properly.

The smell of a compost heap can also be an indicator. It should have a spicy, not unpleasant smell. Maybe a neighbour with a well managed compost heap can help you to make yours in the right way.

If there is a foul smell, black and wet patches, the heap is usually too wet, and the microorganisms cannot get enough air. You have to turn the material, adding some dry and coarse material after several scoops.

If the material degrades slowly and there is a smell of fungi or white dust, your heap is too dry and needs more watering, probably also more nitrogen from fresh green material or animal manure.

The compost is mature if it has a dark colour and a fine crumbly texture, only the coarsest material is still recognisable.

Mix the material properly

Does the arrangement of different layers in a compost heap contribute in any way to its decomposition of the matter?

The layers are made to show that there is a mixture of different materials used during preparation of the compost heap. You can also mix them thoroughly.

Which materials should be available in plenty when one is making a compost?

Very important: Fresh green plant material like weeds or trimmings from fences and animal manure provide nitrogen that is needed for a good composting process. Dry and woody material cannot decompose easily.

No problems with tithonia

My compost is full of tithonia plant leaves. I want to fight ants from the roots of my crops and I need living organisms like earthworms, beetles and others to help improve the soils. Will they not be affected since tithonia can also be plant extract?

No, you do not have to worry. Tithonia is one of the best plant materials used in compost making. It decays quickly and provides nutrients to the microorganisms which helps decompose the other materials. Tithonia stems and leaves decomposes leaving no trace of the original materials used. They are broken down completely by biological and chemical processes.

Mix manure into the compost

Is it advisable to apply poultry manure directly on my crops?

It is not. The best treatment of all animal manures is to compost them for some time. Mix them into the compost heap continuously; this is also the best way to ensure a good decomposition of plant material. Make sure the heap is shaded, protected from heavy rain, and always slightly humid.

Litter in the chicken house

- Why do people put litter in the poultry house even when the house is dry?

- What happens to your birds especially chicken when the litter is not changed? (Patrick Makokha)

Litter is provided to absorb liquids and prevent diseases. If chicken have to stand and walk in their own droppings, there is a high risk of diseases like coccidiosis. Chicken houses must be dry, clean and well ventilated at all times. Clean the chicken house and add fresh litter at least once a week. In addi-



tion, wash and treat the floors regularly with organic acaricides such as neem powder. In brick houses, apply lime wash or other disinfectants to the floor and walls.

Chickens need balanced feed

- Apart from maize and *ugali*, what else can I give to my local birds to realize production of eggs?

- Is there a way farmers can simplify their own means of preparing poultry meals?

Grains like maize or millet, also *ugali*, are good chicken feeds. However, they do not contain the proteins that are needed for good egg production. Scavenging chicken will look for insects and worms. Dung heaps from the waste of cattle, goats and sheep are also excellent sources of insect protein. But chicken will still need some additional protein supplements like cooked beans, *omena* fish, crushed groundnuts, sunflower cake, *busaa* waste (dregs/*machicha*), or chicken starter feeds.

All chickens also need fresh vegetation such as grass and vegetables. They contain vitamins which keep them healthy. The necessary minerals and calcium for eggshells are provided if you offer limestone, crushed eggshells, fishmeal, or bone meal. And finally, birds need to ingest small stones for their digestion.

The easiest way of feeding chickens is to buy a good quality chicken mash which should provide all necessary nutrients. If you want to have your own mixture, make sure you use good ingredients. No rotten or mouldy grains and beans! Chickens are very sensitive to aflatoxins that are produced by mould fungi. See TOF March 2012. *tsz*



Simple methods for honey processing

More than 25 per cent of the honey sold in the local market is either adulterated, impure or unfit for consumption.

The Organic Farmer

Most honey sold in the market contains many impurities including pollen, bee parts, wax and other foreign particles. This is due to lack of knowledge on the part of beekeepers on how to maintain quality during production. The way honey is harvested, handled, processed and stored determines its quality.

After harvesting, honey should be kept in clean containers to prevent dirt or exposure to moisture. There are two methods that beekeepers can use to process honey, a beekeeper needs to have a clean bucket and a clean piece of clothing preferably made of nylon material:

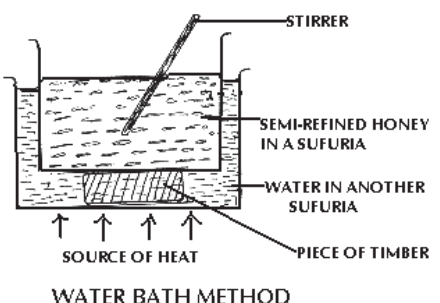
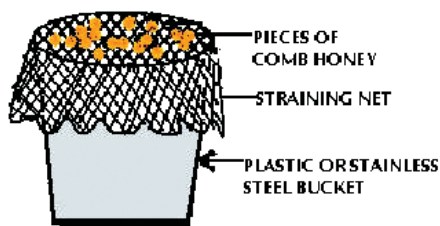
Simple method

1. Fold the piece of cloth 2 times to make 4 layers and tie it around the neck of a dry plastic or stainless steel bucket.
2. Let unprocessed honey flow by gravity into the bucket.
3. All the impurities strained remain in the layers of the cloth.
4. Allow the strained honey to stay overnight.
5. Remove the top layer that is creamy using a spoon.
6. Put the honey in an airtight container.

Water-bath method

This method is suitable for honey that has been harvested and stored for some-time, such honey has already crystallised (hardened):

1. The honey is indirectly heated in a water-bath (as shown in the sketch) to make it flow easily for straining purposes. The processor should ensure the temperature is just enough to make the honey flow (around 45°C).
2. Stir the honey continuously as you heat it to distribute the heat evenly.
3. Heating also destroys yeast that causes honey fermentation, which occurs when the honey moisture content is above 17°C.
4. Once the warm honey has passed through the straining cloth, cover the bucket with a lid. Allow it to settle for a maximum of 3 days.
5. Remove the creamy top layer as in the first method above using a spoon.



6. Pack the honey in an airtight container ready for the market or home consumption.

How to test honey for adulteration

Some unscrupulous traders often add various substances such as molasses, sugar starch or glucose to honey in order to increase its quantity and sell more. Research shows that more than 25 per cent of the honey being sold in the local market is either impure or is adulterated. It is important that consumers know how to tell good honey from adulterated honey. Good honey has the following qualities:

- If you tilt it, good honey has a smooth flow (it is viscous).
- Good honey has a unique aroma and taste. Ensure that you taste the honey if it is not already packed to ensure you are not cheated.
- Good quality honey forms a bead or layers if allowed to flow into any surface.
- The colour of honey may not help to tell if the honey is good or not. The colour mostly depends on the type of forage from which the bees collect the pollen.
- Quality honey crystallizes (hardens) when exposed to lower temperatures.
- To test honey for excess moistures, put some honey in a piece of cotton wool, light a match stick and expose it to the fire. It will make a cracking sound if there is excess water and burn normally if the honey is of good quality.

Farmers' feedback on feeds story

Our article on how to make feeds (issue Nr. 81, March 2012) has elicited a lot of debate from farmers across the country, below are some of their observations:

We need formula for cows

Thanks for your chicken feeds formulations article. Besides Pearson Square Method, is there any other different method for chicken feeds formulation? Please provide feeds formulation for dairy, beef and zebu cows too. Ramadhan Odhiambo email: ramakokha06@yahoo.com:

Formula was kept a secret

Thank you for sharing with farmers chicken feed formulations on this magazine. For long, the feed formula had been kept a secret by feed makers. I am going to try it. My only problem is where to get the ingredients cheaply in order to save on feed costs. Let us share the information. Beatrice W bwgrungu@yahoo.com

It will help me

Your article on feeds will go a long way in helping me as a poultry farmer. Thank you. Wairimu - wairimuwamuchiri@gmail.com:

A good feed formula

The feed formula is really great, it is exactly what I have been waiting for. For the few who do not see the difference, the secret is to go bulky. Kadamu email: eskadamu@yahoo.com:

How about feed for turkey

I need tips on how to feed turkey and their vaccination program. Enock Ochola email: eochola@nema.go.ke:

The feed formula works

I have attempted the proposed chicken feed rations and they are working considerably well. I am selling Kenbro hens at Ksh 750 each. Please contact me on 0721 344 852. Lucas Wahinya, osmwapoultryfarm@gmail.com:

We have raw materials

Do you need raw materials for making animal feeds? We have cotton seed cake, sunflower, omena, pollard, wheat bran, maize germ, fishmeal and lime. We also stock premixes for all types of all animal feeds. Contact Jacob Tarime Suppliers Tel 0729 099 550, City Stadium, Nairobi email: tarimesuppliers@yahoo.com

I do not think it works

From my own critical analysis of the above formulae, in relation to the cost of ingredients, I tend to think there is not much cost savings when you make your own feeds. Jane Melly, Janemelly38@yahoo.com,

Editors note: The cost of feeds is a very critical factor in animal production. It is mainly determined by availability of raw materials and quality. The response from farmers is a clear indicator that all is not well in this industry. We will feature more on feeds in future issues of The Organic Farmer.

continued from page 6 **Kagio-cakes**

lizes blood pressure and controls glucose levels in diabetic patients (see *TOF*, September 2011 issue). However, Murimi insists that the group is making profit which they reinvest into the group. The *i-TOF* field officer for Central province, Peter Murage, has been instrumental in helping the group in writing funding proposals and advising them on adding value to their farm produce.



Uzima group members inspecting a Moringa nursery