



Students at Kodero Bara High School in Migori County read TOF magazine: The agriculture teacher partly attributes improved grades in the subject to TOF readership. The average score in agriculture subject was 9.4 in the 2013 and 10.5 in 2014 Kenya Certificate of Secondary Education examinations. Agriculture is the best performing subject in the school and the students practise what they learn in school and at home. Page 6

Proper weeding increases crop yield

TOF - One of the most undesirable plants in a crop field are weeds. Weeds are like parasites since they use up a large portion of nutrients from the soil if they are not controlled on time and in the right way. Every year, farmers in Kenya and most African countries lose between 15 and 90 per cent of their crop yields due to weeds. Research shows that farmers can harvest up to 2.6 tonnes of maize (about 29 bags per acre) if they practised timely and



proper weed control combined with good crop and soil fertility management practices.

The average maize yield in most parts of Africa is, however, about 0.8 tonnes (about 9 bags each 90kg) per acre, partly because of poor weed management. Due to the high cost of labour, most farmers ignore weeds or use ineffective ways of controlling them. This results in weed problems worsening, decreased crop yields and loss of income.

Apart from taking away important nutrients that crops depend on for healthy growth, weeds also harbour pests and diseases. Weeds can prevent growing crops from getting adequate sunlight which they require to make food and grow. They also take away water (in form of moisture) and space

that should be occupied by crops.

After planting, many farmers take too long to start weeding and usually start weeding after the weeds have overgrown. The weeds use up nutrients, light and water leaving the crops weak and unhealthy. In some cases, farmers neglect their crops because they have to work elsewhere to raise money for other urgent household needs such as food, school fees and medical bills. But proper planning can help avoid delays in weeding, which are costly in the long run.

For organic farmers, controlling weeds without using chemicals is extremely important. Do not use chemicals like RoundUp®, which is a common herbicide that has been banned by the World Health Organisation (WHO). Roundup® is also prohibited in several countries because it has been linked to some cancers and other health complications. Weeds should be properly uprooted and disposed of or buried deep in the soil where they cannot grow again. This is to prevent repeated weeding which is expensive and time consuming. Remove weeds before they produce seeds so that you can prevent their reproduction. Page 2

Dear farmers,

Agriculture in Kenya and most of Africa is in a crisis. For many years, we have been made to believe that the only way out of constant food problems in Africa is to embrace modern methods of crop production especially industrial agriculture and monocropping (growing only one crop in a large area of land). Billions of dollars have been spent by local and foreign governments to enable Africa to be self reliant in food production through developing or supporting policies that promote industrial agriculture.

Industrial farming heavily relies on new or improved seed varieties (some of which are GMOs), use of chemical fertilizers to provide nutrients to crops and chemical pesticides to keep insects and diseases under control. Monocropping depletes the soil of nutrients since the same crop is grown on large pieces of land, year after year. To produce high yields, farmers are forced to use chemical fertilizers, which together with the chemical pesticides, are washed into rivers and streams thus polluting the waters and causing growth of invasive weeds.

Food security is based on diversity. Farmers should be facilitated to produce different food crops for a balanced diet and to share it with their extended families to meet their nutritional needs.

The Galana-Kulalu irrigation project aims to irrigate over one million acres of land to produce food for the country especially maize, which is a staple food. While the project may have good intentions, history has proven that such projects rarely benefit small-scale farmers or contribute to food secure communities.

A new study by the University of Anglia (UEA) researchers in Rwanda, which was released last month, has confirmed that indeed, modernization of agriculture in Africa has not increased food production. It has instead disturbed sustainable traditional farming system that ensured many different crops, which are sources of balanced food. The crops which were produced every year were rich in carbohydrates, proteins, vitamins and minerals. Farmers should be able to use available resources on the farm in a way that works in harmony with nature to produce food. They should also be encouraged to conserve their environment, including the soil and water, through practices such as agroforestry, crop rotation and use of organic manures.

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For a good harvest, weed control is important

Farmers who ignore weeds get poor crop yields because weeds compete with crops for nutrients, sunshine and space. They may also harbour pests and diseases.



Photo: TOF

If not controlled on time, weeds can cause great loss in yields in any crop. Farmers should always ensure their crops are weed free during the entire growth phase.

Elkanah Isaboke | Keeping your crop free of weeds is critical in good farm management. Farmers should plan their farm activities well so that they do weeding at the right time and in the right way. Weeds use the nutrients that your crop needs to grow. They may also harbour diseases and pests which destroy and weaken the growing crops thus reducing the yield at the end of the season.

Ploughing helps spread weeds

Ploughing is the most common method used by farmers to control weeds. For crops like maize, weeding is usually done two times after planting - three weeks after planting and when the crop is knee high. Weed control starts at the ploughing stage when the soil is turned

over to bury any weeds and to loosen the soil. Ploughing buries weed seeds while at the same time brings to the surface seeds buried in the subsoil. Here, they germinate causing more problems for farmers. Ox-drawn ploughs and tractors also facilitate spreading of weeds on the farm. The plough cuts the weeds down and drags them along as it moves. Eventually, the weeds spread throughout the farm.

Some ways of controlling weeds without chemicals

It is always wise to control weeds when they are still young before they produce seeds. Weeds should never be allowed to grow until they compete for nutrients with the crop. Uproot them manually, cut or slash to stop them from producing seeds.

1. Practise minimum tillage

Minimum tillage is a system of agriculture that ensures that the soil is not disturbed much during land preparation. The system discourages ploughing of land such that weed seeds buried in the soil are not brought to the surface. Suitable cover crops are planted instead to suppress weeds before they can grow.

Select good cover crops which have several uses. These include dolichos or *njahe* (lablab) which provides human food and animal fodder. Lablab can cover the soil completely in about two months. Mucuna is also a good cover crop that also provides food. It suppresses weeds including striga.

Purple vetch and desmodium are also good cover crops. When growing cover crops, it is important to weed once to give the cover crop a chance to establish. If there are good rains, farmers can schedule the planting of the

cover crop such that it remains in the field even after the main crop has been harvested.

2. Mulching

Weed seeds germinate easily if the soil is left bare. Mulch makes it difficult for weeds to grow because they do not leave any space or light for weed germination. Mulch not only control weeds, but also reduces soil temperatures, conserves moisture, enables water to penetrate the soil and adds organic matter, which enriches the soil.

3. Crop rotation and intercropping

Practising crop rotation and intercropping breaks the life



cycle of weeds leaving fewer weeds that are easier to control. Intercropping helps cover the soil and smother weeds that grow between the rows of the main crop.

How to keep weeds under control

1. Slash weeds immediately after harvesting and during the dry season to prevent them from producing seed.
2. Before planting, slash down any plants (such as weeds and maize stalks left over the previous season) in the field.
3. Dig planting holes with a hoe or open planting furrows with a ripper or sub-soiler (see picture).
4. After the first rains have fallen allow weeds to grow or new weeds to emerge, and then weed them out before planting.
5. Plant a cover crop between rows of the main crop.
6. Check for weeds every week and control them by pulling them out by hand or by scraping the soil surface with a hoe. Do not dig as this exposes weed seeds that later sprout.
7. Harvest the main crop and allow a cover crop to remain in the field and grow.
8. Remove weeds continuously regardless of whether there is a crop in the field or not. Remember some weeds take 3 to 5 years to disappear completely. Continuous weed control can eliminate or reduce weeds to a minimum.
9. Avoid the use of chemicals in weed control. Most chemicals in the market leave dangerous residues in crops and in the soil which are harmful to human, animal and environmental health. Weed control chemicals such as Roundup® have been found to cause cancer.

The Organic Farmer is an independent magazine produced monthly for the East African farming community. It promotes organic farming and supports discussions on all aspects of sustainable development. The articles in the *The Organic Farmer* do not necessarily reflect the views of ICIPE and Biovision Foundation.

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Sponsor Biovision, a Swiss-based foundation for the promotion of ecological development, based in Zürich, Switzerland.

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Farmer uses herbs to treat animals and people

Makumi Njue has wide knowledge of herbal remedies that he uses to treat animals and people. The traditional medicine is cheap and safe compared to chemical drugs that have the potential to affect people especially if they consume milk and meat from treated animals.



Mr Njue feeds his dairy cow with leaves of a fodder tree that also controls worms.

Peter Kamau | Makumi Njue is a dairy farmer in Gitare village in Runyenjes division of Embu County. He is, however, a different kind of cattle keeper. When other dairy farmers run to seek the services of a veterinary officer or an agrovet shop to buy veterinary drugs, Njue simply observes a sick cow and once he has diagnosed the problem, gets a *panga* and a hoe and heads to a nearby forest. Here he looks for roots and herbs that can treat the condition, prepares it and gives the sick cow. Within days, the cow will be on its feet again, completely healed. Njue has been treating his animals for the last 26 years and he has not had any complications that would need a veterinarian.

“Some of the chemical drugs that people rely on to treat various ailments have serious side effects such as allergies and other health complications. Some drugs used to treat animals also end up affecting people who consume animal products such as milk and meat. This is because farmers rarely observe the withdrawal period—the length of time that a treated animal should stay before its milk or meat can be consumed by people.

This is to ensure drugs used to treat the animal are removed from its body before its products can be used. Farmers have a tendency to sell milk and even slaughter animals before the recommended withdrawal period is over. People taking milk or meat of such animals end up consuming the veterinary drugs which may have serious health implications,” he adds.

He can treat many diseases

Njue is known in Gitare village and beyond for his knowledge of herbs and has been treating animals belonging to other farmers in the region, “I can treat East Coast Fever (ECF), all forms of diarrhoea, allergies, mastitis, after birth complications like retained placenta and many

other diseases that affect cattle, sheep, goats, chickens and other poultry,” he says.

Makumi gained his knowledge from his father, General Maina Kevote, a renowned freedom fighter. His grandfather who was a beekeeper knew very many trees and shrubs. Makumi would accompany him to Mt Kenya forest where he came to learn the use of many herbs to treat animals and even people. Apart from the knowledge he gained from his father, Makumi would talk to many elderly men in his village who also taught him how to use other herbal plants. He learnt how to process them, the right doses for people and animals and length of treatment.

Documented many medicinal plants

Today, Makumi has kept a record of about 100 trees and shrubs that can be used to treat both animals and people. Every week he goes to the forest to collect herbs and seeds from various trees, which he plants in the farm nursery and later transplants to a section of

his farm. “The rate of deforestation is alarming and soon, we may lose many of these useful trees and shrubs. I have found it wise to conserve them since we will need them in future not only for the treatment of people and animals against various ailments but also to maintain our environment and biodiversity,” he says.

Working to register herbs

Makumi has teamed up with two farmers, Nyaga Kiarago and Willy George Nguri from Gitare village to learn and document more medicinal trees and shrubs. They intend to reproduce these and make herbal remedies for ailments affecting people and animals. They also plan to register with some of the veterinary and medical research institutions and universities in the country. Their aim is to come up with well researched herbal remedies to cure human and animal diseases.

The three farmers are speaking with most of the old men in the region renowned for their knowledge on herbal cures, “We need to tap the knowledge of

these elderly herbalists. They may not live for long, so we thought it is wise to seek their valuable knowledge that could help manage many diseases in future,” says Makumi.

A vast knowledge of herbs

A walk in Makumi’s 5-acre farm is botanical journey that reveals his vast knowledge of trees and herbs. He has planted many around the homestead, “The bark of *muiiri* (*Prunus Africana*) can be used to treat many conditions in both livestock and people. *Mukoigu* (*Bridelia mowicrantha*) treats indigestion in cows, and its bark can also be used to treat broken limbs in animals by tying it around the broken part. It heals better and faster,” he says while explaining the use of each and every medicinal plant we come across in his *shamba*.

As we leave Makumi’s farm in the evening, we are amazed by his immense knowledge and skills in the use of medicinal plants. ■

Useful medicinal trees and shrubs for treatment of animals

Below we give some of the medicinal trees and herbs farmers can use to treat dairy cows.

| Botanical name of plant | Local names | Active ingredient | Disease controlled | Animal | Treatment |
|---|---|-------------------|-------------------------------|--------|--|
| Red hot poker (<i>Erythrina abyssinica</i>) | Muhuti (kikuyu) Olepangi (Maasai) | Flavonoids | Babeosis (tick borne disease) | Cattle | The roots of the tree are boiled |
| African Plum (<i>Prunus Africana</i>) | Muiiri (kikuyu) Mivili (Kamba) Twendet (Nandi) Mweria (Meru) | Pygeum extracts | Babeosis | Cattle | The bark is boiled and the solution is given to the sick animal. |
| Baobab (<i>Adansonia digitata</i>) | Baobab | Flavonoids | East Coast Fever (ECF) | Cattle | The bark is boiled and the solution is given to the sick animal. |

Farmers interested in using medicinal plants can contact Makumi on 0738 259 592

Farmers need to know how to cope with climate change

Climate change is an emerging threat to the economic, social and political well being of people globally. Agriculture is also affected by change in climate. Farmers have a role to play especially in environmental conservation.

Sarah Ndonge | It is now more evident that world climate is changing. Temperatures have increased, and rainfall patterns have become more irregular.

There are also longer dry spells, increased pest and disease incidences and scarcity of water.

Farmers can adopt some environmentally-friendly ways of farming to adapt to climate change. These include:

1. Drip irrigation

This is the slow and frequent application of water directly to the plant through emitters (small openings) on a drip line. A suspended water tank attached to the drip lines allows the water to trickle directly to the root of the plant.

Benefits

Drip irrigation allows for the efficient use of water and inputs such as organic fertilizer, compost or manure. Drip irrigation maintains the moisture content of the root zone even when the temperatures are high. Due to its efficient water use, it reduces the amount of water needed to grow crops. Water is uniformly distributed to the



plant, and this ensures water is conserved. This type of irrigation is cost effective as it uses less pressure, less energy and cost. Also it is not labour intensive. The water is distributed to the crop via emitters thus there is less erosion from runoff water. Since minimal water is used, the leaching of nutrients is also reduced.

Requirements for small-scale irrigation: 200 litre tank for a 7 by 15 meters plot size, drip lines, pipes (mainline and emitters) and drip irrigation kit. These items are available in agrovet shops. This technology requires technical assistance to install.

2. Crop rotation

Farmers have practiced crop rotation for many years. This practice involves alternating crops from different families between seasons to interrupt the lifecycle of insect pests and improve soil fertility. It is recommended that farmers rotate crops from different crop families such as:

- *Leguminosae/malvaceae* family: Garden peas, snow peas, bread beans and okra.
- *Alliaceae* (onion family): Onions (bulbs), spring onions, leeks and garlic
- *Solanaceae/amaranthaceae/umbelliferae* family: Tomato, amaranth greens (*mchicha*), green pepper, egg plant, beet-root and carrots.
- *Brassicaceae*: Cabbage, kales, cauliflower and radish.

Benefits

Crop rotation allows the soil to replenish its nutrients therefore reducing soil degradation. It improves the soil structure, drainage and its ability to retain water and nutrients. Crop rotation also supports pest and disease control thus reducing the need for the use of pesticides.

Requirements: Crop rotation requires no special tools but knowledge of growing crops from different families (as shown above) during the different planting seasons (See TOF No. 93 February, 2013).

3. Agroforestry

This is where trees and shrubs are grown together with the main crops in the farm.

Benefits

Trees provide shade which helps lower the temperatures



Farmers should adopt sustainable agricultural practices in order to overcome the effects of climate change.

and improve the microclimate in the area for crops. In addition, trees control soil erosion and provide leaf litter for mulching. They are also a source of timber and non-timber products which can provide income to the farm owner. They are useful as wind-breakers especially in areas that experience strong winds. Trees are also important for carbon sequestration, a process that allows the leaves of the tree to use carbon from the atmosphere for photosynthesis. Some trees such as leucaena and tithonia improve soil fertility (See TOF No. 107 April, 2014 for more information).

Requirements: Agroforestry needs no special tools except knowledge of the most suitable tree species for a specific agro-ecological zone.

4. Roof rain water harvesting

During the rainy season, a lot of water is wasted as runoff especially in areas with no cover crops or trees. However, roofs of buildings can provide a good opportunity to harvest and store water during the rainy season.

Benefits

Storing rain water that is plenty during the rainy season reduces water problems that usually



occur during the dry season or when the rains delay. The collected rain water can provide water for irrigation and for livestock during the drier seasons. Such water is, however, not recommended for drinking because it may be contaminated with chemicals from the air or roof.

Requirements: The rainwater harvesting system is simple to put up and easy to maintain. One needs a roof which acts as the surface that directly receives the rainfall gutters to collect and transport the water, a filter to remove suspended rubbish from the collected rainwater and a tank to store the collected water.

5. Mulching

Mulch is a protective layer of material that is spread on the soil. The protective covering of organic matter, such as leaves or grass, helps plants retain moisture especially during the drier seasons.

Benefits

When the organic matter rots, it provides a source of nutrients for the plants. It also prevents the growth of weeds in the farm and promotes the preservation of soil moisture. It also reduces soil erosion by reducing the speed of runoff water and the formation of soil crust (hardened part of top soil).

Requirements: Mulch, which can be in form of leaf litter, dried grass, ground wood debris.

Source of information: *Climate Change Impacts on Ecosystem Services and Food Security in Eastern Africa (CHIESA)*. For more information contact Sarah Ndonge at 0719-052709 or sndonye@icippe.org website link: <http://chiesa.icippe.org/>

Make lemons an important part of your diet

Lemons contain the most essential vitamins, minerals and compounds that protect the body from diseases,

Dr. Peter Mokaya | Citrus fruits, including lemons, have been associated with many health benefits. These include, cell protection, immune system regulation, and inflammation relief to name just a few general nutritional benefits: What lemons don't have is a lot of calories - may be another reason they're so popular. Who doesn't like lemonade, and the bright, fresh flavour lemons added to so many dishes, especially on pan-fried tilapia fish.



Avoid processed lemon juice

Bottled lemon juice and other processed fruit juices are not as healthy as they seem, and contain very high amounts of fructose and potentially dangerous additives. These also lack the vitamin C that fresh lemons have and are therefore not useful. In fact, many have added sugars and preservatives that are harmful.

The citric acid in lemons aids in digestion and helps to dissolve kidney stones, while the ascorbic acid is a natural antioxidant that prevents a disease called scurvy. Other antioxidants in lemons include β -carotenes, beta-cryptoxanthin, zeaxanthin, lutein, and vitamin A, which promotes healthy mucus membranes, skin and vision. Pantothenic acid and folates, provided by lemons, are compounds needed by the body, but can only be derived from sources outside the body.

Use organic lemons

Most conventionally grown fruits have pesticide residues on their skin. Such skin is not safe to eat or use for cooking because of the chemicals. The only way to be confident that what you are eating is pure is to buy organic lemon.

Here are some nutritional facts about lemons:

- Lemons contain no fat and very little protein. They consist mainly of carbohydrates, some minerals, vitamins and water.
- The carbohydrates in lemons are primarily composed of fibres and simple sugars

such as glucose, fructose and sucrose.

- The main fiber in lemons is pectin.
- A medium sized lemon only contains about 20 calories.

Soluble fibers like pectin can lower blood sugar levels by slowing down the digestion of sugar and starch. Dietary fibers are an important part of a healthy diet, and linked with numerous health benefits.

Lemons have many vitamins and minerals

It is probably no surprise that lemons provide a lot of vitamin C, but the amount per serving is pretty impressive at 187% of the daily value, making it a super infection fighter. Lemons are also a good source of thiamin, riboflavin, pantothenic acid, iron, and magnesium, and are an excellent source of fiber, vitamin B6, calcium, potassium, and copper, as well as folate and potassium.

Vitamin C: An essential vitamin and antioxidant. It is important for immune function and skin health.

Potassium: A diet high in potassium can lower blood pressure levels and have positive effects on cardiovascular health.

Vitamin B6: One of the B vitamins; it is useful in converting carbohydrates in food into energy.

Other beneficial compounds in lemons

Citric acid: The most abundant organic acid in lemons. Helps the kidneys work properly and may help prevent the formation of kidney stones. It is also

useful in soothing sore throats, renewing the skin, among other benefits.

Hesperidin: An antioxidant that strengthens bones and blood vessels and prevents atherosclerosis.

Diosmin: An antioxidant that is used in some drugs that affect the circulatory system. It improves vascular muscle tone and reduces chronic inflammation in blood vessels.

Eriocitrin: An antioxidant that is found in lemon peel and juice.

D-Limonene: Found primarily in lemon peel. It is the main component of lemon essential oils, and responsible for the distinct smell of lemons. In isolation, it can help relieve heartburn and stomach reflux. Many of the plant compounds in lemons are not found in high amounts in lemon juice, so it is recommended to eat the whole fruit for maximum benefit. Choose organic lemon for this reason.

Health benefits of consuming lemons and lemon products

As for the vitamins and minerals, lemons come with infection-fighting vitamin C, as well as thiamin, riboflavin, pantothenic acid, iron, and magnesium, fiber, lots of B vitamins, calcium, potassium, copper, folate, and potassium.

The above vitamins and minerals fight the following conditions:

1. Flu and colds

One of the most effective remedies for cold is made from

lemon: Start with one pint of raw honey over very low heat. Chop a whole lemon into a bit of water in a separate pan, warming for two to three minutes. Add that to the honey, preferably organic honey. Warm for about an hour, then strain out the lemon bits and seeds before taking.

To soothe a cough: Give 1/2 teaspoonful for a 25 lb. child (11kg), 1 teaspoonful for a 50 lb. child (22kg). For adults, take 1 tablespoonful, about 4 times a day or as often as needed.

2. Cardiovascular Health

Cardiovascular diseases, including heart attacks and strokes, are becoming common. Intake of fruits high in vitamin C helps reduce heart diseases.

3. Prevention of Anaemia

Anemia is often caused by deficiency of iron, vitamin B12 or folate. It is most common in pregnant women, athletes, those with certain diseases like cancer, or women just about to reach menopause. Lemons contain small amounts of iron and folate, but they are a great source of vitamin C and citric acid, which increases the absorption of iron from other foods. Because lemons can enhance the absorption of iron from foods, they may help prevent anemia.

4. Cancer

Research has shown lemons are a potentially beneficial in the treatment of cancer, including breast cancer in patients undergoing chemotherapy.



Lemons are much healthier and safer, if they are grown using organic farming practices, which are free from harmful pesticides and chemicals.

Dr. Peter Mokaya, Director and CEO, Organic Consumers Alliance(OCA), Website: www.organicconsumers.co.ke Email: Peter.Mokaya@organicconsumers.co.ke or Mokayppm@gmail.com ■

Biovision nurtures future farmers through organic farming

The Biovision Farmer Communication, of which TOF programme is a part of, encourages and supports pupils and students in educational institutions to learn organic farming early in life.

Musdalafa Lyaga | Young people in schools are taking steps to combat hunger, enhance food security and improve rural livelihoods across the African continent. In Kenya, free primary education has increased primary school enrolment to more than 50%, and this is already seen in the increased number of students joining secondary schools, universities and colleges. This presents opportunities to reach more young people with information on ecologically friendly farming practices.

Now more than ever, technology is making it possible for pupils and students in schools to access information on new innovations, technology and emerging trends in agriculture, which they pass on to their parents and other farmers in their communities.

TOF in schools

Biovision Africa Trust (BvAT) through the Farmer Communication Programme (FCP), has been focusing on potential future farmers to transform rural farming communities in the country. TOF magazine has been made available to schools that request for copies. Through TOF pupils, students, teachers and parents have learnt various agricultural practices which are not harmful to human, animal, plant and environmental health.

Peter Murage, the extension officer in charge of the Kagio Biovision Resource Centre has been working tirelessly with several secondary schools to give them practical information on organic farming. At Thumaita Secondary school in central Kenya, the school management has set aside an acre of the school land for a demonstration plot where students and the surrounding farming communities learn various organic farming practices.

"We use the demo plot to train students and farmers neighbouring the school on compost-



Peter Murage (in a t-shirt) shows Thumaita secondary school students how to prepare compost for use in the school farm.

ing, mulching, minimum tillage, agroforestry, among other environmentally friendly farming practices. We have also planted sweet potatoes which are now supplementing the school diet for students and teachers. Now I do not have to eat bread from the shops as it can be quite expensive," says Mr. Charles Macharia, a teacher at the school in charge of the Young Farmers' Club project.

More schools interested in organic farming

"Many schools have indicated their interest and willingness to revive and support their young farmers' club as it presents many benefits to the school and the surrounding community. The schools that have already started practicing what we have taught them have been able to get some of their food supplies from the school farm," observes Murage.

The same has been replicated in Kenya's Eastern region, which is largely semi-arid. Through the leadership of Mr. Joseph Mbithi, the FCP field extension officer based in Makueni County, a demonstration plot was set up in Mutulani Primary School. Here pupils, teachers and the neighbouring community get to learn about organic farming and other sustainable agricultural practises.

Performing arts spread message

Ms. Regina Muthama, the chair-lady of Katoloni Mission CBO and Biovision Resource Centre in KALRO Katumani, Machakos, and her team have been teaching pupils organic farming through performing arts - songs, dramatized verses and plays. "Children learn best when they are having fun and are actively engaged, so they are able to retain knowledge and skills

learnt in childhood which will be useful later in providing solutions to the existing problems. It is critical that children are introduced to sustainable farming practices at an early age," says Ms. Muthama.

Organic farming thriving in slum areas

Henrieta Githeu, a resident of the slums of Mathare in Nairobi, spends her time at the Mathare Youth Sports Association grounds. She has attended training sessions on using sacks for kitchen gardens facilitated by Biovision's Outreach Officer, Ms. Njeri Kinuthia.

"The knowledge I have received from the training is something I am eager to practice and teach my siblings at home because most of the time we go hungry. We lack money to buy food, yet we have space and energy to grow our own food and even sell the surplus," says Ms. Githeu.

These young powerful voices represent the future farmers. They continue to remind all of us to rise up, join hands and promote sustainable agriculture for food security, nutrition and improved incomes and livelihoods.



Regina Muthama uses performing arts to promote sustainable agriculture practices in schools.

The Biovision Farmer Communication Programme is implemented with the support of Biovision Foundation, a Swiss-based charitable organization, and other partners. The programme uses TOF magazine, *Mkulima Mbunifu* magazine (for Tanzania), TOF Radio, field based extension agents and web-based channels like Infonet-Biovision online database to reach farmers in East Africa. ■

Organic production is possible in a greenhouse

Is it possible to do organic greenhouse farming?

Yes, it is possible to produce crops organically using a greenhouse. Production, however, requires a lot of care to prevent and control common crop diseases and pests in the greenhouse. Apart from flowers and fruits, one of the most important crops that farmers prefer to grow under greenhouse conditions are tomatoes. Tomatoes are prone to many diseases and pests. To grow them successfully, you will need to start by selecting a suitable place to put up the greenhouse to minimise the threat of diseases. The diseases and pests that affect tomatoes in a greenhouse are outlined below:

Diseases

1. Bacterial wilt: This is a devastating disease that is caused by bacteria called *Ralstonia solanaceum*. The disease has no known cure. Bacterial wilt affects all crops in the potato family including tomatoes, chillies, capsicums, eggplant and bananas. The disease can only be controlled through crop rotation. For a farmer who wants to put up a greenhouse especially for tomato production, selection of the site to set up the greenhouse is very important. Select a site where none of the crops mentioned above have been grown for up to five years. Alternatively look for a new site where no crop has been grown before. Soil tests for bacterial wilt are very expensive and are therefore not a good option for most small scale farmers. No plants in the potato family should be planted near the greenhouse.

2. Early and late blight: Tomatoes are prone to early and late blight. To control these diseases most farmers use chemicals. All chemicals are prohibited in organic farming except copper oxychloride (Cupravit®WP) you can spray this chemical at least once a week throughout the growing period.

Pests

Pests are easy to control in a greenhouse since the environment is controlled. A greenhouse has screens that keep out pests. But workers entering the greenhouse have to ensure the screens at the entrance do not allow pests to get in by keeping the screen doors closed at all times. Whiteflies are usually the most troublesome pests in greenhouses. To control them, place insect traps such as yellow sticky polyethyl-

ene papers all round the fence around the greenhouse and even inside it to trap insects like whiteflies.

Farmers can then use organic inputs such as those prepared using plant extracts (See TOF issue No. 17, *Plant extracts special edition*). If well prepared, plant extracts combined with growth activators such as EM1 can boost crop health and create resistance against diseases.

Except for labour, the cost of organic greenhouse production is low compared to con-

ventional greenhouse production. For farmers who would like to buy organic inputs for greenhouse production, there are many organic fungicides,

nematicides and biopesticides available in the market that they can use. The table below shows some of the inputs farmers can use:



Organic tomatoes in a greenhouse in Kamulu in the outskirts of Nairobi.

| Stage of growth | Organic Product | Dosage | Spraying | Application method |
|--|----------------------------------|------------------------------------|----------------------------|--|
| Before planting | Biox500 | 200ml | 1 litre/ 90 m ² | Drench (allow 2 days before planting) |
| Seed treatment | Trichotech Mytech Vitazyme | 2.5g 2.5g 5ml per kilo seed | - | Mix the seeds with and dry under shade |
| At Planting | Agriorganic (6:7:7) fertilizer | 400kg/litre | - | Apply in planting holes furrows and mix well with soil |
| Two weeks after planting and up to flowering | Vitazyme Radiant | 50ml 10ml in 20 litres of water | 8-12 | Spray the mixture to run off |

Farmers who require the organic products shown on this table can contact Lachlan (K) Ltd Tel. 0722 209 474 or Juanco SPS Ltd 020 2088 793, 0722 078 05/6.

Farming Tip

Clarification on how to prepare dairy meal

Our articles on home-made dairy meal in the last month's issue of TOF Magazine has elicited a huge reaction from farmers in Kenya and abroad. Within two days of posting the issue on our website, more than 3,000 farmers responded to the article seeking clarification. Because of the huge reaction, underscoring the popularity of the magazine, we have decided to provide clarification needed in dairy meal ration preparation. The dairy meal ration is simple to make because the farmer only needs three ingredients - maize, fodder legume and mineral salts.

Ingredients

1. 5kg of whole maize on the cob
2. 5kg flesh calliandra/ sesbania/ Lucerne/ lucaena

3. 200g minerals (such as maclik Super®, dairy superphosphate® or Unga High Phosphorus®)

NOTE: Most farmers raised concern on the amount of mineral salt needed. The amount of mineral salt used must always be 2% (0.2) of the total quantity of ingredients used. For example in the above ration the amount of salt used is 200g and not 2kg as was erroneously written. For a 100kg ration (50kg of whole maize and 50kg of calliandra, Lucerne, desmodium or lucaena, the amount of mineral salt is 2kg). The error made in the previous article was an oversight and is highly regretted.

Preparation: Grind the whole maize together with cob into gristed form (*chenga*). Wilt the calliandra, sesbania or lucerne in

a shade (not in direct sunlight) and grind it too. Mix all the ingredients thoroughly and preferably using a drum mixer or even a spade and feed the cows. You can multiply the above ingredient values to increase the amount of concentrate needed depending on the number of cows you have.

To determine how much dairy meal each cow should get, you need to know how much milk each cow produces in a day; a cow should get at least 1kg of concentrate for every 1.5litres it produces above 7litres of milk. For example, if your cow produces 10 litres of milk in a day, this means that it has produced an extra 3 litres of milk above the 7 litres.

Additional information can be obtained from William Ayako, Scientist KALRO Naivasha

TOF Rad answers your questions

TOFRadio is broadcast on Mbaitu FM as *Uthui Muundani* every Friday from 8.30PM to 9.00PM. Tune in and listen to farmer experiences and expert advice on agribusiness and eco-friendly farming methods. On this page, we respond to some of the issues raised by farmers in their correspondence to the radio program. Send your questions and comments via SMS 0715 916 136.

Farmers can earn more by adding value to sweet potato

Joyce Wambui Mahui | Sweet potato has been described in many communities especially those in dry areas as the 'king of crops' because of its ever increasing demand. The most favourite drought resistant, hardy crops grow mostly in marginal areas, thus contributing to improved food security and additional income to farmers. The young leaves and vines are usually consumed as vegetables or fed to livestock.

The orange-fleshed sweet potato variety has high beta-carotene content, which boosts the immune system. Unfortunately, during bumper harvests; farmers often sell sweet potatoes at throwaway prices. Losses after harvesting are high because the tubers are delicate and highly perishable. In some communities in Eastern Africa, sweet potatoes are preserved for the dry season by sun-drying to make dried sweet potato chips. The dried chips are boiled and mashed with beans, milled or pounded to make flour, which can be mixed with either millet or cassava flours to make stiff porridge.

Some facts about dried sweet potato chips and flour

- Any sweet potato variety can be dried to make chips, which can then be milled into flour.
- Dried sweet potato chips can be stored for up to six months when packaged in airtight, strong, black plastic bags.
- Sweet potato flour can be used to make doughnuts and pancakes.
- Flour made from the chips can also be used to make high-value flours by mixing with millet, maize or soybean flour. These mixed flours are used to make porridge and baby foods, which are easily digestible.
- Some bakeries are already using new flour mixes to make bread and cakes.
- The poultry feed industry is showing interest in using



orange-fleshed chips in their feeds to improve yolk colour and vitamin A content of eggs.

Requirements for making sweet potato chips and flour

- Mature sweet potato roots on average, 4kg of fresh sweet potato roots which will give about 1 kg of dried sweet potato chips.
- A clean area, ideally a room with raised working surfaces, such as tables – not on the ground.
- Large plastic containers, preferably 10 to 20 litre buckets with lids.
- Supply of clean water.
- A manual or motorized sweet potato chopper for chipping or slicing.
- Raised open platform for air drying, or ideally a solar dryer, placed in a clean area in full sun.

How to make sweet potato chips and flour

Step 1: Choosing the roots

- Use any sweet potato variety.
- The tubers should be undamaged and mature – three to four months for the early maturing varieties and five to six months for the late maturing varieties.

Step 2: Washing

- Wash the sweet potatoes in

clean water in large buckets, changing water as frequently as required.

- Alternatively, you can wash the roots in a sweet potato drum washer when processing large quantities to speed-up the process.

- Do not peel the roots because the peel is rich in nutrients.

Step 3: Draining

- After washing, drain by placing the sweet potatoes on a raised, perforated rack.

Step 4: Chipping or slicing

- Chip the washed sweet potatoes to uniform size (3-6 mm thick).

- You can slice them manually with a sharp knife or use a manual or motorized chopper to speed-up the process.

Step 5: Drying

- Sweet potato chips should be evenly spread on a raised platform, preferably on a clean, black plastic sheet, to sundry under maximum sunshine for about six to eight hours – it is best to do this during the hot, dry season.

- To ensure high quality chips, solar dryers can be used. A modified solar dryer, called a hybrid solar dryer, which has an additional energy source, such as charcoal, and can be used to dry the chips. Information on availability of fabricators of chippers and solar dryers can be obtained from

farmers forum

0717 551 129 / 0738 390 715

Hay: Boma Rhodes at Ksh 300 and barley hay at Ksh 200. Within Nairobi and Kiambu counties. Contact Peter on 0721 629 913.

Friesian and Ayrshire heifers: In Ol Kalao, Nyandarua. Contact 0732 744 284.

Tractors and implements for hire: We have tractors, and farm machinery for hire. We are one of the largest suppliers of hire tractors and machinery in Kenya. We have a couple of powerful tractors available for hire for any kind of task. We provide our customers with the most reliable equipment and a nationwide service network. For agricultural machinery we have trailers, seed drills, fertilizer spreaders, harrows, ploughs and sprayers. We offer very good rates and discounts for short and long time hire for up to 3 years. Long term is a cost effective way of running a tractor and farm equipment, rather than buying one and we can advise on the best options for you and your business. We stock a vast range of parts for all makes of tractor directly from the UK. Contact us on 0722 848 520.

your local extension officer or national agricultural research station.

- Chips should be dried until they are brittle.
- If drying in the open, cover chips with netting to keep off insects and birds.
- Pack chips or continue processing to flour.

Step 6: Milling

- Mill dried chips to flour using the ordinary posho mill.

Step 7: Packaging and labelling

- Pack dried chips or flour in strong (thick gauge) black polyethylene bags. Flour can be packaged in 2kg packs for distribution to shops and other retail outlets.
- Label product to state source, date of manufacture and expiry date (after six months).
- Place bags of dried chips or flour in cardboard cartons to protect them from light.

Step 8: Storing

- Store in a cool, dry place off the ground, preferably on pallets or raised surfaces.
- Flour can be stored for six months.

Source: CTA Practical Guide Series, No. 6