

The Organic Farmer

The newspaper for sustainable agriculture in Kenya

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Dear Readers,

The Organic Farmer (TOF) has continued to reach you with valuable information and knowledge on sustainable agriculture every month since 2005 with sponsorship by the Biovision Foundation of Switzerland. However, due to rising production and distribution costs and growing demand for the magazine, Biovision can no longer continue supporting production of TOF without your contribution.

Starting with the July 2017 issue, we expect all our esteemed readers to pay a modest cost charge for their copies of this magazine.

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Plant more trees to fight effects of climate change

Peter Kamau | At the beginning of each rainy season, a lot of water in the farm goes to waste unless collected and put to productive use. After planting various crops, one important activity that every farmer can engage in is planting trees. Most trees planted at the beginning of the rainy season survive if they are well managed.



Photo: IN

Despite their importance in the farm, very few farmers plant trees. Yet trees provide important benefits to the environment we live in. Most of our forests are disappearing due to illegal logging encouraged by corruption especially among forest rangers who are tasked with protecting trees especially in water catchment areas. Demand for charcoal, firewood and trees for building purposes is growing with the increasing population, putting pressure on the few remaining trees.

Deforestation alarming

Although the government has allowed the harvesting of mature trees in most of the major forests in the country, illegal tree cutting is going on a massive scale. Important indigenous trees such as podo, cedar and other protected indigenous tree species are almost extinct. To reverse the trend, farmers ought to embrace afforestation to guarantee a healthy environment in

the future. If every farmer took the responsibility and ensured to plant at least 50 trees every season; the farmers can significantly contribute to the restoration of forests and biodiversity in a big way. This is very beneficial.

Trees can reverse climate change

Trees play a very important role in the ecosystem. They take in carbon dioxide and release oxygen. At night, they take in oxygen and release carbon dioxide. However, one of the most important functions of trees is that they take carbon from the atmosphere and convert it into biomass. This, reduces the negative effect of greenhouse gases and global warming.

A single mature tree releases between 250 to 400 gallons of water. Through evaporation water is lost everyday. This can be reversed by planting trees. The water vapour released into the atmosphere comes back to the earth in form of rain which is attracted by trees.

Let us plant trees to reverse the trend by fighting causes of climate change and restoring the rainfall patterns we had before.

For complimentary reading:
<http://www.infonet-biovision.org/agroforestry>

Dear farmer,

It is another busy month for the farmers across the country. Like in other years, the rainfall has delayed hence forcing most farmers to plant in the month of April instead of March to April as has been the trend before. If the rains remain depressed as they have been in the past year, temperatures will remain high. This increases the problem of pests which tends to proliferate in high temperatures. As a result, the crops are destroyed, the harvest decreases and farmers spend large sums of money in buying chemicals to control them.

Farmers can easily control pests by adopting environmentally-friendly practices such as the preparation and the use of plant extracts from available trees and herbs within the farm. The use of plant extracts can help cut costs and it doesn't require a lot of labour, which is a small price to pay instead of using dangerous chemicals that affect humans, health, that of their animals, soil and environmental health. For farmers who have the resources, various companies have come with environmentally friendly methods for pest control that are very effective in pest control (Page 2 and 3).

Apart from these measures, the first line of defence is prevention. Farmers should not wait to see the damage by pests before they can take action. They should be proactive in crop protection. Every morning and evening, stroll around the crop field scouting for any pests, check the underside of the leaves for any sign of disease or pest.

Act immediately if there is any pest or disease. If you are using plant extracts, ensure you prepare enough to spray two or three times every week to keep pests at bay. In the maize crop, look for any signs of stem borers and apply ash, pyrethrum solution or powder in the funnel to kill any pests. Such simple measures go a long way in protecting your crops.

Since the rains may not be adequate, conserve as much moisture as you can by applying mulch to keep the available moisture in the soil for use by the crops.

Weed control is a big challenge for farmers. Weeds harbour pests and take a lot of moisture that your crops need to grow. Keep your crops weed free at all times.

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Biological methods of pest control that protect environment

Biopesticides and fungicides protect humans animals and the environment. Unlike chemicals, biopesticides and fungicides kill only the targeted pests or microorganisms. Moreover, they are cheap and do not leave any harmful residue in the soil, water or the air.

Joan Mukiri | As farmers are already aware, overuse of chemicals for pest and disease control is to blame for the destruction of beneficial insects that control pests naturally with little harm to the environment. The use of Integrated Pest Management (IPM) strategies to control pests and diseases has been found to be the most effective way to combat pest and best practice in disease management. This is due to the many benefits to overcome in the use of synthetic pesticides. In the coming two months, we will feature different biological products that farmers can prepare including those already in the market from various companies. In this issue, we feature products from Real IPM and Osho Company Ltd, which farmers can use without harm to themselves, animals, insects, consumers and the environment.

Biopesticides

Biopesticides are a form of pesticides made from organic material and are therefore free of any synthetic substances (chemical substances). Biopesticides can be either from plant origin or made from microbes. All types of biopesticides kill one or several specific targets.

Why use biopesticides?

They are friendly to non-target organisms - Use of chemical pesticides at high dosage of high toxicity will end up killing the pest and all other living organisms in the ecosystem (environment). However, biopesticides are very specific and will only



Biological products for pest and disease control

kill the targeted pest but cause no harm to the useful natural enemies, humans, animals and the environment.

They are cheaper - Biopesticides are made from naturally occurring products which makes its production cost cheaper. This translates into lower prices of the finished product as compared to synthetic pesticides.

They are safe - Biopesticides are not only environmentally-friendly but also safe for human and animals. More people are becoming health-conscious and prefer organically produced products.

Real IPM Products

The products come in various sizes or even sachets, making it convenient and cost-friendly even to small-scale farmers. (Read more in the next article published on page 3).

Diseases management

There are a wide range of products available in the market from various commercial companies. These range from different types of bio-pesticides to traps and coating (such as fungicides used for seed dressing).

The following are examples of Bio-pesticides

Real Bacillus subtilis (bio-fungicide). This is produced from a soil-borne bacterium. It is a very effective product against powdery

mildew and can be applied as a foliar spray. It is available in form of a fermented product and its recommended application rate is 1-2L/ha (½ litre-1 litre per acre).

Real Trichoderma (bio-nematicide and bio-fungicide). It is made from a fungus found in the soil known as *Trichoderma asperellum*. This fungus can grow on plant roots. Its application mode can be in form of root application or foliar spray. It has several benefits including; increasing the ability of plants to compete with soil-borne diseases that affect roots by enhancing growth and branching of roots, destruction of root nematode eggs, protecting the plants from being attacked by *Meloidogyne spp* as well as promotion of resistance in plant. The product is used for management of root knot nematodes and phytophthora. Its application can be done by drenching at a rate of 200ml/ha (100ml per acre) if one uses the spores in vegetable oil formulation and 1kg/ha (½kg per acre) when using the granular form.

Pest Management can be done through the following methods;

Metarhizium anisopliae

Real IPM (Kenya) has been working in collaboration with the International Centre of Insect Physiology and Ecology (ICIPE) and has come up with products made from metarhizium includ-

ing *Metarhizium 69*, *Metarhizium 78* and *Metarhizium 62*.

Metarhizium is a naturally occurring entomo-pathogenic fungi (a fungi that works like a parasite) ending up killing the pest). Being a contact bio-pesticide, the efficacy of the product is affected by the amount of water used. When too much water is used, run-off water from the plant canopy reduces its effectiveness. *Metarhizium* spores germinate and colonise the pest, killing it in 2 to 4 days.

Metarhizium is compatible with various fungicides and insecticides. Additionally, it is not harmful to natural enemies; beneficial parasitoids and predators which is very important in their conservation. They also have formulations for management of fruit flies.

Real Metarhizium anisopliae 69

It is formulated as pure fungal spores in vegetable oil. It is commonly used in the management of whiteflies, mealy bugs, snout beetles and thrips. When soil application is made, the surface of the soil below the crop should be covered. It is used at a rate of 200ml/ha (80ml per acre).

Real Metarhizium anisopliae 62

It is meant for management of aphids. However, for the control of waxy aphids, a wetting agent should be added to the product to enhance adhesion of the product to the pests' body. Its application rate is 200ml/ha.

Achieve (Metarhizium 78)

It is used in the management of spider mites (*Tetranychus urticae* and *T. evansii*) and varroa mite, a parasite of bees. It can be combined with use of *Phytoseiulus* and *Amblyseius andersoni* in management of red spider mites. It is applied at a rate of 1Litre/ha (½litre per acre).

For complimentary reading:
http://www.infonet-biovision.org/natural_pest_control

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 nor Biovision Foundation or BvAT.

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Farmers can use biological enemies to protect their crops

The use of natural enemies is a very effective and environmentally friendly method of controlling pests. Natural enemies are useful insects that feed on harmful ones. Hence, controlling the damage that they cause to crops apart from spreading diseases.

Joan Mukiri | Naturally, pests in the environment are controlled by useful insects that feed on them resulting in the control of their population. On its own, nature has been able to create a balance between harmful and useful insects that protect crops from destruction by pests. However, the widespread use of chemicals has disrupted this natural methods of pest control because the chemicals have wiped out the useful pests while the populations of the harmful ones has increased due to the ability of harmful pests to develop resistance.

Scientists have developed ways of rearing the useful pests in laboratories and release them back to the environment where they are used in pest control. There are companies that sell some of the useful insects (predators) that can be bought and used by farmers. These companies are The Real IPM and Osho Chemical Products. Some of the biological pest control are given below:

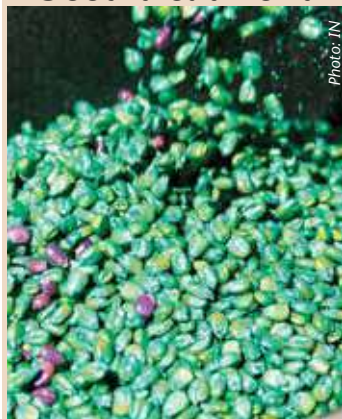
Capacity building for farmers

Some organisations like The Real IPM does not only supply pest and disease management solution, they also offer consultancy services and training to farmers. The training programmes are distant learning, workshops, practical skills, classroom-based teaching and farmers can have courses tailor-made to suit their needs. The lessons taught are fertiliser usage, pesticides, designing scouting protocols for specific crops, residue free crop production, crop specific IPM, GLOBAL GAP compliance as well as health and safety training among others.

Contact:

The Real IPM Co.(Kenya) Ltd
Telephone: +254 (0)725 806 086,
(+254) 0711 045 000

Seed treatment



Dressed maize seeds

The Real IPM company also do seed treatment for the management of nematodes and other soil borne diseases while enhancing plant growth and yields. These products include:

a) *TriCoat*-This is a seed coat that contains the beneficial soil fungus; *Trichoderma asperellum*. It protects seeds against soil borne pathogens during germination. The coat is applied by wetting the seeds by sprinkling some water on them, adding tricoat powder and mixing then air-drying the seeds under a shade for a period of 30 mins before planting. *TriCoat* also promotes root growth as well as enhancing yields.

b) *Gro Plus*-This is a phosphate based seed treatment fertilizer. It enhances root growth during the early stages of growth in different seeds including maize, sorghum, wheat, potatoes and tomatoes among others. Its benefits are that it is cheap, easy to use and increases yields.



Trichoderma can help control fungal diseases in all crops

Predatory mites

These are for the management of mites. The use of predatory mites can eliminate the need for use of acaricides (chemicals that control mites) in crop production. The predators include:

Real Amblyseius andersoni - It is useful in the management of the spider mites (*Tetranychus urticae*). They can be used in combination with either *Real Phytoseiulus* or *Achieve* (*Metarhizium 78*) when the spider mite densities are high. The predators are applied at the rate of 50,000 – 100,000 per hectare. It is recommended to do weekly applications.

Real Amblyseius cucumeris - This is used for controlling thrips due to their high resistance to pesticides. Regular inundative release are recommended. Their use can be integrated with sticky traps and *Real Metarhizium 69* and compatible pesticides for better management of all stages of thrips. Application rate is 500,000 – 1,000,000 predators per hectare per week.

Real Phytoseiulus persimilis - This is considered the best predator for spider mites because of its ability to reproduce very fast as well as feed on more spider mite stages compared to any other predator. Its use is compatible with *Real Amblyseius andersoni* or *Achieve* (*Metarhizium 78*).

Leaf miner parasitoids - *Real IPM* also do mass rearing of *Diglyphus* and *Encarsia* for control of leaf miners.

Some other physical interventions methods found in various agribusiness companies like The Real IPM are;

Sticky traps

The Real IPM has a wide range of traps and offer advice on their optimization in an IPM programme. The traps come in blue and yellow colours which are used in both monitoring and mass-trapping of flying insects including thrips, whiteflies, aphids, fruit flies and leaf miners. There are various types of these traps. A hectare of greenhouse can use 10 strips of traps and each strip retails for less than Ksh 500. Therefore, an entire hectare would cost less than ksh 5,000. The traps come in various forms;

Roller Trap

These are long yellow and blue sticky traps measuring 15 cm X 100 metres. These are placed near greenhouse doors and along vents. Blue are meant for trap-



Amblyseius andersoni



Amblyseius cucumeris



Phytoseiulus persimilis



Leaf miner

ping thrips while the yellow is best for trapping whitefly, bean fly, winged aphid, leaf miner, and fruit flies.

Entrap

These are small traps in both blue and yellow colours that are 25cm X 10cm in size with wet glue on both sides and is ideal for mass trapping. It is recommended to use 1 trap for every square metre (1000 per hectare).

Monitrap

They come in both blue and yellow colours and their size is 25 cm X 10 cm. These traps have dry glue which allow for easy pest counting and identification. It is advisable to use one trap for every greenhouse bay.



A sticky yellow strip whitefly trap

Continues on page 6

Deworm your livestock now to improve their health

Parasites take away important nutrients in the animal's body which leads to poor health, low productivity and even death. Regular deworming is important to keep your animals healthy.

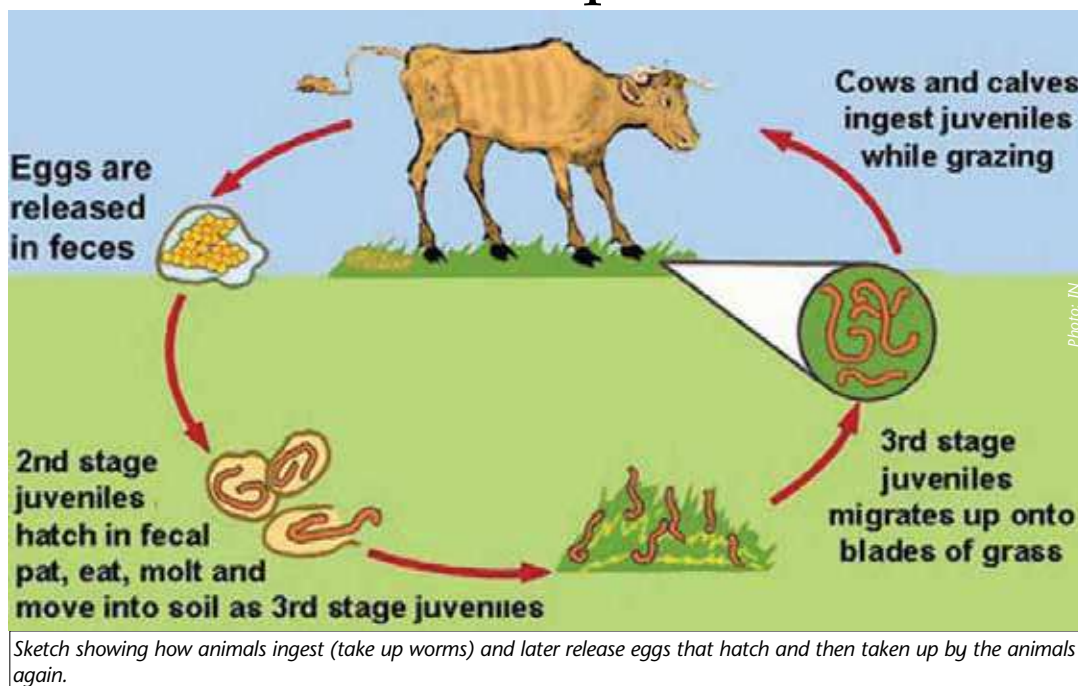
Elkanah Isaboke | Deworming animals is a big challenge to small-scale farmers in Kenya and many parts of Africa. One reason for lack of de-worming is the fact that farmers do not link the poor state of their animals to the problem of worms. They may think that their condition is due to other causes such as poor feeding, poor housing and poor management of the animals. In most cases, farmers will tend to think their animals have contracted other diseases.

There are many types of worms that affect livestock. The main ones are roundworms (nematodes) and flatworms (known as platyhelminthes).

Worm infestation management

Young calves are very prone to worm infestation because their immune system is usually low. Calves infested with worms have frequent diarrhoea, poor feeding habits and usually have rough skin which gives an unpleasing appearance. If adult cows are affected, one symptom they exhibit is low milk production and anaemia. Sometimes, cows die if they have heavy worm infestation.

As the rainy season sets in, worm infestation is likely to be the main problem, which in the long run can interfere with the normal growth and production levels in all animals. The animals mostly affected are dairy cows, sheep, pigs, goats and even domestic pets such as dogs and cats. To prevent worm infestation, farmers need to deworm their animals at regular intervals and maintain high hygienic condition in their feeding and maintain high discipline in their management (i.e. feeding them well). It is not easy to eliminate all worms in animals. But, farmers should aim to keep them at a minimum through regular deworming to maintain their animals' health. The best way to ensure the animals' health is maintained is to ensure chances of worm infestation are kept to a minimum while the vitality and the general well-



ness of the animals is maintained through proper feeding and management.

Controlled grazing

All animals pick up worms when grazing especially during the wet season. This is the case because the worms have the right conditions for reproducing and multiplying. Farmers should therefore know the life cycle of each of the internal parasites to control their multiplication much more effectively.

Grazing animals pick the worm larvae from the grass, the larvae then grow into adult worms inside the animal. Some of the worms like coccidia, intestinal worms and tapeworms mainly live in the small intestines, lungworms live in the lungs, liverflukes in the liver while brainworms in sheep and goats live in the brain.

Once the worms produce eggs, the eggs are passed out with the animal dung. If there is sufficient moisture, the eggs develop into tiny infectious larvae that survive in pastures until they are taken up by the animals again when grazing.

Good grazing practices can help control worm infestation in cattle. Farmers can take the following measures to reduce worm infestation in their animals:

- Divide the pasture into four or five paddocks and allow the animal into each paddock at a time through rotation. Graze each paddock for about a week and let it recover for one month.
- Graze the young calves first in each paddock before

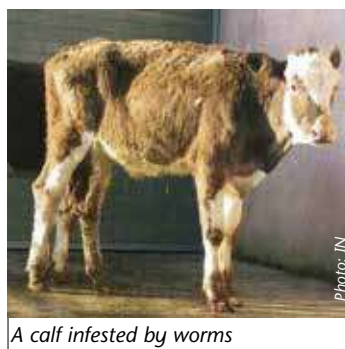
allowing the adult cows into the paddock for about a week and allow the grass to grow for one month.

- Do not overstock or overgraze the paddocks. Always leave some pasture for the next group of animals.
- Fence off any swampy area in your pasture to prevent animals from drinking water in such areas to reduce liver fluke infestation.
- Farmers should only use the right dewormers to control worms. To reduce the incidence of worm resistance to dewormers, farmers should use different deworming drugs each time they carry out deworming exercise.
- Using the right dose is also important (follow carefully the instructions given on the label of the deworming drug). This is important in order to avoid under-dosing or overdosing which all lead to resistance or related side effects. It is always important to use the services of a qualified veterinarian for proper advice on the most effective dewormers in the market and how to use them.

Natural dewormers

Farmers can also use natural dewormers to prevent worm infestation to their animals. Herbal dewormers do not work as fast as synthetic dewormers. But, they are safe for livestock and can reduce the cost of buying chemical dewormers. If given regularly to livestock, herbal dewormers can control worms effectively. Some of the herbal preparations farmers can use are given below;

- Pyrethrum extract which can be (mixed with animal feed at all times).
- Minced garlic mixed with 250g in 4 litres of water, give each cow two (2) litres after milking to avoid the tainting of milk by garlic smell.
- Various extracts of neem (neem cake, seed, oil or bark can be mixed with the animal feed).
- Pumpkin seeds or its extracts can be mixed with the animal feeds.
- *Artemisia spp.* wormwood use extract and mix it with the animal feeds.
- Wild ginger (mince 50g of aerial roots and give to the cattle, sheep and goats).
- *Albinzia anhelminitica* - *mwoowa* or *kyalundathi* in Kamba language (soak 500g of chopped bark in three (3) litres of water, leave it overnight to dissolve, sieve, drench and pour it into the animals' drinking trough for their consumption).



For complimentary reading:
<http://www.infonet-biovision.org/AnimalHealth/Worms>

Take hibiscus tea regularly for its health benefits

Hibiscus contains medicinal compounds that prevent aging, has calming effect on nerves and helps reduce blood pressure while protecting the liver from harmful chemicals. It also has weight management abilities and it is good for digestion.

Dr Peter Mokaya | Hibiscus tea is made from *Hibiscus sabdariffa*, from the Malvaceae botanical family of plants, also known as roselle. The hibiscus flowers, from which the hibiscus tea is made, look like a rose flower, hence the name Roselle. It is also known as "sour tea" because of its pleasant but sharp taste. The calyx part of the flower is what is dried to make a red pinkish-coloured tea. Hibiscus tea is especially useful during dry and hot weather due to its cooling and soothing qualities. Many cultures, including those in Africa, the Caribbean, Mexico, China, and Europe, cultivated and used hibiscus tea, not just for its flavor but for its medicinal properties.

Hibiscus extracts contain polyphenols, (compounds recognized for their disease prevention, antioxidant and anti-aging properties, among others). For nutritional and health benefits of hibiscus tea, especially the organic varieties, grow *Hibiscus sabdariffa* without the use of pesticides and related agro-chemical inputs.

What are the health benefits of hibiscus tea?

There are many nutritional and health benefits of hibiscus. They include the following;

- **Relieves anxiety and calms nerves** - High in vitamin C, minerals and antioxidants, hibiscus tea has been recognized in both traditional and modern science as a remedy to calm nervous disorders. It also calms nerves activity



A cup of hibiscus tea



Hibiscus flower (left) dried hibiscus flowers (right)

- and relieves anxiety.
- **As management for lack of sleep also called insomnia**-Hibiscus tea works through various pathways of hormonal regulation and effect on serotonin, the "feel good hormone", causing relaxation which promotes sleep.
- **Reduces high blood pressure** - A study reported in the *Nigerian Journal of Clinical Practice; 2015, Vol 18*, hibiscus was found to be more effective in lowering blood pressure. 75 participants with mild to moderate hypertension were randomly placed in three groups, each receiving a daily dose of hydrochlorothiazide (a prescription medication), hibiscus (HS) or a placebo (a harmless pill given to patients during an experiment for psychological effect).
- **Reduces the risk of stroke and heart attack**: Using hibiscus over time, can reduce blood pressure and the risk of stroke and heart attack.
- **Protects the liver**: In one study, tested on human cancer cells, this compound was found to cause apoptosis or cell death in leukemia cells (cancer cells in blood).
- **Prevents obesity and fatty liver disease**: Another study (*Hibiscus sabdariffa* extract inhibits obesity and fat accumulation, and improves liver steatosis in humans) linked hibiscus extracts with protecting the liver and preventing obesity and fatty liver disease.
- **Potential anti-cancer effects**: Research has shown that polyphenol-rich extracts of hibiscus induced cell death in human gastric carcinoma cells (cancer cells in the stomach). Hibiscus extract has also induced cell death in human leukemia cells.
- **Antioxidant benefits**: Research has revealed that consumption of hibiscus extract increases antioxidant potential (substances that removes toxic material in human cells) and reduces oxidative stress from toxins in the body.
- **Kidney stones removal**: One study found that hibiscus extract has anti-urolithiatic activity, which means it may help reduce the formation of kidney stones.
- **Liver protection**: It's also been shown to help protect the liver against chemically induced damage.
- **Diabetes management**: Hibiscus extract has shown promise for improving both blood pressure and blood lipids (bad fats) profiles in people with diabetes.
- **Management of metabolic syndrome**: Hibiscus extract has shown promise for preventing and treating metabolic syndrome, with one study showing a daily dose of hibiscus extract for just one month leads to improvements in glucose, cholesterol and triglyceride levels as well as improvements in insulin resistance in people with metabolic syndrome.
- **Lowering bad Cholesterol**: Hibiscus tea is effective in increasing good cholesterol while decreasing the bad cholesterol. The bioflavonoids in hibiscus tea, prevent plaque build up in the blood vessels; this is associated with high amounts of the "bad cholesterol" also called low density lipoproteins (LDL).
- **Improves digestion**: Hibiscus tea has a soothing effect on your stomach which aids digestion and bowel movement in addition to increasing urination from its diuretic effect discussed earlier in the section on preventing kidney stones formation.
- **Helps in weight management**: Hibiscus tea, like all other teas, is rich in flavonoids which are antioxidants; weight loss is achieved through its inhibitory effects on the enzyme amylase which reduces the absorption of glucose and starches, which in turn result in the reduction of body fat, as metabolic fuel, resulting in weight loss.
- **Relieves menstrual pain**: Hibiscus tea has been reported to relieve menstrual pain through various mechanisms including hormonal balancing and regulation
- **Acts as antidepressant and anxiety reliever**: Hibiscus tea has minerals and vitamins which have antidepressant properties which are good for calming nerves and relieving anxiety

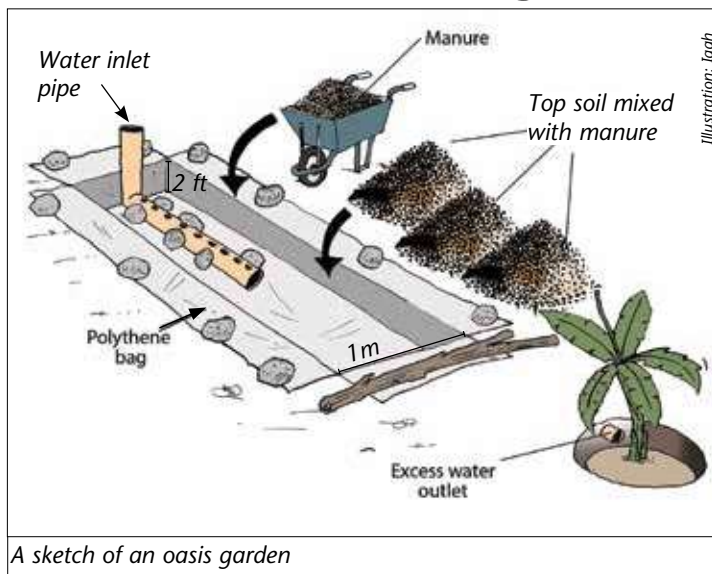
Dr. Peter Mokaya, Email: Peter.Mokaya@organicconsumers.co.ke or Mokaypm@gmail.com

Oasis garden ensures vegetable supply

An oasis garden can provide you with vegetables and fruits all year round, especially during the dry season when vegetables are in short supply.

Venter Mwongera | The unpredictable and errant weather changes leave many farmers unsure of when to expect rains. Rainfall is the main source of water for irrigation for many farmers. Hence, with unpredictable weather conditions and continued changes in rain patterns, farmers are bound to diversify their sources of water and use the little water available with utmost care. Diligence in water management is key to ensuring continued supply of vegetables during dry seasons for better nutrition and improved livelihoods.

Many farmers in Vihiga County in Western Kenya are reaping the benefits of investing in oasis gardens. Despite two subsequent dry seasons; innovative farmers are enjoying balanced meals with better nutrition derived from their evergreen oasis gardens. An oasis garden is a one-off investment which allows continuous growth of vegetables throughout the year. With the little supply of water, a bumper harvest of any vegetable grown



A sketch of an oasis garden

is realised. A single investment in oasis garden serves a farmer for a period longer than 50 years.

How to prepare an oasis garden

- Dig two feet (2ft) deep and one meter (1m) wide trench.
- Exhume all the soil from the trench.
- Spread a polyethene paper on the floor of the trench.
- Ensure the polyethene paper is long enough to appear on top of the level ground.
- Put a horizontal PVC pipe that runs up to the middle of the trench. Ensure the PVC pipe is perforated.

- Ensure an L-joint is made at the beginning where a half a metering pipe, vertically placed, will appear on the earth surface.
- Place hard-core stones on top of the PVC pipe.
- Mix topsoil with manure and fill the trench with the mixture (soil and manure).
- The ratios of manure to soil could be one (1) wheelbarrow of manure to one (1) metre of a trench dug soil.
- At the far end of the trench, put an opening with a pipe from where excess water can drain. Dig a hole and plant a fruit tree such as banana which can maximise on the

water drained from the oasis garden.

How an oasis garden works

- Plant vegetables of your choice on the prepared garden.
- Pour water through the hole of the vertically placed pipe.
- The horizontally placed and perforated pipe slowly oozes water to the soil, the underground placed polyethene paper prevents sipping of water downwards.
- Slowly, water spreads evenly in the oasis garden allowing growth of vegetables planted in the garden.

Materials and cost of preparing an oasis garden

- 2 lorries of hard-core stones at Ksh 5000.
- Polythene paper at Ksh 2800.
- 1 PVC pipe with a joint at Cash 150.
- 1 can of contact glue to join the joints of the papers at Ksh 150.
- All the above materials can be found at any hardware shop.

With about Ksh 8,100 you will have an oasis garden to supply your household with vegetables for 50 years.

cont'd frm pg.... 3 Farmers can use biological agents to protect their crops

Bio-pesticides

Oshochemicals is one of the leading companies in production of quality and affordable agribusiness products. They offer a variety of products including biological products and fungicides and livestock products. They have bio-pesticides such as:

HALT 5 WP: This is meant for the management of the Diamond-Back Moth (DBM) and caterpillars in crops like kales, cabbages, tomatoes and French beans.

Nimbecidine: This is a bio-pesticide that is made from neem and is for control of aphids, leaf miners, mites, whiteflies, thrips, wireworms and nematodes in various crops including tomatoes, cabbages and French beans.

Bio-fertilizers

SymbionN: This is a microbe-based soil application for enhancement of nitrogen fixation



Metarhizium spores: A parasitoid

and uptake of other nutrients for maximum yields.

SymbionP: It is also a microbial product that is applied to the soil to improve on availability and uptake of phosphorous by plants for improved root growth and development.

SymbionVAM PLUS: This is another microbial product that is used to maximize on nutrient uptake and enhancing plant tolerance which result in increased yields. Microbial inoculant consisting of selected strains of microorganisms for maximizing nutrients uptake, increasing plants tolerance to stress thereby increasing yields.

Bio-stimulants

Amino FORTE: It is used in enhancement of vigorous growth and to bring about even growth, and improve fruit colour and maintenance of quality.

Protaminal: It contain a combination of amino acids with pesticides. The combination is used enhance plant resistance to environmental stresses which result in increased growth and high yields.



Bacillus subtilis: A fungicide and biostimulant

Wokozim: This is a liquid bio fertilizer that enhances root development and nutrient uptake in crops.

For complimentary reading: <http://www.infonet-biovision.org/PlantHealth/Natural-enemies>

How to control mange disease in livestock

What causes mange in domestic animals? How can a farmer control it?

Thank you for your questions. Below is a response to your question.

Mange (pronounced 'menj') is a parasitic disease of the skin caused by one of two mites either *Sarcoptes scabiei* or *Demodex phylloides*. Sarcoptic mange (sometimes called scabies) is by far the most common parasitic disease in animals because it is easily observable because of an irritating (causes itchy skin) and the discomfort it brings to animals like the pigs. It causes them to rub themselves against any hard surface leading to the damage of the skin. It significantly leads to stunted growth due to poor feeding resulting from itchiness of the skin. Mange is widespread across countries with up to 60% of national herds affected. Apart from pigs, mange is very common in goats in arid and semi-arid areas in the country. Dogs and cats are also affected by the mites that cause skin infection.

The *Sarcoptes scabiei* or *Demodex phylloides* mite that causes mange spreads directly from animal to animal either by skin contact or contact with recently contaminated surfaces. The boar (male pig) helps to maintain infection in the herd because he is in direct skin contact with breeding females



A goat infested with mange



Hair loss is symptom of mange infestation

hence, becoming a chronic carrier. Since pigs are housed in groups, there is increased opportunity for cross infection (from one pig to the other). Away from their host animals, most mites die in a short time, sometimes in about five days. This is one reason why mange is one of the easiest diseases to control.

Mange is a major killer of

dairy goats in arid and semi-arid areas such as Tharaka Nithi County. The major symptoms in goats are severe itching, loss of hair, scabby skin (rough skin like that of a healing wound). Mange in goats causes losses to farmers since the parasites damage the animal's skin, infected meat cannot be eaten and the disease spreads fast and can wipe out a whole flock. However, there is an effective and natural method of controlling mange parasites in goats, which is given explained below;

Natural method of mange control

Ingredients

a) 1 tin-gorogoro (2kg) of castor seed oil to ½ tin-gorogoro (1kg) of tamarind (*mkwaju*-Kiswahili).

Preparation

Castor seeds

- Roast the castor seeds on a pan until they pop up and turn dark.
- Pound the roasted seeds in a mortar using a pestle or use a grinding stone.
- Put them in a cooking pot.
- Add water to cover the pounded material.
- Heat the mixture over the fire until oil shows on the surface.
- Remove the mixture from the fire and leave it to cool.

Tamarind fruit

- Soak the tamarind fruit in water in a bucket.
- Stir it to make a thick paste.
- Remove the seed and the residue from the paste.

Application

- Mix the castor oil with the tamarind paste.
- Use a hand brush to scrub the mixture onto the animal's body.
- Apply this once every week for 4 weeks.

The paste is very effective and will help save the farmer a lot of money they would have used to buy drugs to treat the condition. Castor seed and tamarind trees are available in most arid and semi-arid areas.

Source: John Nduati Kangara, KALRO-Embu.

Management of mange is a big problem in pig farms

Mange disease is expensive to treat in pigs. This is because it requires repeated treatment with expensive drugs. However, farmers can cut down the cost of treatment if they can manage their pig herds well. Below, we provide three ways in which *Sarcoptic mange* can be controlled in a pig sty:

1. Maintain a mange-free herd

Farmers can make their pig herd free of mange by ensuring any new pigs brought into the herd are not infested by parasites. Examine all incoming pigs while in isolation. Scrap their skin for any suspicious lesions (wounds). If you are not sure, give each of the pigs two injections of ivermectin or doramectin (buy these injectables from any agrovet) every ten days;

ensure the pigs do not mix with rest of the herd.

2. Control the parasites

Farmers can also control the parasites in their pigs by spraying them regularly or applying phosmet 20% (an oily liquid that is absorbed through the skin), the oil is applied to the back of the pig. Medication such as ivermectin can also be mixed with feed or through injections to ensure the pigs do not harbour any parasites.

3. Keep pigs separately

Boars (male pigs) and sows (female pigs) can harbour parasites for long periods of time since they remain in the herd for a long time. Growers and finishers are always removed for sale once they have reached desired weight. Any parasite control

should focus more on boars and sows. Sows especially should be kept mange free since they can pass the parasites more easily when they are suckling their young ones (piglets). Regular parasite control (between 7-10 days) in boars and sows through injections of ivermectin is effective in keeping parasites at bay. Growers and finisher pigs should always be kept separately and also injected to prevent infestation with parasites. A veterinarian should train the workers on how and where to administer the injection in the animals.

Adult stock

Treat all pigs (gilts, sows and boars) with phosmet 20% for every 10kg of weight on one day (same day). Repeat 10-14 days later. Repeat the treatment every

three months. Alternatively sows can be treated twice yearly and also be given one dose just before farrowing (giving birth). Continuously keep checking the inner and behind the pig's ear to see if there is any sign of infection and treat accordingly.

Weaners

Weaners (young pigs that have just stopped suckling) should be injected with ivermectin or doramectin. Their feed can also be medicated for 7 days.

- Treated pigs should only be moved into clean and washed pens that have been sprayed with parasecticide such as amitraz and left empty for three days.

Answers by Elkanah Isaboke

For complimentary reading: <http://www.infonet-biovision.org/AnimalHealth/Skin-Problems>

TOF Rad answers your questions

TOFRadio is broadcast on KBC on Thursday at 8:45pm and Mbaitu FM on Friday at 8.30pm. 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.

Kibwezi farmers earn more through marketing in groups

Musdalafa Lyaga | Pulse crops (beans, cowpeas, green grams, pigeon peas, etc) are important food crops in many parts of the world. Here in Kenya, pulses are a major food crop, source of protein and a source of income for millions of small-scale farmers.

Pulses have a high capability to yield even during dry seasons than most crops. This increases farmers' yields, maximize sources of income and they have high potential to contribute to food security.

Mary Kimanthi, a pigeon pea farmer from Kibwezi East is a happy farmer. Of her pigeon she says, "Pigeon pea is important to us because we consume and sell it as dry grain or green vegetable. I sell 90kg bag at Ksh 4,300 at the farmgate. I use the stems, leaves and vines of the pigeon pea trees as a source of animal fodder during the dry season and dry vines as firewood."

Lack of organised marketing

Despite the potential of pulses to improve rural livelihoods, many pulses farmers continue to sell their crops individually at low prices and are unable to produce sufficient quantity to meet the demands of big buyers like supermarkets and grain processors.

Small-scale farmers have had to rely on brokers who often buy at very low prices at the farm gate.

Lack of organized marketing results in low producer price offer by traders. Traders have an edge in the industry due to their ability to source for the



Pigeon peas grain



Pigeon peas is a nutritious legume and source of income for farmers

produce from different individual farmers. In the recent years, farmers have tried to increase their bargaining power by organizing themselves into producer farmers' groups.

"Bulking up small parcels of produce into truckloads of goods provides us an opportunity to sell farm produce to outside buyers. Here in Makueni, middlemen want to make huge profit at the expense of farmers. If farmers have a large stock of produce to sell, they can hire transport to distant markets to find traders who pay better prices than local traders," says Joseph Kiseve, Coordinator Muungano Nguvu Yetu CBO.

Groups work together

The CBO comprises of nine farmers' groups. They train and support members through various value chain actors to create market linkages for their produce. Farmers in Kibwezi in Makueni County are already adopting collective marketing strategies and they receive the benefits of higher prices for their output.

Members of the Muthoonze Self Help Group, a local Farmers' group that is a member of the Muungano CBO; sell their green grams together as a group. The group is guided by standard rules of producing same quality which is delivered to the market

at the same time.

Dishonest farmers checked

A farmer, Mr. John Muange, popularly known as 'Power' is a trader at Nzuwii Market in Mtito Andei. He confesses that in the past, some farmers used to add sand to the grain and mix wet produce and stones; just to increase the weight in the bag to maximise their profits. "As traders, we are aware of all these tricks. Farming like any other business is based on reputation. I am happy with the initiative by farmers forming themselves into groups and to receiving trainings on the importance of quality," he adds.

"My advice to anyone who wants to increase income from pulses is to look around for friends to form groups. You cannot profit from farming by working as an individual because you need advice from fellow farmers and to share your problems. You can only do that in a group but not by yourself," advises Joseph Kiseve.

By working in groups, farmers gain from the advantage of collective selling by focusing on quality and fair markets which are key for a sustainable development and increased revenues to enable improved livelihood of rural communities.

Beehives for sale: We make beehives for sale. Interested farmers can make orders on any quantity they require. The following are prices for various hives: Langstroth Ksh 4,500, Kenya Top Bar Hive Ksh 3,800, Stingless bee hives cost Ksh 400 and Ksh 1,500 depending on size. Interested farmers can call Stephen on 0734 371 557.

Stingless bees for sale: I have stingless bees for sale to interested bee keepers. Contact me on Tel. 0710 155 415.

Fruit seedlings: We have fruit seedlings for sale. Grafted Apple mango at Ksh 150 per seedling, grafted Avocado at Ksh120, grapes at Ksh 300, grafted purple passion at Ksh 300, tree tomato at Ksh 50, pawpaw at Ksh 50, breadfruit at Ksh 500, tangerines at Ksh150, peach at Ksh 300, Pomegranate Ksh 150. Call 0714 118 794.

Avocado seedlings for sale: I have Hass variety of avocado seedlings at Ksh 150. Interested farmers can get in touch with me on 0720 031 754, 0722 608 855, Eldoret.

Liquid organic fertilizer: Seaweed extract with over 60 nutrients. Ideal for all crops *sukumawiki*, wheat, tomatoes, chillies, potatoes, fruit trees, Napier grass, tea, coffee, beans and others. Quantity 1-4 liters. Contact 0721 96 09 49 or 0734 020 982. Email: bweru@gmail.com

Tree seedlings for sale: We have indigenous and exotic varieties of trees, Contact Mr. Zachary Mwangi on Tel. 0716319097, Kinangop.

Fruit and fruit seedlings: We have tree tomato fruits, pepino melon fruits and their seedlings. Contact Mr. Waweru Ngundo 0728657941, Kinangop



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