

Fight pests and diseases naturally

Farmers can manage mango pests like fruit and full flies using natural enemies like wasps. Pesticides destroy natural enemies leading to increase in pest population in the fruit orchard.
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Dear farmers

In this issue of *The Organic Farmer* (TOF), we highlight organic pest and disease control methods that farmers can use in their orchards. Mangoes and passion fruits are some of the most important fruits in Kenya and are often eaten fresh or used to make fresh juices and marmalade. Mango pests like fruit and gall flies, however, continue to worry farmers in Ukambani and other mango growing areas.

Is it safe to spray your fruits with pesticides? TOF does not encourage the use of pesticides due to the human, plant, animal and environmental side effects. Farmers can effectively control pests in the farm using natural predators like wasps or biological methods such as pruning, orchard sanitation, traps and baits and soil treatment. We should avoid destroying the delicate balance provided by mother nature between plant pests and the beneficial insects.

Storage pests are another big problem for farmers especially now with harvesting of maize crop in counties like Trans-Nzoia, Uasin Gishu and Narok which are the country's grain baskets. In this issue, we show you how to use diatomite to control the Larger Grain Borer (LGB) popularly known as *Osama*, weevils and moths in stored cereals (page 8).

TOF has made a lot of progress in the last eight years, having published 101 issues full of educative and informative articles. Thousands of farmers have written inspiring letters on how they have also benefited from the training sessions provided by our extension officers. Most have had to traverse vast regions to reach the farmers in remote areas to conduct training sessions using public transport. In the last few months, the mobility of our extension officers has greatly improved with the provision of four motorbikes supplied by Biovision.

Biovision President bags another global award

TOF - Former icipe, Director General and President of Biovision Foundation for Ecological Development, Dr Hans R. Herren has won the Right Livelihood Award, which honours "outstanding vision and work on behalf of the planet and its people". The Nobel Prize jury said the decision to award Dr. Herren is based on "his expertise and pioneering work in promoting safe, secure and sustainable global food supply". Dr Herren, one of the world's leading experts on sustainable agriculture also received the World Food Prize in 1995. "I see this recognition as an important endorsement of my vision of a world which can provide all 9 billion people



expected to live on our planet in 2050 with sufficient healthy food." Since May 2005, Dr Herren is President of the Washington-based Millennium Institute, which supports third world countries in developing sustainable agricultural policies.

Ban Ki Moon praises Biovision's FCP

TOF-The United Nations Secretary General Ban Ki Moon has praised Biovision's Farmer Communication Programme in East Africa for empowering small-scale farmers and women in particular, through dissemination of knowledge about sustainable agricultural technologies. In a report about Agricultural Technology for Development that has been published in New York, the UN head calls for a shift to sustainable and resilient agriculture and food systems to ensure food and nutrition security, which will help eradicate poverty while protecting natural resources in the world. Ban Ki Moon emphasizes the relevance of small-scale farmers and women in ensuring



food security in the world and stresses the importance of governments to ensure that national agricultural policies adopt sustainable methods which alleviate poverty and protect the environment.

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Youth benefit from stingless bee project

Kakamega beekeepers now earn more from stingless bees which pollinate their crops. It has also encouraged them to plant more trees for bee forage.

Peter Kamau | Mark Livaha, a 49-year old beekeeper from Ileho village in Kakamega county made his first log beehive when he was 14 years old and he has never looked back. His paternal grandfather, 85-year old Joseph Mulama had earlier introduced him to the art of traditional beekeeping. This equipped him with skills on how to identify different types of stingless bees and even log hive making. The use of stingless bees honey as traditional medicine is an old tradition among the Luhya community living around Kakamega rain forest.

Modernised beekeeping

Traditional honey hunting and gathering was unsustainable. It involved the destruction of valuable trees, the honey harvested was impure and the method involved destruction of stingless bee colonies and their habitats.

For bee hunters living around the forest things took a turn for the better when *icipe's* Commercial Insect Programme (CIP) launched a beekeeping project among communities whose main aim was to preserve forest habitats and wild colonies through domestication of the honey bees and stingless bees. Stingless bees are smaller in size than the honeybees and unlike the honeybee, they do not sting but bite to defend their nests.

Youth become stingless beekeepers

The project came into the area in 2006, and in 2008 Livaha organised young people mostly schoolgirls from Ileho village and formed the Kakamega Stingless Bee Association (KASBEHA), which has 56 young farmers. The main aim



Mark Livaha has changed from using log hives to modern stingless beehives provided by *icipe's* CIP programme.

of the group was to introduce young people into professional stingless beekeeping, an activity that earns them an income to pay school fees while conserving the forest and stingless bee habitats.

The group is highly organised into teams, each with a different task. Various teams are trained on stingless bee feeding, hive maintenance, harvesting, processing and marketing. Several species of stingless bees in this farmers group are reared in different modern hives designed by *icipe*. Livaha says domesticating stingless bees has enabled them to harvest more honey than those who hunt the bees in the wild. "From the modern hives we have been able to get as much as 100kg from our stingless bee house (meliponary) in a year. We plan expand the project

to produce two tonnes of stingless bee honey for the market every year," he says. A farmer can harvest different amounts of honey from each beehive depending on the bee species. For example, the average honey produced by *Meliponula bocandei*



Meliponula Lendliana stingless bees domesticated in a pot hive

is 5 litres, *M. ferruginea* (black) 2 litres, *M. ferruginea* (reddish-brown) 1 litre, *M. lendliana* 0.2 litres, *Plebeina hildebrandti* 0.5 litres and two species of *Hypotrigona* 0.1 litres.

All the honey collected from the beekeepers is taken to the Kakamega silk and honey market place, which is a processing facility in Lurambi for beekeepers supported by the project where honey is refined, packaged and sold. The proceeds from honey sales are shared among the beekeepers depending on how much they have delivered during the year.

Bees pollinate crops

KASBEHA has derived other benefits from domesticating bees through improved pollination of crops. There has been a marked increase in yields in crops such as sorghum, avocados capsicums, tomatoes and sunflower.

"Before the project we did not know that bee pollination can help increase crop yields. We have seen the difference in fruit sizes in homesteads where we have domesticated bees. This is an added advantage of keeping bees," adds Livaha.

The farmers know the type of forage trees that stingless bees forage and have planted them around the homesteads, further contributing to afforestation. The

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Sheila Iminza feeds stingless bees



The KASBEHA members in their honey processing facility

The *Organic Farmer* is an independent magazine for the East African farming community. It promotes organic farming and supports discussions on all aspects of sustainable development. It is published monthly by *icipe*. The reports in the *The Organic Farmer* do not necessarily reflect the views of *icipe*.

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Avoid using pesticides in mango farms

Due to prevalence of mango pests like fruitflies, farmers use excessive amounts of industrial pesticides which kill the natural enemies of the pest.

Caroline Nyakundi | Fruit flies are still a problem to many mango farmers in Kenya. Indeed, the Biovision staff in Kola Resoure Centre in Machakos have been receiving many questions from farmers on how to control mango pests and diseases. Mangoes are affected by a number of pests especially fruit flies, gall flies, aphids, mealybugs, cotton scales, mealybugs, cicadas and black flies. Diseases like anthracnose and powdery mildew are also a menace to farmers.

According to Patrick Kimeu, a Biovision Information officers who manages the Kola community resource centre and trains farmers in Machakos County, many mango farmers lack information on pest and disease management, marketing and value addition techniques. "Most farmers in Ukambani battle with the powdery mildew disease, and pests like fruit flies and gall flies.

To deal with the pests, farmers often use pesticides which destroy natural enemies like ladybird larvae, wasps, spiders and parasitic fungi. This results in increase in pests in the fruit



Patrick Mutie shows his mango trees. Most pests and diseases can be controlled using natural enemies, safe organic pesticides and fungicides

leaves often get infected with fungal infections and drop out prematurely resulting in poor yield.

Gall flies are best controlled by natural enemies like wasps. The farmer must therefore ensure wasps are introduced and conserved in the farm.

The fruit fly *Bactrocera invadens* attacks mangoes (the primary host), and other cultivated fruits such as oranges, tomatoes, bananas, guava, custard apple and avocados. Other species that attack mangoes are *Ceratitis cosyra*, *Ceratitis rosa* and *Ceratitis fasciventris*.

Controlling mango pests

In TOF No. 27 *icipe's* Dr. Sunday Ekesi highlighted how farmers can protect their mangoes against fruit flies, one of the most damaging pests. One of the methods of controlling fruit flies is the use of beneficial insects or parasites also called parasitoids. The wasp called *Fopius arisanus* is very effective at controlling the fruit fly *Bactrocera invadens*. It attacks the eggs and larva of the fruit fly. For this method to be effective, the farmer must minimize spraying of pesticides in their orchard as this destroys the natural enemies (wasps).

Fruit flies can also be controlled naturally using weaver ants. Farmers can provide dried fish, which the ants can feed on during the dry season. It is also important for farmers to tie

ropes between mango trees in the farm to enable the ants to move from one tree to the next. Existing weaver ant colonies can also be harvested and introduced to other trees in the farm.

Apart from natural enemies, other methods of controlling mango pests are:

1. **Spray pyerin** 60ml per 20 litres of water
2. **Prune affected plants:** Pruning minimizes the spread of the pests and diseases.
3. **Orchard sanitation:** Remove fruits with dimples and oozing clear sap. Although laborious, this method is more effective than picking rotten fruits from the ground, as the maggots may have left the fruits to develop into pupa. To be effective this has to be done regularly (twice a week for the entire season). Farmer are also advised to kill the maggots by burning, burying or trying collected fruits in black plastic bags and expose them to the heat of the sun for a few hours to kill the maggots. Alternatively, feed affected fruits to pigs or poultry. When burying fruits, ensure that the fruits are buried at least 50 cm (about two feet) deep to prevent emerging adult flies from reaching the soil surface.
4. **Use traps and baits:** Use Fruit fly trap (Lynfield or bucket trap) with baits containing brewers' yeast (45 ml of yeast per litre of water; use about 250 ml of the mixture in each trap and add one tablespoonful of borax (di-

sodium tetraborate) to each trap to prevent rotting of the flies caught)

5. **Fruit fly bagging:** Bagging prevents fruit flies from laying eggs on the fruits. It also protects the fruit from scars and scratches thus improving the quality of the produce. However, it is only practical on small trees.

6. **Soil treatments:** Having a fungus called fungus *Metarhizium anisopliae* are also effective especially when the trees start producing fruits.

Controlling powdery

Powdery mildew is a whitish, powdery growth on leaves, flowers and young fruit. It's prevalent in dry weather when humidity is high and cool nights. The disease clears all flowers if not controlled on time."

1. Grow resistant varieties like tommy Atkins as varieties like kent, apple and *ngowe* are very susceptible to powdery mildew.
2. Spray organic pesticide GC-3 60ml per 20 litres or fosphite 53sl dose 100ml per 20 litres from Juanco Ltd.



To make a simple fruit fly trap:

- Take a plastic bottle
- As bait, use 1/2 cup vinegar, mix with water.
- Add 4-6 drops liquid dish soap (it weighs down the the fruit fly and it drowns), do not stir.
- Then take a pen or pencil and poke 4 to 5 holes in the plastic, just big enough for a fruit fly to fit into, about 7mm. Once a fruit fly crawls in, it cannot get out. You would think they would just fly back out through the holes, but they will not! If you see fruit flies crawling around on the surface of your plastic container but not going inside, make the holes larger
- Hang the bottle in an area where you have seen most fruit flies. Depending on the amount of fruit flies you have, you can expect to start seeing the bottle fill up within just a few hours.



Mango leaf affected by gall flies

orchard. In Machakos the gall flies have been a problem to farmers who are finding it difficult to control. The flies lay eggs on young leaves which hatch into maggots that dig into the leaves to feed resulting in formation of small 'pimples' or galls on the leaves. The affected



A wasp attacking a fruit fly caterpillar



Paper bags preventing fruit fly invasion



An adult gall fly



An adult fruit fly

FCP extension services boosted with motorbikes

The motorbikes are expected to enhance the mobility of the extension workers which will help increase the number of farmers trained and the area of coverage for the programme.

The Organic Farmer | Biovision's Farmer Communication Programme (FCP) is one of the leading non-governmental extension initiatives that was started to provide organic and sustainable agricultural extension services to farmers in Kenya's rural areas to meet the demand for training. Lack of transport has however been a big

problem as the extension officers from the FCP programme could not easily access the farmers for training purposes and even do follow-up visits to assess the groups' performance. This greatly limited the number of farmers that could benefit from the programme.

Fortunately, the Biovision outreach programme made a huge step forward in June this year when it bought 4 motorcycles for use by the CIWs who previously had to cover vast regions using public transport. Below we highlight the reactions by the farmers and the extension officers from each of the regions served by the programme after they received the motorbikes:

Motorcycle delivered to Kagio

On June 23 2013, an outreach team set out for Kagio to hand over one of the motorbikes to Peter Murage, the *iTOF* officer in charge of the Central Province. Njeri Kinuthia, the Outreach Programme Assistant led the team that included Dr. Yitbarek Nigatu, the Coordinator of Biovision's Farmer Communication and Extension Programme in Ethiopia, Joan Mukiri and Ruth Muthoni, two students on attachment to the

programme from Egerton University and University of Nairobi respectively. Murage took the team to a training session of the Uzima processors and Caterers, which specializes in value addition of a variety of farm produce including sweet potatoes, pumpkins, bananas, moringa, cassava and mangoes. The group was also trained on plant tea preparation. There was jubilation among



Peter Murage receive his motorbike at Kagio Resource Centre, in Kirinyaga County.

farmers when Dr. Yitbarek officially handed over the motorcycle to Murage. He told the *iTOF* that the motorbike would enable

him to reach more farmers than before. Dr. Yitbarek also encouraged the extension officer to give priority to farmers and serve them diligently. Mr. Murage lamented that lack of transport and access to farmers in vast Central region was a problem that hindered his work. With the motorbike he promised to increase farmer group visits and training. Charles Murimi, the chairman of the group said the Outreach Programme was a great gift to farmers in the region. He said the motorbike would enable Murage to reach many more farmers groups in the region.

Motorcycle handing over in Kangundo

The handing over ceremony in Kangundo took place on June 13 2013. It was presided over by Dr. David Amudavi, the FCP Coordinator in Kenya. He was accompanied by Dr. Yitbarek, Njeri Kinuthia, and Carol Kinyua a student on attachment from Kenyatta University. There was song and dance by members of Ukulu Maiuni and Kyangwasyuimiwawo Self-Help Groups when the

motorcycles were presented to Victoria Mutinda, the *i-TOF* field officer for Eastern Province. Dr Amudavi said that the motorcycle would go a long way in easing her transport problems during farmer training: "I hope it will help you not only to reach more farmers, but also make your daily activities more efficient and timely," he said. Mutinda was very happy to have



Victoria Mutinda receives a motorbike from FCP Coordinator Dr David Amudavi.

a motorbike, "I will now reach and train many more farmers

to ensure that they get valuable information that will enable them produce more food". The handing over took place at the homestead of Gideon Mitaa, one of the group's members. Mitaa produces tissue culture banana seedlings and the Kyangwasi Farmers Group runs a tree nursery where they produce and sell tree seedlings to other farmers. The group was thankful to Victoria Mutinda for introducing and training them on establishment of tree nurseries and their management which has increased tree cover in the semi-arid region and helped to conserve the environment.

Katoloni Mission CBO also benefited

The KARI-Katoloni Farmers Resource Centre, under the management of the Katoloni Mission CBO in Machakos County and oversight of KARI Katumani Centre holds a special place in the Biovision Farmer Communication Programme.

It is also unique in many ways, having started with one farmers group which encouraged the CBO to form and register 280 groups in only three years. The CBO promotes organic farming, environmental conservation and income generating activi-

ties among farmers groups in the county. The CBO was recently granted Ksh 23 million from the European Union, Community Development Trust Fund (CDTF) for their projects and has also been awarded a certificate of proper



John Mutisya receives keys to his motorbike from FCP Coordinator Dr. David Amudavi KARI Katumani Resource Centre.

management of funds by ILRI2 Programme. John Mutisya,

the Resource Centre Manager, Regina Muthama, the chairlady and coordinator of the CBO and Margaret Kioko, one of the CIWs received the motorcycle on behalf of the CBO.

Mutisya said the motorcycle would enable him reach more farmers groups and on time. "I have had to rely on public transport before, which is quite unreliable," he added. When handing over the keys of the motorcycle to Mutisya, Dr. Amudavi said that with the motorbikes, Biovision expects more farmers to benefit from training in all the project areas due improved efficiency and speed in movement of extension officers.

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Passion fruit diseases a big concern

Many farmers have abandoned passion fruit production due to diseases and pests. The diseases can be prevented if farmers are willing to take measures to stop them.

Peter Kamau | Prevention of diseases in passion fruits is one of the safeguards against making losses in passion fruit production. Most farmers who start passion fruit farming give up after one or two years after failing to control the diseases. The most common diseases in East Africa are bacterial and fungal in nature. Below we give farmers information on how to identify and control them:

Brown spot disease (*Alternaria passiflorae*)

This is the most common passion fruit disease in the world today. Its symptoms are brown spots on leaves, vines and fruits. The spots can be up to 10 mm in diameter on the leaves and often extend to



Important tips

- Farmers should plant only certified passion fruit seedlings. Seedlings from unknown sources are the main cause of diseases in passion fruits.
- Crop rotation is very important after three years to prevent disease outbreaks. Rotate with grasses to prevent disease persistence.
- Pest control is very important since most pests transfer the disease from plant to plant.
- Spray plant extracts fortified with biostimulants such as EM1 to keep the passion fruits plants healthy and strong. This enables them to withstand diseases and even pest damage. Spraying can be done at least three times a week.



Photos: infonet

the veins, while drying out at the centre. On the stems, the spots sometimes extend to 30mm long. When they occur at the leaf edge, they may kill the vine, resulting in "dieback" appearance. On the fruit, the spots are light brown, light and sunken. They often merge, covering large areas and produce large brown spore masses. Spores produced on the leaf, stem and fruit are dispersed by wind-blown rain. Warm moist weather favours the diseases.

Prevention

- Plant disease-resistant varieties such as yellow passion and its hybrids
- Collect all diseased leaves and vines and ensure the field is free of any fruit residue
- Prune vines to reduce density and humidity that encourage the disease
- Spray copper-based fungicides. An interval of 2 to 3 weeks should be observed to protect new shoots.

Septoria spot (*Septoria passiflora*)

The disease attacks leaves, stems and fruits. Brown spots up to 2 mm with tiny black dots develop on leaf surface. Infected leaves fall off (the diseased vines have no leaves. Light brown spots with tiny black dots can be seen on the fruit. Spores produced by the black dots are blown by wind to other vines during wet, windy weather further spreading the disease. The disease is spread by rain, dew and overhead irrigation. Warm moist weather favours the disease development.



Prevention

Preventive measures are the same as those of the brown spot disease.

Fusarium Wilt (*Fusarium oxysporum f.sp passiflora*)

Symptoms consist of yellowing of leaves, collar region of affected plant at soil level turns brownish and vertical cracks and vines wilt and followed by a complete collapse of the plant. When the stem is split, its vascular tissue shows brown discoloration.



Prevention

- Affected plants should be removed and burned. Snap off the affected parts or remove the affected plant manually.
- Do not cut affected plant tissue and then use the same pruning equipment on other plants.
- Keep the base of the plant clear of grass and weeds, which encourage fungal development.
- Grafting to wilt-resistant yellow passion fruit rootstocks is the most effective way of controlling the disease.

Phytophthora blight (*Phytophthora nicotianae* var. *parastica*)

Affected leaves are water-soaked and light brown in colour. They fall easily and leaving the vines without foliage. The affected areas of the stem are first purple and later brown above the graft union. They may completely girdle the stem causing wilting and collapse of the vine. The fruit shows large, water soaked areas and the diseased fruits fall off easily and are



later covered with a white fungal growth. Another strain of fungus (*phytophthora cinnamoni*) causes root rot. The yellow and purple varieties have different patterns of susceptibility. The yellow vine is affected by the fungus *P. cinnamoni* and the purple vine is susceptible to *P. nicotianae*. Both fungus strains attack both passion fruits and can cause root rot, wilt, damping off and leaf blight. Fungal spores are initially produced in wet soil beneath the vines and are splashed up to lower leaf canopy. Wet windy weather encourages the disease.

Prevention

- Observe good field sanitation.
- Prune the fruit trees and keep the ground covered with grass to reduce the possibility of disease spores from being splashed to the lower leaves.
- Graft with resistant varieties.
- Apply copper-based fungicides every 2-3 months during the wet season to reduce disease incidence. Wounds on the stem can also be painted with copper-based fungicides.

Passion fruit woodiness Virus (PWV)

Passion fruits affected by PWV show light and dark green mosaic pattern with light yellow speckles. Sometimes small, yellow ring spots may develop on upper leaf surface. Infected fruits are small and misshaped with very hard rind and small pulp cavity. When the affected fruit is cut, the inside rind tissue may have brown spots. Some strains of the virus cause cracking of the affected fruits. The



viruses are spread by aphids and pruning knives. The virus is also found in bananas, pumpkins and many other weeds.

Prevention

- Use clean planting material.
- Use clean pruning tools.
- Use resistant rootstocks such as yellow passion fruit.
- Remove diseased vines from the field.
- Ensure the passion field is free of weeds.
- Do not plant bananas or pumpkins near passion fruits. ■

Wangige farmer excels in vegetable and dairy farming



Photo: TOF

Eunice Kimani, a dairy farmer in Wangige, Kiambu County

Eunice Kimani and her group have acquired useful information from TOF magazine, which has enabled them to succeed in farming.

Caroline Nyakundi | Eunice Kimani is a small-scale farmer in Kiambu. She grows black nightshade (*managu*) *sukumawiki* and spinach and keeps dairy cows. Njeri Kinuthia (an Outreach Officer with Farmer Communication Programme) whom the farmers fondly call "Mama Njoki" have been very instrumental in the success of the group.

"She has trained us on many things - for example on how to grow and process *moringa* trees and various indigenous vegetables, how to prepare fodder for dairy animals. Now I do not buy vegetables for home use. I also have some to sell which provides an extra income," she says.

Kinuthia says Eunice has been very aggressive and would not miss a training event in her area. Eunice is now a volunteer who engages in the biannual Brookside Breeders' show.

Keeping dairy cows

Her dedication is evident in the quality of dairy cows in her farm. She currently milks 6 of her 8

cows, each of which provides about 18 litres of milk daily.

This translates to about Ksh. 34 - 52 litres everyday. She feeds her cows mostly on Napier grass, Boma Rhodes grass, hay and concentrates (Phosphorus® or Mak Lick®).

She milks the cows twice a day but would like to increase their milk production since it is inconsistent and she does not have enough land to plant Napier grass. Her husband, who works as an accountant, helps feed the animals at 4.30 am everyday before leaving for work.

"I read about a farmer in one issue of TOF magazine (TOF No. 85 June 2012) who has very productive dairy cows. Each of the farmers' cows is fed 35 kg of homemade fermented dry matter and concentrates also prepared on the farm. I would like to know how to prepare the same feed as he does for his cows since I have very limited space for planting Napier," she says.

Her market is equally unpredictable. She at times sells to dairies, which buy at a low price of Ksh 34 per litre in large quantities. Selling to shops, however, fetches better prices Ksh 52 per litre but these outlets take small quantities and are sometimes unable to completely sell the day's stock, returning the



Photo: TOF

Kimani has boosted her income by diversifying into goat and indigenous vegetable production.



remainder to her.

The advantage with dairies in this regard is that they do not return the unsold milk. Eunice, who is already training her children on dairy farming would like to grow her stock to 20 dairy cows. To do this she needs to know how to feed the animals well to improve milk production. She would also want to venture into mushroom growing to diversify her income sources.

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Photos: Kiatoko, icipe

There are different types of hives that each stingless bee species can inhabit. The icipe 3M & 6M compartmented vertical beehives (1st and 2nd left) are used to domesticate *Meliponula ferruginea* (Reddish Brown). While the icipe 2H beehive (left) is used to domesticate *Hypotrigona gribodoi* (right)

group has identified and domesticated some stingless bees that had long disappeared from the forest such as one known as *vuyiira* in the local language.

The CIP project is transforming the lives of many farmers around the Kakamega forest. The groups are trained on aspects of beekeeping such

as apiary maintenance, colony division, pest and disease control, honey processing, packaging and marketing. The project has introduced sericulture (silkworm and cocoon production) and encourages them to plant horticultural crops that benefit most from bee pollination.

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Kamukuywa Farmers Resource Centre

Kamukuywa Farmers Resource Centre is managed by Alfred Amusibwa, who is the i-TOF field officer for Western Kenya. From the Centre Amusibwa is tasked with serving farmers in a big region. At times he is forced to travel to Mt Elgon, Kakamega, Nyanza region, Trans-Nzoia and Uasin Gishu and even Nandi



Photo: TOF

Alfred Amusibwa receives a motorbike from Kephah Okatch of Biovision, FCP.

Counties which are a distance apart. It was therefore a great relief for him when the Outreach Programme team of Njeri Kinuthia, Caroline Kinyua, and Joan Mukiri and led by Kephah Okatch, delivered a motorbike to him on June 26, 2013. The team handed over the motorbike to Amusibwa as he trained members of the Umoja Self Help Group on haymaking and fodder conservation. Okatch said that the motor-cycle would help increase efficiency in information delivery

to farmers in Western Kenya and beyond. Alfred expressed his gratitude for the motorbike: "This is a very happy day for me and the farmers that I serve. Now I will be able to make more field visits and reach individual farmers who need my services with ease. With the motorbike, I can now train up to three groups in different places in a day," he added. Naomi Amala, a member of the group said the motorbike will enable the extension officer save time and reach many more farmers in the region.

All that farmers want to know on compost making

1. How do you apply water on compost if most of the composting material is dry?

A compost pile should be moist, not wet. If the pile is wet, the water replaces the air in the pile - this is not good for composting because it interferes with the bacteria responsible for breaking down the organic matter. If there is too much water in the compost, turn it over and over until much of the water is absorbed into the compost. This will reintroduce the air into the compost allowing the soil bacteria to be active again.

If you notice a foul smell when turning the compost, it means that the compost will not be of good quality. Apply enough water to make the compost heap moist, not wet. In areas with a lot of rainfall, it is important to cover the compost heap with a polythene sheeting, banana leaves or grass straw to prevent too much water from getting into the compost. Covering the heap also prevents the leaching of essential nutrients and even loss of nitrogen to the atmosphere (volatility). Moisture and air must be balanced in order to make good compost.

On the other hand, if the pile is too dry, biological activity cannot take place (breaking down of organic material requires oxygen). If the heap



Photos: P. Kamau

Compost should always be covered to conserve nutrients

is too dry, then one has to add enough water to make it moist and allow the composting process to go on.

2. What can you use in place of ash when preparing your compost?

The main nutrient in ash is potash (potassium). Most organic matter used in compost making does not have potassium in adequate quantities. That is why farmers are advised to use ash as much as possible. Since we do not encourage the use of external inputs in making compost, the organic farmer should use ash since there is plenty of it in most homesteads.

If you do not have enough of it, you can ask your neighbours to allow you to take ash from their kitchens. Farmers can also use tithonia leaves (contains 4.6 % potassium) *Leucaena leucocephala* (3.37 % potassium) banana stalks (4.10 % potassium) sweet potato vines (6.63% potassium) in their compost piles.

3. Is it advisable to make compost on a flat ground?

It is best to put up your compost pile in a place where run-off water cannot wash or cause leaching. Choose a flat ground which has good drainage. Standing water will slow down the

decomposition process. Avoid direct sunlight and areas prone to strong winds which can dry and cool the material. Putting up a compost heap under a tree shade is ideal. Sometimes a shallow trench about 1 foot deep can be used for putting up a compost heap.

4. What can I use in place of topsoil during the process of compost making?

Topsoil contains a lot of bacteria that help in the compost decomposition process. Using topsoil in your compost heap is most beneficial since it introduces the useful bacteria into the heap. After each layer of compost material, farmers advised to top it up with topsoil for this purpose.

5. How much compost can I apply per hole during planting?

Compost should ideally be spread evenly on the shamba and then worked into the soil. A special way of applying compost is to apply it as a surface mulch. This helps to stimulate living organisms in the soil. However, due to loss of nutrients when using this method, it is advisable to spread it first and then apply mulching material to stop the nutrients from being exposed to the sun or even washed away by run-off water.

Address nutrient deficiencies in vegetables

My kales are turning yellow. What is the problem?

Vegetables such as kales and cabbages turn yellow because of deficiency in nutrients like nitrogen and magnesium. Heavy rainfall or cold weather may cause these deficiencies. Soils low in organic matter are also prone to nitrogen deficiencies. In such cases there is poor growth and leaves may have tints of yellow, red or purple. Magnesium deficiency may first show the yellow colour on the older leaves, then spread to younger leaves. Sometimes the leaves turn red, purple or brown. Nitrogen deficiency can be corrected by building up organic matter in the soil and applying nitrogen rich organic fertilizers which provide the required nitrogen for immediate use by the plant. In the long term however, the solution is to practise crop rotation. The best crops for rotation



Magnesium deficiency



Nitrogen deficiency

are legumes which fix nitrogen into the soil such as beans, peas or green manure crops such as lablab. Tithonia, when chopped and worked into, is also a good source of nitrogen and other nutrients.

Controlling nematodes in bananas

How can control banana nematodes in my banana plantation?

Root-knot nematodes are soil inhabitants. They do not move more than 10cm per year. They can survive in nearly all types of soils where they cause great damage to plant roots.

Nematodes are spread by transplanting infested seedlings or plant material from soil washed down slopes or sticking to farm implements and even farm workers. Affected plants become stunted and yellow in colour.

Plant extracts made from cassava (crush juice, dilute in at ration of 1:1 using 4 litres per square metre. African marigold (crush 100-200g leaves, roots or flowers pour in 1 litre boiling water soak for 24 hours then add 1 litre of cold water.

Spray into the soil at base of affected plants. Another good product is Achook® from Organix Ltd 0735 712090, 0720 720 937 535.



What is the difference between EM and EM1?

EM is the short abbreviation of Effective Microorganisms, which are a mixture of beneficial and naturally occurring microorganisms that can be applied to the soils to improve plant growth or as a growth activator. EM1 is the processed product (picture right).



Preserve your maize with diatomite powder



The Kensil F diatomite (left) is safe for use in cereal preservation against storage pests. Diatomite powder (right).

The month of October is the beginning of the harvesting season. But after harvest, the most common problem that farmers will face is pests. Some pests such as the Larger Grain Borer (LGB) popular known as *Osama*, weevils and moths destroy a large portion of stored maize. Destruction of maize by these pests can be as high as 40 per cent in most areas. The pests have become resistant to most of the pesticides in the

market, making it very difficult for farmers to secure their grains.

No side effect

Farmers facing pest problems in their stored maize can use diatomite. Diatomite is a powder made up of fossilised microscopic plants called diatoms. Diatomite is a fine powder that contains millions of small particles which have very sharp edges. When diatomites sharp

edges come into contact with an insect or a parasite, their protective coating is pierced, causing the insect to dehydrate and die. This makes diatomite an excellent and natural pesticide that does not have any side effect.

Farmers across the world have used diatomite for decades to control pests. Diatomite can be mixed with maize, wheat, barley, wheat, oats, beans rice, sorghum at a rate of ½kg (500g) for every 90kg of any of these grains. Diatomite is safe for both humans and animals. Cereals preserved with diatomite can be stored for up to 4 years or longer without damage so long as they are kept in a cool dry place that has not threat of rat damage.

Grain that has been treated with diatomite has to be washed and dried before cooking or milling. However the only limitation for farmers is that diatomite is not available in most agrovet shops in the country. But farmers groups can come together and purchase the powder and share among themselves. Diatomite is sold by African Diatomite Industries in Gilgil town along the Nakuru-Nairobi road. Interested farmers can. Contact *African Diatomite Industries (ADL)* on 0723 760 402.



Turkeys for sale: I have turkeys for sale. Interested buyers can get in touch with me. Call Kamau 0722 364 337

Ducks for sale: I have 20 ducks for sale. Call Evans on 0723 342 969.

Grape seedlings for sale: I have may different grape cultivars for sale in Dodoma, Tanzania. ■ Denosh Tosh

Eggs for sale: Anyone who needs to be supplied with 20 trays of eggs every week, yellow york in Eldoret area can contact me. ■ Elijah Koskei.

Vanilla wanted: I need vanilla. If you know where I can get it, please get in touch.

Silage tubes for sale: We have silage for sale to interested farmers. Star Rays Centre Nangili Corner along Eldoret-Kitale road. Training for farmers groups also available.

Chicks and chickens for sale: Day old chicks, layers, at Ksh 75 broilers at Ksh 55, Dorep at Ksh 100, Kenbro at Ksh 85, Call 0724 919 885.

Fish farming training and equipment: Geosh Ltd has expertise in construction of ponds, fish cages, fish hatcheries. Find out more from our website at www.Fishfarming-business.com, email: geosy-business.co.ltd@gmail.com

Egg incubators for sale: We are selling a 528-egg incubator (fully automatic) at Ksh 100,000. Call us 0724 702 512

Vanilla beans: Berita Keya is looking for vanilla bean farmers in Western Kenya. Call 0723 11 6 324.

Agricultural lime can be used as a soil conditioner

Lime is useful for reducing soil acidity and is available in local agrovet shops.

Agricultural lime is obtained from crushed limestone, an organic sedimentary rock made of calcium carbonate. The carbonate is formed when dead microscopic material such as coral, shells and algae accumulate over millions of years.

The rocks are then crushed into powder to form lime. Lime is used to reduce soil acidity especially soils where a lot of chemical fertilizers have been used for a long time, in the process reducing soil pH. Different types of lime have different abilities to neutralize acidity in the soil. This is sometimes determined by the how fine the lime is. The finer the lime, the faster it reacts with acid soil to neutralise it.

Application rate

The application rate of agricultural lime depends on the condition of the soil especially its pH level (acidity or alkalinity). Lime cannot be applied unless the farmer has done a soil test on their shamba. The agricultural specialist or soil scientist will then advice how much lime the farmer can apply.



Granulated (left) is more effective in neutralising soil acidity than when powder form (right).

When to apply lime

Lime should be applied 3 months before planting row crops (maize, wheat, beans, etc) and 6 months before planting forage crops such as pasture grasses-this is adequate time for the lime to neutralise acidity in the affected soil.

How do you apply lime?

Farmers should always work lime into the soil whenever possible. The contact with the soil helps maximize the effectiveness of the liming material. because lime gets absorbed into the soil

at the rate of 1 inch per year. There is also the risk of much of the lime being washed away during heavy rains. Lime applied as dust is also difficult to get into the soil and is therefore not very effective in neutralising acidity. Farmers are advised to buy granulated lime, which is more effective in correcting acidity in the soil. Farmers can buy lime from a number of companies whose contact are given below:

Lachlan (K) Ltd Tel 0720 706 939, *Athi River Mining (ARM)* Tel. 374 470 31, *Athi River Mining*, 0731 028 062, 0722 843 546. ■

Advice to farmers

We have been receiving many calls and enquiries on items advertised in this column. We would like to bring to the attention of buyers and sellers of various items advertised that **they should contact the advertisers directly through telephone, emails and facebook accounts given and not The Organic Farmer magazine.** We would also like to advise farmers to be careful not to send money before they have verified the quality of any items they intend to buy. The magazine will not accept any responsibility for any loss as a result of any transaction between the buyers and sellers of items advertised in the magazine. The symbol ■ denotes the facebook address of the contact advertiser - it is not possible to access facebook unless you have an account.