



National Geographic

Farmers can get good harvest of honey and other bee products through proper management of bee colonies. In this way, bee pests and diseases can also be easily controlled.

Dear farmers,

The Ministry of Agriculture Livestock and Fisheries has brought together several research institutions including the former Kenya Agricultural Research Institute (KARI), Coffee Research Foundation (CRF), Tea Research Foundation of Kenya (TRFK) and Kenya Sugar Research Foundation (KESREF) under one Research umbrella, the Kenya Agricultural and Livestock Research Organization (KALRO). This is aimed at better coordination of research operations, increasing efficiency and improving generation of research outputs, reducing wastage by tightening administration and resource allocation and spurring the country's agricultural development. This will run within the framework of the long-term Agricultural Sector Development Programme Strategy (ASDPS) and National Agricultural Research System (NARS) Policy to ensure the country achieves its overall objectives in food self-sufficiency, which is in line with the country's Vision 2030 goals.

Agricultural research in any country is the goose that lays the golden egg. It has enabled countries to develop demanded new seed varieties and technologies that enhance food production and income for small-scale farmers and confront emerging threats in terms of pests and diseases.

Inevitably, restructuring of research institutions has to be done in a very careful way to ensure that the ongoing research activities are not interfered with, delayed or abandoned. This calls for careful redeployment of staff such that there is proper matching of skills, experience and competences in every research discipline to make sure all research operations continue as they were before or even improved.

In the past, claims have been made that there are lots of valuable research findings in terms of information, technologies, practices and systems that haven't benefited farmers. The new umbrella research body will therefore need to operate differently to enhance effectiveness and efficiency in redefining the agricultural research agenda by identifying gaps that should be addressed and forging partnerships with organizations, networks and forums for strengthening dissemination of research outputs. We need to ensure that majority of the farmers including small-scale farmers benefit from investments in research.

Use organic methods to feed and protect crops

TOF - After planting, the period between May and July is very critical since the crops are in their growth stage. They need weeding, enough nutrients, disease and pest control. During this time agro-veterinary shops make good sales from selling chemicals to farmers. Top dressing, and pest and disease control cost a lot of money. Chemical fertilizers commonly used by farmers are primarily made from non-renewable

sources, including fossil fuels. Once these sources are depleted it is difficult to regenerate them.

The problem with chemical fertilizers

It has been scientifically proven that excessive use of fertilizers damages the soil and causes other negative environmental effects. This is one of the reasons why farmers in the breadbasket areas of Kenya like Trans Nzoia County no longer enjoy the bountiful harvest of maize crop.

cidal and antifungal properties such as the African marigold, chillies, garlic, soddom's apple and pyrethrum, the farmer can easily control harmful crop pests and diseases. Using these organic inputs, the farmers not only reduce the cost of buying chemicals, but also ensure they have food crops that are safe from chemical residues.

Organics work differently

Farmers should remember that plant extracts do not work in the same way as chemicals. For instance, organic fertilizers like farmyard manure break down according to nature's rules. This means that they may not release nutrients as quickly as you expect.

Organic plant extracts should be applied two to three times a week for them to protect your crops against harmful pests. There's little to no risk of toxic build up of chemicals and salts that can be deadly to plants and other organisms that consume them. Organic fertilizers are renewable, biodegradable, environmentally friendly and therefore sustainable.

Past editions of TOF magazine can be accessed through Infonet Biovision website (<http://www.infonet-biovision.org/default/text/-1/orgFarmerGroup>) or The Organic Farmer website (<http://theorganicfarmer.org/downloads/organic-farmer>).

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Go organic on insect-pest and disease control

Although many farmers know the benefits of organic pest and disease control, they prefer using dangerous pesticides. The risks of using chemical pesticides outweigh their benefits in the long term.

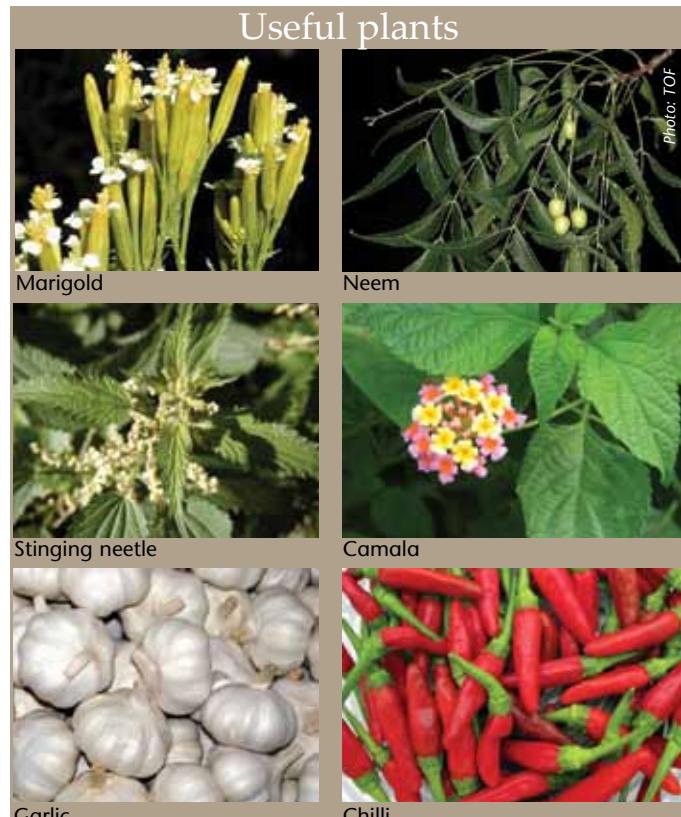
The Organic Farmer Farmers have a very difficult time at the moment due to pressure of pests and diseases and declining soil fertility. Pest and diseases usually tend to increase when it is warm and wet. At this time of the year, shops selling chemical pesticides make good sales because farmers prefer use of "fast acting" chemical pesticides to deal with the menace.

Malaria parasites usually develop resistance to common anti-malaria drugs, which prompts drug companies to develop stronger ones to prevent death. In the same way, pests also become resistant to chemical pesticides. To deal with this, chemical compa-

nies develop stronger pesticides that can overcome the resistant pests. However, a number of new pesticides introduced to the market have serious side effects.

The chemicals kill beneficial insects like parasitic wasps and ladybirds that control harmful pests such as thrips, worms and caterpillars naturally. Also, most chemical elements in the pesticides do not breakdown completely when used on target crops. Chemical residues remain on the crop up to the time of harvest which has negative side effects on people who consume them. Some of the side effects include allergies, liver and kidney complications and cancers that are difficult to cure.

There are many safe, natural and simple methods that farmers can use to protect their crops from pests. In the past issues of *The Organic Farmer*, we have explained various methods that farmers can use to protect their crops without using chemicals. One of these is the use of plant



Useful plants

Other methods of insect pest and disease control

Organic farming promotes an integrated system of pest and disease management where the farmer, for instance, tries to restore the natural balance between pests and their natural enemies (predators and parasitoids).

In this system, each organism has an important part to play in the ecosystem. For example, a few pests in a farm may not be a threat to your crops if there are predators which feed on them. This helps to keep the predators alive. The predators on the other hand ensure the pest population does not increase to a level where they can devastate a crop.

For example, thrips are a common vegetable pest. Their natural enemies include predatory thrips, predatory mites (like *Amblyseius* spp.), anthocorid bugs or minute pirate bugs (*Orius* spp.), ground beetles, lacewings, hoverflies, spiders and

parasitic wasp (*Ceranisus menes*). The farmer can increase the number of these natural enemies by providing protective habitats for them.

The use of chemicals disrupts all these systems because chemicals kill the natural enemies or beneficial insects, therefore allowing the pest population to increase to a level where they can destroy an entire crop.

Disease control is also possible in this system if the farmer practises crop rotation and intercropping.

Crop rotation eliminates the problem of pests or diseases that attack a particular crop; if maize is rotated with potatoes which are affected by bacterial wilt, the disease disappears in 3 to 4 years because the disease causing bacteria cannot survive for long in a maize field. The bacteria dies because the host plant has been removed. Planting hedges that

separate one crop from another also helps to control pests. For instance, a tithonia hedge can act as a barrier to insects such as aphids. A row of pigeon peas (*Mbaazi*) can protect your tomatoes, potatoes and even cabbages from red spider mites.

Beans planted around tomatoes, potatoes or any other crop also attract aphids and many other insects that may attack the crop, thus protecting it.

When planted in the farm, some plants such as the African marigold, aloe, blackjack, garlic, tephrosia, crotalaria, chilli, peppers and eucalyptus naturally repel and kill a number of pests like the diamondback moth, stemborer, cutworm and aphids. When prepared and used as natural insecticides, African marigold, black jack, tephrosia, lantana camara, garlic, tea, papaya, pyrethrum and crotalaria kill the pests mentioned above.

extracts. If properly used, plant extracts can not only prevent pest damage, but also control common fungal and bacterial diseases while saving farmers a lot of money.

Aggressive marketing of chemicals

Considering that preparing plant extracts requires more labour and time, many farmers are usually not ready to do the extra work required to prepare plant extracts. They would prefer to walk to a shop selling chemical pesticides and fertilizers.

Chemical companies are spending millions of shillings every month to advertise various chemical pesticides over the local FM radio stations, most of which have a wide coverage in rural areas. In the advertisements, the farmers are not told of the numerous side effects of the chemicals being sold. There

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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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African Insect Science for Food and Health



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Publisher icipe-African Insect Science for Food and Health, P.O. Box 30772, 00100 Nairobi, KENYA, +254 20 863 20 00; icipe@icipe.org; www.icipe.org

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

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PGS certification is better for organic farmers

Participatory Guarantee Systems (PGS) are built on trust, integrity and transparency among organic farmers. They are cheaper and reduce bureaucracies involved in organic certification and make it possible for farmers to sell their produce in local and regional markets.

Jack Juma | Many small-scale farmers who have gone into organic certification, through the third party (certification companies) have had to go through a rigorous process and incurred additional costs. They also have a lot of paper work to do to prove their compliance with the requirements. Third party certification is very relevant for access to regulated export market. However, there is growing realisation that third party certification is not always possible especially for farmers targeting the local and regional markets.

Efforts to promote PGS for local farmers

In recent times there has been a strong need to acknowledge and develop PGS as an alternative and/or complementary option to the third party certification. Indeed the International Federation of Organic Agriculture Movements (IFOAM) acknowledges that PGS are locally focused quality assurance systems. They certify producers based on active participation of farmers and other stakeholders and are built on foundation of trust, networks and knowledge exchange.

Two main factors have made the growth of PGS certification important: The desire to improve the way organic food is certified and need for an organic guarantee system that is recognised in local markets and not controlled by the compliance requirements and costs associated with third party certification.

Fundamental values of PGS

PGS shares a common goal with third-party certification systems in providing a credible guarantee for consumers seeking organic produce. The difference is in the approach. In PGS, farmers and consumers are encouraged and required to



A farmer sells her organic produce during an organic farmers market day in Nairobi.

directly participate in the certification process. This is realistic and beneficial especially for small-scale farmers and the local, direct markets that PGS systems are most likely to serve.

Active participation of farmers

Active participation on the part of the farmers and other stakeholders results in greater empowerment and greater responsibility. This requires PGS to place a high priority on knowledge and capacity building through training not only for producers (in this case the farmers) but also for consumers.

Most importantly, this direct involvement allows PGS programmes to be less involving in terms of paperwork and record-keeping, since PGS systems seek to be absolutely inclusive in bringing small-scale farmers into an organic system of production.

PGS model built on trust

Common certification programmes are usually based on the idea that farmers must prove they have complied with organic standards and regulations to be certified. PGS programmes use an integrity-based approach that starts with the foundation of trust. Farmers and consumers are expected to be transparent and open, while maintaining an environment that minimizes hierarchies and administrative levels.

How does PGS Work?

There are several PGS operating all over the world with an estimated 46,000 farmers across 38 countries. Philippines, Uganda

and India lead in the number of farmers involved. PGS is, therefore, unique as it is designed to suit particular markets and communities.

Stakeholders in a PGS system have shared vision, engage in processes of participatory, transparency, trust and learning. All members are basically equal in terms of power. In many cases PGS starts from community networks where members meet to address common issues, which may range from table banking, social issues or members' welfare.

Interaction between farmers and consumers

Local organic markets are always a great drive for starting PGS. When consumers interact with farmers or visit their farms, they get to see their production methods and techniques.

Consumers also meet farmers at the organic farmers market, ask questions, and get responses from the producers of food or participate in peer reviews. This builds trust and assures the consumers of the quality of the product, beyond the paper certificate.

Regular peer review or on farm inspection carried by farmers is a valuable tool for knowledge exchange as farmers discuss problems, challenges and share advice.

Sustaining the PGS

Any group of farmers who want to establish PGS must think beyond establishing the usual rules that govern the group members. Many PGS groups are involved in other common activi-

ties that bring them together beyond aspects of agriculture. These activities are encouraged as individuals within groups could have different interests and needs.

Such activities should, however, meet a particular market demand. For example, the group can start supermarkets, schools, home deliveries and farmers' markets. It is always good to have diverse local markets to cushion farmers against market risks.

The PGS products require active promotion through brand development, good packaging, advertisement and participation in trade fairs. Many PGS groups have their own logos. In Kenya and East Africa region, *Kilimohai* mark is used on PGS certified organic products.

The PGS groups should know from the start how they are going to fund their activities. One option is to start with members' financial contributions or consumer support like in the case of Consumer Supported Agriculture in USA. A local NGO or Government agency can provide support.

The PGS groups should analyse their external and internal funding opportunities and aim at being self-sustaining in the long run. This is possible if some profits are put back into the operations that can sustain full operations.

Diversify products

The PGS groups should deliver diverse quality organic products in the market that meet the needs of consumers and enable them earn a reasonable income.

PGS has great potential

PGS has great potential for developing both local and even regional markets. Many consumers who want organic products will usually check whether the product is marked as "certified organic" and not just the certificate and logo.

The fact that farmers are entrusted with guarantee of organic produce provides them motivation to do better. However, caution must always be taken to ensure that PGS does not appear less effective than third party certification.

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Common bee pests and diseases in East Africa

Honey bees are responsible for at least one third of agricultural production in the world. Unfortunately, these bees have been dying very fast and this threatens our ability to produce enough and affordable nutritious food.

Caroline Nyakundi |

Although tough and well-adapted to the environment than do bees in Europe and America, African bees are also affected by pests and diseases. In Europe and America, the Colony Collapse Disorder (CCD) has led to huge reduction of honey bee (scientific name of the Kenyan bee is *Apis mellifera scutellata*) populations. CCD happens when worker bees from honeybee colonies suddenly disappear. The colony remains with no adult bees or dead bee bodies but with a live queen, and some honey and immature bees.

CCD has not been identified in bee colonies in Kenya or East Africa. Although no particular cause of CCD is known, scientists have established that due to environmental pollution and pesticide applications, there has been a decline in the population of honey bees.

Other factors that may be responsible for colony losses include climate change, loss of habitats (for bees to get food), destruction of the environment

(such as cutting down trees and shrubs that bees forage on), certain diseases and parasites, poor nutrition, loss of queens and certain commercial bee keeping practices.

East African bees more tolerant

It has been established that bees in Kenya and other parts of East Africa are generally resistant or tolerant of the parasites and pathogens that threaten honey-bee populations in other parts of the world. One reason could be that they have not yet been affected by stressors like exposure to toxins in the environment.

It is likely that low levels of pesticides in hives from across Kenya, compared to that in developed countries, may be responsible for the resistant nature of the bees. Scientists in ICIPE are, however, working to establish the factors that contribute to the resilience of the East African bee.

Pests identified in East Africa

1. Varroa mites

The varroa mite is an external parasitic mite that attacks the honey bees. It is common in Kenya and many other parts of Africa.

In a survey by the ICIPE bee health team in Central, West and Southern part of Africa (Madagascar) in 2014, the varroa mite

was found to be a common pest in most of the bee colonies. The team found out that the mite, also called *Varroa Destructor*, destroys or attacks broods (young ones of bees) in the combs as well as adults.

Some of the bee colonies have genes that provide good "grooming behaviour" that helps in resisting varroa mites – two recessive genes (not dominant) enable some bee colonies to resist the varroa mite, resulting in a "hygienic colony". Some bee species may not resist the mite as their grooming behaviour may not be so efficient. But grooming ability depends on the genetic ability of a particular colony.

African bees had been found to resist attack by the varroa mites. Dr. Eliud Muli, a bee-keeping and honey production expert in ICIPE, in a study conducted in a few African countries, found that the East African bees are quite resistant to varroa as compared to the European ones – as they groom, they kick the varroa mite out of their bodies; they also chew and throw out the mite.



Varroa mite

Varroa mites spread viruses

When bees get infested by varroa mites, they are infected by their viruses. The mites have spread viruses that cause bee diseases in most parts of the world except a few particularly East African countries. When they get into a hive they transmit the viruses through the brood, they suck up their body fluids and destroy them. Scientists have found out that Varroa mites transmits many different types of viruses in East Africa.

The source of the mites in East Africa is not yet known.



Beekeepers should always check their hives for the presence of varroa mites by burning the honey combs and cleaning the hives.

However, because of the migratory nature of bees, it is possible that some bees may carry the mites, especially when they are swarming (bees reproduce when swarming). The varroa mites have to be controlled as they can be destructive going by what has been observed in Europe and America – which have much higher levels of varroa mite infestation than in East Africa.

Research into controlling varroa mites

Although varroa mites have been located in nearly all the locations surveyed by ICIPE in Kenya, Tanzania and Ethiopia, not all colonies (hives) are affected by the mites.

"ICIPE is working on ways of rearing colonies that are free of varroa mites. This involves breeding queens that are resistant to varroa. To breed a new generation of varroa-resistant bees, scientists get drones from another hive which is resistant to varroa mite then artificially inseminate the resistant queen. The next generation of queens is likely to have at least 40 – 60% of the resistant gene in the first filial generation. By repeating the breeding line one can have 80% resistant strain of bees – a strong queen that produces a robust colony," says Prof. Suresh Raina.

Hives that are infested with the varroa are then replaced with the new generation of queens that are varroa-resistant. Currently, scientists are validating the results of the experiments after which the resistant queens will be distributed countrywide. This will ensure that we have varroa-free apiaries,

Signs of pest and disease infestation

- Reduced honey production
- Dead bees at the entrance of the hives. When there is severe infection or pesticide pollution you get many bees dead at the entrance.

How to manage bee colonies for maximum production

- Ensure you protect your environment and its biodiversity (all the living things in an environment). Do not cut trees and shrubs as these provide nutritious food that ensures bees have a strong immunity to resist diseases and pests.
- Bee keepers should always avoid using industrial pesticides in controlling crop pests. They weaken the bees and make them susceptible to diseases.
- Avoid using aggressive chemical treatments for control-

ling honey bee diseases.

- Replace the queen every two years. This prevents the diseases and pests from being transmitted from the queen to her generation.
- Routinely inspect your hives
- Check them for symptoms of pest and diseases and contact ICIPE or a qualified bee keeper for assistance.

• Avoid domestication of bees, which has been related to the collapse of bee populations in other parts of the world.

For more information or training on bee keeping you can get in touch with Prof. Suresh Raina, the Team Leader, the Bee Health Programme; Tel. No. 020-8632060. A Practical Guide for Sericulture and Apiculture is available at a cost of Ksh. 1,000. The book is available in English, Kiswahili, Luganda, French, Arabic and Spanish.

can be controlled with good farming practices



case of wax moth which can be easily controlled by

which means possibly virus free apiaries.

Veterinary officers and bee experts from 46 African Union (AU) member states have been trained on how to develop apiaries that are free of the pests and diseases. The breeding of varroa-free colonies is not only being done in Kenya, but also in some parts of Africa. This has been done in Ethiopia, and initiated in Cameroon, Madagascar, Burkina Faso and Liberia.

Prof. Raina's team is also conducting experiments to find out what happens to the East African bees when they are attacked by the mites or get exposed to pesticides. This may provide insights as to why the East African bees seem resilient to the varroa pest yet those in other parts of the world are being affected.

2. Small hive beetle

This is another pest that troubles bees in the East African region. These beetles spread in the world as a result of global trade or through flight. The beetles can be a real menace to bees as they disturb the bees, eat the honey and wax and crush the combs. The large hive beetle has been identified in some hives but is usually not problematic.

How to detect the beetle

According to Dr. Ayuka Fombong, a research scientist in the ICIPE bee health project,



Small hive beetle in a honey comb

Photo: TOF

the beetles love the smell of honey and so are naturally attracted to bee hives. It is sometimes difficult to detect the presence of this beetle in the bee colony because once the hive is opened, the beetle usually escapes into the dark. To be able to catch them, special traps can be used in the hive. The beetle hides in the trap and this makes it easy to detect the presence of the beetle early. If not controlled, the small hive beetle can destroy the whole colony. This beetle can also be controlled using a strip containing a repellent that has been developed by ICIPE.

3. Wax moth

Although not common in hives in East Africa, the wax moth can be destructive in infested hives. The moth lays eggs and their grubs (larvae), eat the comb, wax and honey. These moths liter-



A wax moth larvae

ally chew up everything, leaving powdery residue in the hive. The solution to this is to maintain the apiaries including cleaning and repairs.

Common diseases that affect bees in East Africa

1. Nosema disease

Nosema in honey bees is caused by one of two (or both) fungi called *Nosema apis* and *Nosema ceranae*. *Nosema apis* has been identified in bee colonies in Kenya. This disease causes a kind of dysentery (in humans, it is an infection of the intestines resulting in severe diarrhoea with the presence of blood and mucus in the faeces). It usually affects the adult bees and has been known to cause a lot of bee deaths in many parts of the world. The spores of the fungus have been identified in the Coastal area of Kenya, but the situation is not serious, according to Prof. Raina.

The fungus affects the gut or intestines of the bee and affects their ability to make food. The bees do not go out of the hive but stay in and put their faeces on the comb – you can see some lines of the bee faeces in the combs. When the bees defecate in the combs they spread the spores of the fungus. High levels of infection can result in death of bees.

The colony gets weak because of the disease as the adult bees die, honey production reduces and the population of bees generally decreases because there is not enough royal jelly to feed the brood. If the queen gets infected, her ovaries can degenerate and this reduces her capacity to lay eggs. If the colony is largely affected the colony can disappear (collapse). It is possible to detect hives that have been infected with *Nosema apis* by the fact that such hives usually fail to build up after death of the queen or adult bees.

Symptoms of *Nosema* (spores) have been identified in the Coast, although ICIPE scientists have not yet located the disease in the colonies that have been studied.

2. Chalk brood disease

Another disease that had been identified in the country is the Chalk Brood disease which is caused by a fungus. Although, there are some indications of this disease in East Africa, more research is being done to determine the seriousness of this disease, in West, Central and East Africa.

3. Foulbrood disease

The two major diseases – European Foulbrood and American Foulbrood – that are common in Europe and America have not been located or recorded anywhere in East Africa. In the 2014 survey of hives, in East Africa, ICIPE scientists did not detect any signs of the disease but some spores have been detected in some hives.

So far, farmers in Kenya are safe from this disease. But in Libya, and some parts of North Africa like Tunisia, Algeria and Libya, the disease has been detected.

Effects of pesticides on bees' health

Bees have a more delicate immune system than do humans and cannot withstand pollution or harmful chemicals. Honey bees (called *Apis mellifera*) can be affected by pathogens - viruses, bacteria, fungi and other micro-

organisms that cause diseases.

Since they are foraging insects (this means that they travel over a wide area to search for food), bees can easily be poisoned by chemicals in the environment such as pesticides used on the plants and flowers that they visit for food. Even in small doses, pesticides can weaken the immunity of the bees and this makes them very vulnerable to diseases and pests.

Pesticides have been identified as one of the major causes of death of bees, especially in Europe and America where whole colonies have collapsed. In many cases, spraying crops with pesticides may instantly kill the bees or impair their behaviour, and they do not return to the hives once they leave to forage. The colony collapses naturally as there are no adult bees to take care of the "babies" or grubs.

Farmers and bee keepers should know that destroying the environment kills the agents of pollination and this seriously affects food production. When the bees are weak due to pesticides, pollution and other environmental issues – the colony gets weak. Remember the amount of pesticide used by beekeepers has already been shown to be related to high levels of varroa mite infestation in hives in Europe and America.

Why African bees are more resistant?

About 90% of bees in East Africa live in the natural environment and this should be maintained. Farmers make traditional hives, which bees visit during some seasons to make honey then leave. This allows frequent swarming, and the diseased bees die naturally leaving the healthy ones to thrive. The domesticated hives do not swarm and this reduces their ability to survive harsh conditions such as disease, drought and cold.

De-forestation affects bees' health

Farmers should avoid cutting trees and shrubs which results in less sources of food for bees. This problem is common in East Africa where people cut down trees for charcoal and firewood. Bees have to travel long distances to find food and water and this makes it difficult for them to get sufficient amount of pollen and nectar.

Eat and enjoy the health benefits of dolichos

Dolichos are rich in good quality proteins and fibre. They help regulate blood sugar and blood pressure, among other health benefits for consumers.

Dr. Peter Mokaya Dolichos, also called turtle beans, are a small type of legume. In Kenya, they are a delicacy among the Kikuyu community (referred to as *Njahi*). They are typically served during traditional ceremonies including weddings. Their history, however, dates back 7000 years ago when they were popular in the Latin American cuisine.

They fix nitrogen

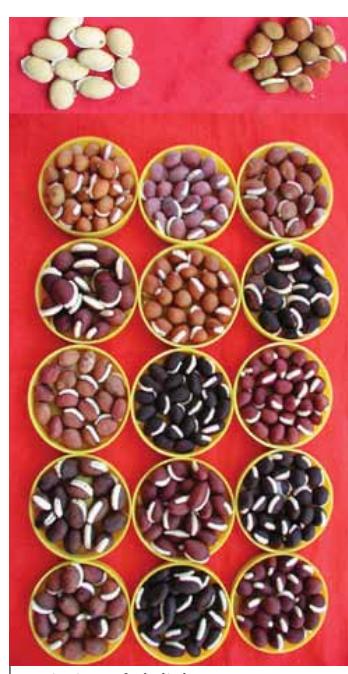
Dolichos are a rich source of nitrogen, through nitrogen fixation, and are often intercropped with maize to provide the much-needed nitrogen.

In this article, we seek to encourage more communities, other than the Kikuyu, to plant these black beans using organic methods-without synthetic fertilizers and pesticides - and to consume them as part of their health diet and as a source of healthy protein and fibre.

Many health benefits

Why should you consume organically grown '*njahi*'? Some of the reasons why you are encouraged to grow and consume organically grown dolichos is that:

- They are an excellent source of vegetarian protein; good



Varieties of dolichos



quality protein that can replace "*nyama*" for those who cannot afford meat.

- They are a good source of insoluble fibre. This fibre has several benefits including serving as pre-biotics (food for the healthy bacteria in your gut), as a "filler food" which create a feeling of "fullness" and hence reduce the need to eat extra food.
- They cleanse the gut, by serving a bulk forming purgative - through various mechanisms and complement the healing process of inflammatory gut conditions like irritable bowel syndrome, leaky gut and hemorrhoids (bleeding from piles at the extreme end of the rectum).
- When absorbed into circulation and metabolised, through various processes, they contribute to reduction of blood pressure and heart health.
- The beans also play a key role in blood sugar regulation by slowing down the release of simple sugars. This is because they contain complex carbohydrates and fibre which create a feeling of satiety (fullness) and reduce more intake of sugar. Dolichos have a low glycaemic index and are therefore recommended for diabetics and people, including farmers, who may want to regulate their blood sugar levels.
- Research studies have shown that dolichos have powerful diuretic properties- this means that they can facilitate the body's removal of excess fluids, through the kidneys. Infact, their effect, in some studies has been found to be similar or equal to using the drug Lasix, without the associated side effects.
- For those keen on losing weight, it has compounds known as phenols, which help to reduce weight thus eating *njahi* is highly recommended.

How to sprout and cook dolichos

Black beans are available year-round, in the market and in grocery stores either dried and packaged or canned. They have a dense, almost meaty texture that makes them a popular source of protein in vegetarian dishes. One is, however, encouraged to find and purchase the organically grown varieties.

One way to eat "*njahi*" is in the form of sprouts. Sprouts have a very rich concentration of high quality proteins loaded with useful enzymes and highly bioavailable micronutrients. You can add the "*njahi*" sprouts to salads or eat the sprouts themselves by adding a little salt, cummin, lemon, finely minced onions and olive oil.

Sort and soak them

When preparing dolichos, it is important to first sort (pick out any small rocks or other debris that may have ended up in the package). Wash and soak them in water for about 8 to 10 hours before cooking in order to achieve optimum flavor and texture and enable faster cooking.

Pour the soaking water- when you can split them easily between your fingers, you know they are ready for cooking. Be careful not to soak them for more than 12 hours, otherwise they become mushy and spoil the taste.

Soaking dried legumes reduces the amount of time needed to cook them. In addition it helps remove substances that cause gas and flatulence associated with eating beans.

Some cooking tips

You can make a hearty black bean soup to warm you up on cold days, especially these cold and rainy months of May, June and July by blending cooked black beans with onions, tomatoes, and your favourite spices.

- Blend cooked black beans with garlic, onion, fresh cilantro and lime juice for a quick and easy bean dip.
- Mix black beans, onions, lettuce, tomatoes, avocado, sharp cheddar cheese and salsa together for a simple taco salad.

Dr. Peter Mokaya is the Director of Organic Consumers Alliance (OCA). For more information go to www.organicconsumers.co.ke or contact him at Mokayapm@gmail.com or info@organicconsumers.co.ke

Preventive measures against maize disease

I would like to know more on how to grow maize and how to protect it from MLND.

It is important to prepare land meant for maize planting early before the rains. Make sure the soil is finely ploughed. The right spacing in highland areas is usually 75 cm x 25 cm while in lowland areas, it is 90cm x 30cm. Plant 2 seeds per hole or 1 seed alternating with 2 seeds per hole.

Plant early before the beginning of the rains. Reduce the use of chemical fertilizers but use organic fertilizers that are now available in the market.

Preventive measures against MLND

Early weeding is also important to ensure the maize utilizes all the nutrients in the soil without competition from the weeds.



Up to now no cure has been found for the control of the Maize Lethal Necrosis Disease (MLND). But farmers can take a number of preventive measures to contain the disease. One of these measures is to practise crop rotation; if a field was under

maize last year, it is advisable to plant a different crop where maize was planted to reduce the incidence of infection.

Destroy all volunteer maize plants, weeds or other crops in the field where you intend to plant maize since they may

harbor insect pests that transfer the disease to your new maize crop.

Infected green or dry maize stalks can be fed to livestock thereby mitigating the maize loss through increased milk production.

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fore, this explains why many farmers would opt for the easy way out.

Farmers who know the dangers posed by chemicals, have adopted plant extracts and other biological methods to control pests and diseases. These organic farmers spend less money, have healthier crops and their income is also higher because they spend less in terms of inputs. Healthier crops can also withstand diseases and pests.

For those farmers who find it to be time consuming to prepare plant extracts to control pests, some local companies have started making organic pesticides some of which are highlighted below:

Nimbecidine: This is a pesticide made from neem oil that can control a wide range of insect pests and mites and nematodes. It is safe and does not harm beneficial insects.

Thuricide HP: This is a pesticide made from *Bacillus Thuringiensis* (Bt) that effectively controls cabbage looper and other pests in tomatoes, cabbages, coffee and citrus fruits. *Bt* is available under different brands, so the farmer has to enquire which of the *Bt* brands are available in the agrovet shops.

Pygar: This is a pesticide made from a pyrethrum extract that is very effective in the control of all types of pests that attack a wide range of crops.

Phosphite: This is a fungicide that can be used to control a number of fungal diseases (more on this product later).

How to control banana Xanthomonas wilt disease



How do we overcome banana wilt challenge in our farm? (Continued from TOF May 2015)

Banana Xanthomonas wilt is bacterial disease caused by *Xanthomonas campestris* pv. *Musacearum*. It originated from Uganda in 2001 and affected all varieties of bananas. Since then it has spread to Rwanda, DRC,

Tanzania, Kenya and Burundi.

Symptoms: The main symptoms of BXW show on the fruit. A bacterial pus comes out of the infected banana plant organs. The fruit has an internal discolouration and shows immature ripening. There is also an orange-yellow discolouration on stem tissue including a dark brown tissue scars. There is gradual yellowing

of the leaves and the buds of the male part of the plant, which later on shrivels (collapses).

Control measures: Farmers should observe their banana plants for any symptoms of the disease and remove the diseased plants in order to stop its spread. Cut the infected plants into small pieces. Removal of the male bud can reduce chances of infection of the entire plant; this is also essential to maintain the quality of the fruit. Do not cover any part of the banana plant with topsoil. Disinfect all tools used in the banana plantation to stop them from spreading the disease. Practising crop rotation by planting other crops such as maize, beans, vegetables such as *sukumawiki* and cabbages can reduce the spread of the disease.

Farming Tip

Making animal feeds on the farm

Several times, we have responded to farmers' requests on the issue of feed preparation by providing different feed formulae that can be used to make feeds at home. This is one way our magazine is using to ensure farmers increase their earnings from poultry, pig and dairy farming operations.

Feeds take up to 80 per cent of a farmers total production costs;



by constituting feeds at home, farmers have been able to cut these cost by up to 50 per cent especially where the raw materials are cheaply available. Quite a number of farmers are unable to constitute the feeds on their own. To deal with this problem, Tarime Suppliers, one of the companies selling feed to farmers has started a service where they constitute

the feeds for the farmers. All the farmer needs is to give them a feed formular and they use to mix the various ingredients for you.

Farmer facing this challenge can now contact Tarime suppliers on Tel. 0729 099 550 Email:tarimesuppliers@yahoo.com (city stadium, Nairobi). Farmers who require feed formulae can download them from TOF Nos.102, 111 and 116. Visit our website at www.organicfarmer.org

TOF Radio answers your questions

TOFRadio is broadcast on Milele FM at 8:45pm on Sunday, and KBC on Thursday at 8:45pm. 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.

Ensure your chickens lay eggs with strong shell

Joyce Wambui Mahui | It is quite distressing for farmers when their chickens suddenly start laying eggs with weak shells which are not strong enough for storage and even sale. Such eggs present a big loss to the farmer who has spent time and money rearing the chickens to make a profit.

Nobody is interested in buying such eggs even at a throw away price. The eggs are not any good either for hatching to produce the next batch of chickens. Many poultry farmers depend on their chickens to provide them and their families with good quality eggs and quality meat and income.

Eggs a steady source of income

Like any other enterprise, farmers have to pay their bills, feed and pay school fees for their children, and provide for other family needs. It's important for poultry farmers to have information at their finger tips on the best feeding practices for poultry to make them productive and provide an income.

So, how can a farmer prevent his or her birds from laying eggs with weak shells?

Farmers can overcome this



Eggs on sale in a market



challenge to ensure the chickens have a balanced diet that includes calcium in their daily feed.

Common in old birds

Cases of hens laying eggs with weak shells or no shells at all are usually higher with the older birds in the flock. This is because the birds have been laying eggs for a long time. A hen loses calcium as it lays eggs.

Calcium is the primary mineral that makes up eggshells and when not supplied in adequate amounts in their diet, the hens may not have this basic mineral that it needs to make the eggshell. The problem comes about when whole grains or feeds deficient in minerals and vitamins make up the bulk of the laying hen's diet. Thin eggshells are observed when calcium, phosphorus and vitamin D3 are not provided in diets in adequate amounts.

Provide balanced diet

The problem of soft eggshells is also more common during periods of hot weather because calcium is conserved and retained within the hen's body and released less efficiently.

Like human beings and other animals, chickens also need energy sources, protein, fat and oils, vitamins, and minerals in their daily ration. Absence of minerals like calcium in the daily feed, affects egg formation. Lack of adequate calcium in feed rations results in weak

eggs. On the other hand, adequate calcium contributes greatly to chickens producing eggs with thick shells. It is also very important for a farmer to make sure the chickens are fed a well-balanced diet even at maturity so that they remain healthy and produce good quality eggs.

Calcium easily available

As most farmers are limited by resources, they do not have to spend much money to get calcium for their chickens feed. Good sources of calcium are easily available in the locality of the farmer.

Limestone and oyster shells can be a very good source of calcium when mixed well with the chicken feed. Diatomite is also a good source of calcium.

For farmers who do not live near the sea, egg shells and bones are also a good source of calcium. After using the egg, crush the eggshells into powder and feed your chickens. Dry and crush the eggshells first, otherwise the chickens may get into the habit of eating their own eggs.

Give your chickens well-balanced feed that contains carbohydrates, protein, fat, vitamins, minerals and fresh, clean water, and try to keep them comfortable.

After the eggshell quality is restored, farmers should strive to maintain this by ensuring the hens continue to get complete layer diet supplemented with minerals.



farmers forum

0717 551 129 / 0738 390 715

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.

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

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.

Cypress seedlings for sale: We have 200,000 cypress seedlings for sale, price is negotiable. Call Robert 0705 185 225 Molo sub-county.

White dry maize for sale: I want to buy white dry maize, cash on delivery. Contact: ipswichlimited@gmail.com

Seedlings: Garlic and sweet bananas in Karatina. Contact 0723 900 051.

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.