



Photo: TOF

Dominic Ochieng a field officer with Real IPM company shows a farmer in Thika how to use a pheromone-baited trap to monitor fall armyworm invasion. The traps help farmers to know when to spray

## Use simple methods to control fall armyworm

**Peter Kamau** | "Having the fall armyworm in your farm is like being in a marriage with few options for divorce," says a Brazilian farmer. This quote shows how difficult it is to eradicate the pest. Last year, maize farmers lost between 30-50 per cent of their maize despite using chemical pesticides recommended by the government. This means that farmers now have a serious



Photo: Venter Mwangera

Fall armyworm (larva stage)

enemy they have to live with for a long time. Farmers need a strategy to control the pest to reduce its damage in farms. Proper timing is one of the best ways to control the pests by spraying at larvae stage.

The pest is voracious and can destroy a lot of maize within a very short period. Studies show that the moth can move up to 30 kilometres and upto 200 kilometres in a day when assisted by wind.

### Scout for the pest daily

To control the pest effectively, farmers need to scout their maize crop daily to be able to detect it early. Farmers using organic or biological methods of control should spray their maize crop only when the fall armyworm

is at its second stage (larvae or second instar).

Most pesticides in the market cannot control the pest if it is at the first and third stage (eggs, pupae or third instar). The only effective control for the fall armyworm is to scout for its presence and when at larvae stage (second instar). Farmers are advised not to go for expensive chemical pesticides because the chemical pesticides cannot control the pest at egg or pupae stage.

### Use environmentally friendly pesticides

Farmers can use simple environmental friendly biopesticides such as Nimbecidine® or simple plant extracts, which can be prepared at home and sprayed on the maize to keep away the pest and even kill the larvae. Spraying should be done early in the morning and late in the evening because the pest feeds at night. Use of pheromone mass traps is also a good way to control the pest. One female fall armyworm can lay 1000- 1500 eggs during its lifetime. This shows that mass trapping can reduce the pest drastically and keep the crops safe. Apart from maize, the fall armyworm can also destroy sorghum, sugarcane, sukumawiki, cabbages, beans, tomatoes, capsicum, spinach, amaranthus and many other crops. See page 3

## Dear farmer,

By now, all farmers are aware of the threat posed by climate change. Due to the impact of climate change, it is difficult to predict the weather in the same way that we did 30 years ago. Nowadays, farmers cannot tell if it is going to rain or not, and this has made farming become an unpredictable venture. However, each one of us can do something that will eventually change the climate in our own regions. For every tree cut plant at least two trees.

Although farmers in developing countries do not pollute the environment in the same way that industries in the developed world do; we can play an important role through adoption of sustainable agricultural technologies that do not affect the soil. For instance minimum tillage, compost making, soil conservation and planting trees.

TOF magazine last month attended a meeting convened by the United Nations Climate Technology Centre and Network (CTCN) at the United Nations Environment Programme (UNEP) Headquarters in Nairobi. During the meeting, it emerged that African countries do not play a big role in production of greenhouse gases, they have done very little to take advantage of new technologies being developed to reduce carbon emissions.

Another observation made at the meeting; is that many African governments through corruption and neglect have allowed a widespread destruction of forests through logging and charcoal burning. A few years ago, the Kenyan government announced that the Country's forest had increased to more than 5.2 per cent. The government then allowed the harvesting of mature trees in all gazetted forests.

Recently, the government again banned logging in forests across the country. The government has realized too late that there is massive destruction of forests going on with collusion of corrupt government officials mandated with protection of forests. The mushrooming of the many saw millers across the country is a testimony to this.

We appeal to farmers to plant more trees as this is the only way to restore the forest cover in all farming areas and increase the number of trees for various uses. We cannot wait for the government to do this for us.

**In the coming edition, look out for ways of harvesting rainwater.**

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# Choose the right sweet potatoes for your region

Farmers can sell both potato vines and tubers, increasing their income besides diversification of their source of food.

**Amina Day Ojijo** | Sweet potatoes are a very important crop for rural farmers since nothing goes to waste. The vines are consumed as vegetables and animal fodder while the tubers are a great addition to people's diet.

Sweet potato has now become a cash crop in many parts of the country with farmers earning a steady income from this traditional crop.

However, the production of sweet potatoes has been hampered by lack of high yielding varieties and availability of clean vines for planting. Typically, farmers keep part of the harvested vines for replanting, which reduces yields. It is advisable to use clean vines for planting material. This means that farmers can make money by selling planting material to other



Farmers can now sell sweet potato vines as planting materials to other farmers apart from tubers

farmers.

"Most farmers recycle unclean sweet potato vines. As a result they are losing a big chunk of their harvest due to use of infected or low quality vines while planting. The demand for clean sweet potato vines now outstrips supply," says Mr Michael Wangalwa, Resource Manager of Biovision Farmer Resource Centre, Kakamega.

More often, sweet potatoes are planted during dry spells when vines are not readily available and this means that farmers

use whatever they can get. These are often vines that have been used multiple times and have lost their vigour.

More farmers have realised there is a shortage of planting material. They are now venturing into making an extra income from selling sweet potato vines.

Presently, a 90 kg sack of clean sweet potato vines are sold at Ksh 1,000 at the farmgate. A farmer can choose from many sweet potato varieties with the high yielding ones being the *Mugande* and *Nyamunyekera*.

The other sweet potato varieties fetching farmers a lot of money include orange fleshed locally referred to us *Kabonde*, *Kenspot* and *Bungoma* variety which has its origin in Bungoma.

To plant an acre of sweet potatoes, a farmer needs an average of 20 bags of vines. This will earn a sweet potato vine grower Ksh 20,000 if they sell 20 bags per season.

**Additional information** <http://www.infonet-biovision.org/PlantHealth/Crops/Sweet-potato>

## Popular high yielding variety

SPK 013	Recommended for the western zone including the Lake basin
Kemb 20	Good for all areas
Kemb 23	Suitable for Central and coastal lowlands
KSP20	Good performance in dry areas
KSP11	Good performance in dry areas
Simama	Good for all areas
Japanese	Good for all areas
Mugande	Good for all areas
Muibai ("Kemb 36")	Good for all areas
NASPOT 1	Popular variety in Ukambani, High dry matter content in tubers. Planting material available at KARI Katumani
Ex-Diani	Suitable for central and coastal lowlands
Mafuta	Best for foliage production. Good for all areas.
CIP 420009	Good performance in dry areas
Mtwapa 8	Suitable for coastal and eastern lowland areas

## Popular sweet potato varieties in South Western Kenya (KALRO Kisii)

Variety	Tuber yield (100 kg bag/acre)
"Bungoma"	40-50
"Gikuyu"	40-50
"Kalam Nyerere "	40-50
"K117"	Vine yield 23 t/ha foliage
"Mugande "	40-50
"Mwavuli"	Vine yield 20 t/ha foliage
"Namaswakhe" "Namaswakhe" leaves	40-50
"Nyakabondo"	40-50
"Nyakathuri"	40-50
"Nyawo/Amina/Misambi" "Nyawo/Amina/Misambi" leaves and flower	40-50
"Odinga" "Odinga" leaves	40-50

Source: Infonet-Biovision

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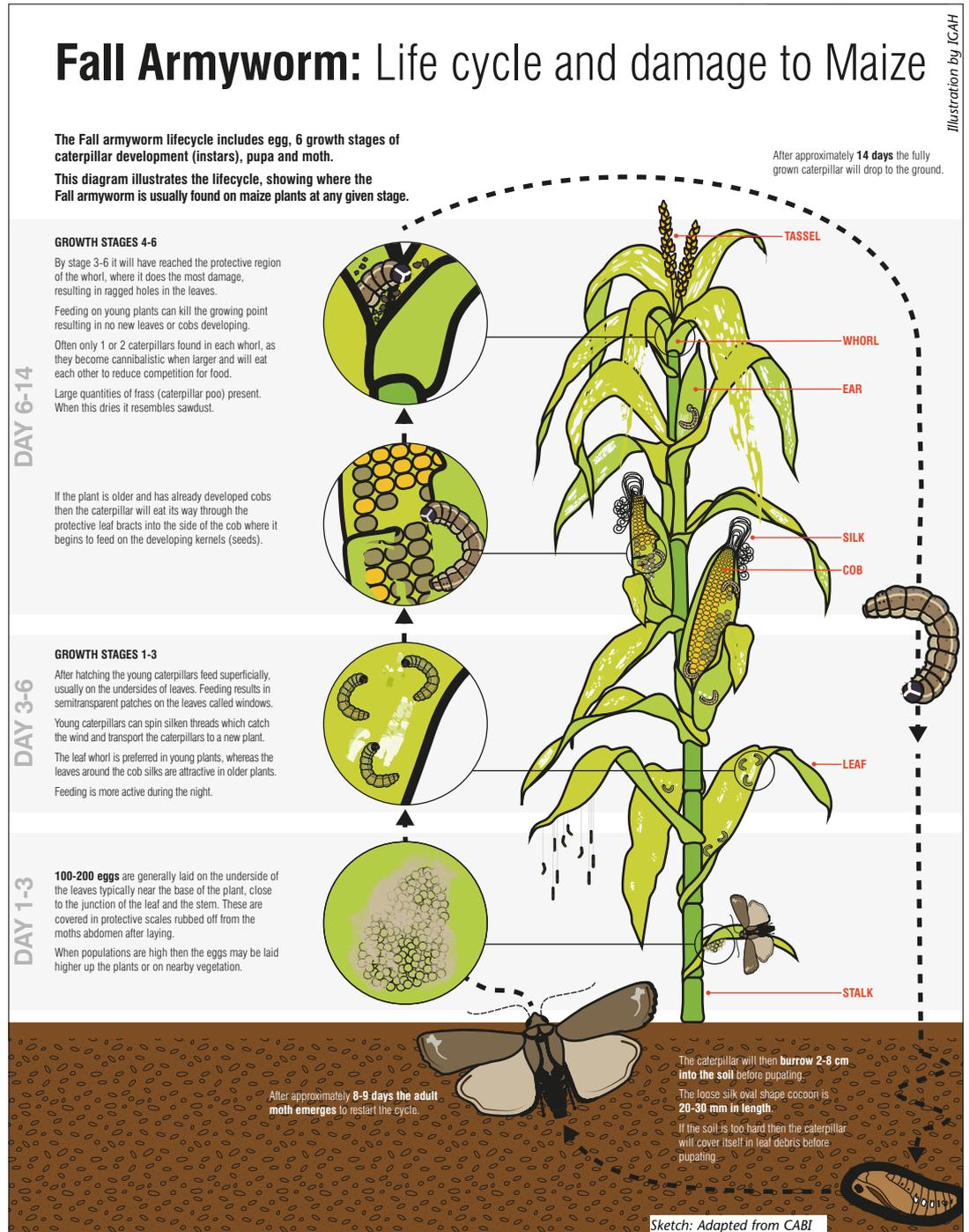
# How to reduce fall armyworm damage

Proper timing and early intervention can control fall armyworm infestation in your maize farm.

**Berita Mutune and Ann Gitau**

Most Kenyan farmers have by now experienced the huge damage caused by the fall armyworm. It is important that all farmers remain alert to ensure they reduce the damage caused by the pest to their maize crop this year. Below we give tips on the best way to control the pest to ensure its damage to maize is brought to a minimum. As we have done before we provide farmers with tips on how to control the pest to reduce the damage:

- Plant a legume crop e.g. beans around the edges of your maize field 10 days before you plant maize. The pest will attack the beans first and fail to recognize the maize.
- Plant early and ensure you plant when the other farmers are planting (pest populations are low at this time so the damage to your maize will be minimal).
- Avoid planting late when other farmers have already planted.
- For farmers who plough land before planting, this exposes the fall armyworm pupae to birds and other predators. Hence reducing the fall armyworm population.
- Place wood ash at the funnel or whorl of the maize to reduce pest population.
- Mix a pinch of ground hot chilli with 2kg of wood ash and apply into the funnels when maize is at knee height.



## How to control other pests in your farm

It is important to know how to save your crops and spend less time fighting pests in your crop. Early pest detection helps the farmer to assess the situation and plan the next steps to eradicate it. Monitoring involves an early warning signs, crops affected and type of pest damage. Some of the most common pests include: Aphids, whiteflies, thrips, bean flies, fall armyworm, stem borers, fruit fly amongst others. Farmers can control these pests through prevention, non-toxic home-made remedies such as use of pher-

omone-baited traps, use of beneficial insects and other natural control measures.

### Prevention

Farmers need to know that the easiest way to prevent insects' damage in your farm is by creating unfavourable conditions for them to thrive. A healthy farm is the best defense. This can be done by:-

#### Pull out any weak plants

Weak plants may already be infected. If not, they will attract predators. Pull out the plant and

dispose of it away from the farm area.

**Build healthy, organic soil:** Using natural composting methods, mulching, and adding compost manure to the soil is the best way to develop strong and healthy plants.

#### Minimize insect habitat

Clear your farm area of debris and weeds, which are breeding places for insects. Use clean mulch.

**Interplant and rotate crops:** Insect pests are often plant specific. When crops are mixed,

pests are less likely to spread throughout a crop. Rotating crops each year is a common method to avoid re-infestation of pests.

**Keep foliage dry:** It is highly recommended to water your plants early in the day so that they will be dry for most of the day. Wet foliage encourages insect and fungal damage in your plants.

**Disinfect:** If a farmer has been working with infested plants, it is advisable to clean his/her

*Continued on page 7*

# Control worms to keep your animals healthy

It is important for farmers to deworm their animals at the beginning of the rains. Thereafter in every three months to reduce parasites in their herds.

**Sharon Chebet** | Failure to deworm suppresses the live-stock's appetite, leads to depletion of essential nutrients from the animal, promotes stunted growth, reduced productivity, unhealthy young ones and might lead to deaths. If you were rearing for meat production, your meat products might not be accepted in the market as a consequence to failure to deworm.

Proper management will lead to reduced use of drugs. Meaning, the drug residue in milk and meat will be minimal. This makes the meat and milk safe for human consumption. The round worms and flat worms mainly affects the younger cattle leading to impaired growth (anaemia) because they scour the gut walls and consume blood. In most cases, the animal is unable to absorb nutrients, which affects its health leading to deprivation of essential nutrients.

## Pigs

Pigs are affected by the adult roundworms which infest the small intestines and the immature roundworms that passes through the liver and the lungs causing poor health. This may cause coughing and diarrhoea. The whipworms live in the large intestines causing loss of appetite and dehydration due to diarrhoea. The dung will most likely contain mucus and blood stains, which may lead to anaemic conditions (loss of blood).

The worms are prevalent where the pigs are allowed to graze in free range or garbage dumps. They are transmitted through infested feed material.

You can control the worms by practising good hygiene, that is clean shed and strategic deworming.

## Cattle

It is vital to deworm the calves especially during the wet season because, failure to do it results in inability of the calves to feed, gastroenteritis, weight loss and in some extreme cases, the mortality rate is increased. Cattle are infested by flukeworms, brown stomach worms and the lung-

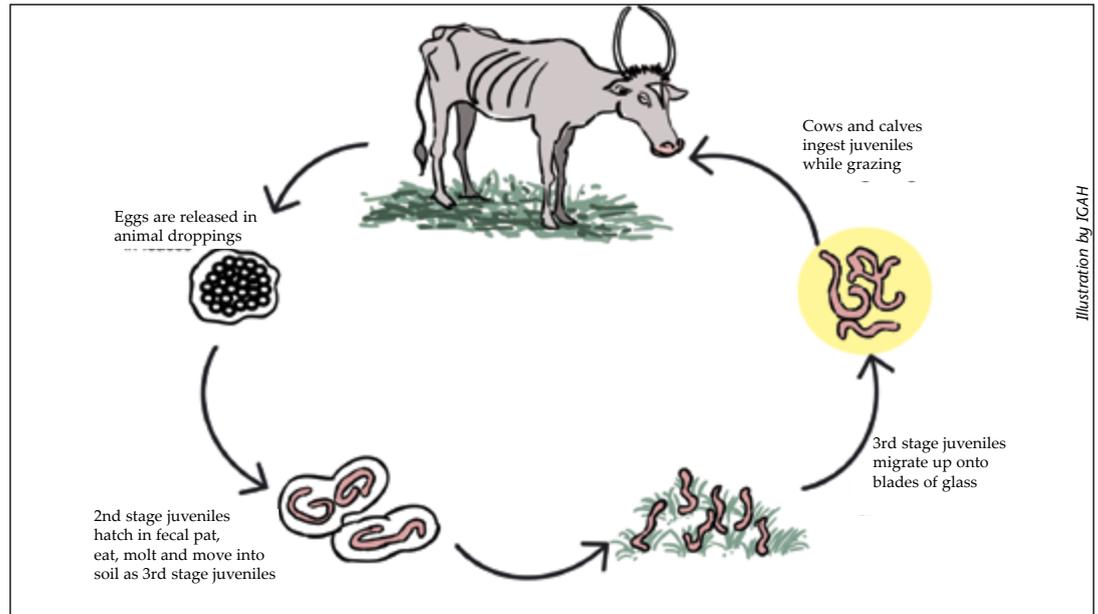


Illustration by ICAH

worms. In their first season of grazing, the calves are prone to the *Ostertagia ostertagi* (brown stomach worms) and lung worms, which also affect the adult cattle. The lungworms cause lung bronchitis and pneumonia in adult cattle.

## Liver flukes are harmful

Liver flukes in the cow liver make it unsafe for human consumption. The worms are transmitted when the cattle graze on grass containing the larvae. The worms develop into adult worms in the animal's intestines as they continue to lay eggs. The eggs are then passed through the dung and the cycle continues.

The same applies to the lungworms, they lay their eggs in the lungs and then, they are passed on to the trachea and released through the dung. The liver fluke is common in wet areas. The snail is a suitable intermediate host where they multiply. When ingested by an animal it moves to the bile duct, then later passed through the dung. An animal infested with worms may result in reduced milk production and growth rate. Treat your animals using the most reliable dewormers in the market. Use a different dewormer every time you deworm your animals to stop the worms from developing resistance.

## Sheep and goat

Sheep and goats are the most vulnerable to worm infestation because, their fecal matter disintegrates easily releasing the larvae into their grazing fields. They also graze close to the soils especially sheep which rely more on grass. Infested sheep have low immunity, especially the lambs.

They are affected by the nematodes, round worms, coccidia, and stomach worms. But, the worst parasite in this class is the wire worm or the barber pole. It sucks blood and injures the abomasum stomach (second stomach). This might result in anaemic condition in the sheep. It



Worm-infested sheep

is also associated with the swelling of the jaws.

## Worms cause slow growth rate

Large numbers of tapeworm may cause blockage of the intestines and slows the growth rate. The lungworm causes fever, coughing, difficulties in breathing and much discharge from the nose in sheep and goats and in some extreme cases, it leads to death. The coccidia parasites mostly affect the younger animals and the impact is adversely felt in them since their immunity is still developing. This can be avoided by proper stocking. The best approaches to prevent worm infection is to avoid grazing directly on wet pasture. Having proper stocking rates. Practice rotational grazing to disrupt the development cycle of the

worms. Observe good hygiene such as giving the animals clean water.

## When to treat parasitism

- First treatment can be administered before lambing/kidding/ weaning or calving in the case of cattle. Cattle are weak and slow in developing immunity.
- Second treatment can also be made when it starts raining and the first grass starts growing or sometimes before the onset of the rain, though, this will not be effective. It is important to know that deworming strategies vary. Therefore, the need to consult a veterinary officer.

## How to treat worms

There are several approved drugs that can be used to reduce the worm infestation. But there is no prescription that is 100% effective. It is important to change deworming drugs every time you deworm your animals. This is to stop them from developing resistance.

## General preventive measures

1. Avoid grazing when the pasture is wet, especially during the morning and evening when there is dew.
2. Practice rotational grazing to disrupt the cycle of the parasites.
3. Isolate animals infested with the parasites to graze on their own.

**Additional information: Worm control** <http://www.infonet-biovision.org/AnimalHealth/Worms>

# Abandoned indigenous crops are very nutritious

Most orphan crops are hardy and can withstand drought. They can do well in areas with little rainfall and have short growing period.

**Linah Njoroge** | Over the years, certain crops that are indigenous have been neglected and underutilized. They are almost becoming extinct. These crops are known as 'Orphan crops'. The orphaned crops not only have exceptional nutritional value but also have many ecological benefits. They are also economically beneficial and can be a good source of a sustainable income and food security for many households.

These crops can be used to bridge the gap in food insecurity the country often experiences. Orphaned crops can mitigate against micronutrient deficiency in vulnerable sections of the populations such as children, the elderly, pregnant mothers as well as those who are sick and recuperating. Most of the orphaned crops are usually uniquely adapted to the local environment and can be used to support a diverse household diet within different communities.

Utilizing the orphaned crops will help increase the diversity of food production and can help supply particular nutrients such as amino acids, fibre and proteins which results in improved nutritional status of the people.

## Baobab

In Africa, we have many of these neglected and underutilized crops. Some of the examples of orphaned crops include the baobab tree which is also referred to as the 'African wonder Tree.' The baobab fruit contains ten times the antioxidant levels



*Sorghum is a nutritious crop that has been neglected by farmers*

in oranges; twice the amount of calcium in spinach, three times more potassium than bananas and it also has antiviral properties. The fruit can be dried, crushed into powder and used as a nutritional supplement. It can be added in therapeutic food not only for people who want to improve their health status but also for those who may be sick and recuperating.

## Finger millet

Finger millet is another underutilized crop that has amazing nutritional value. It has similar protein levels as wheat. It is rich in vitamin B, calcium, iron, potassium, magnesium and zinc. These are key nutrients that are vital in boosting the human immune system. This means that it is an excellent grain that can be used to prepare food for recovering and recuperating patients. It is also a very resilient crop and can be grown in marginalized areas where major cereals would normally fail. Therefore, good for

mitigating against food insecurity due to crop failure.

## Good for young children

Finger millet can be incorporated into school feeding programs because of its rich nutritional value that can help meet the demand and address micronutrient deficiency which is a very common form of malnutrition in children and adolescence.

Finger millet is also an excellent introductory food for infant-feeding as it can be incorporated in the complementary diet from the age of six months as it has high calcium and protein content. From six months of age, breast-milk alone is no longer nutritionally adequate for proper growth and development of an infant.

## Sorghum

Sorghum is another orphaned crop with great nutritional value and health benefits. Sorghum is an excellent source of food for children and adults with gluten intolerance. Gluten is a protein that is found in certain grains especially in wheat and barley. Many people with gluten intoler-

ance are at a loss of what to substitute for wheat. Sorghum has very good properties that help improve the digestive health and is not only high in fibre but it also improves circulation.

It is a good source of energy as it helps in controlling blood sugars in the management of *Diabetes Mellitus*. Studies have also shown that the bran in dark sorghum has extracts that have strong proliferative activity against colon cancer. Researchers are still researching to provide dependable information and *TOF Magazine* will publish once the reports are out.

## Health benefits

Due to the high fibre content, sorghum is good for lowering cholesterol and the high calcium level is beneficial for the health of the bones. Sorghum is good food for managing insulin resistance due to its high phenolic content which inhibits protein glycation (harmful combination of proteins and sugar). For people with diabetes, blood sugar attaches to the protein in the haemoglobin. Sorghum then becomes one of the best foods in helping reduce the increased blood sugar levels in diabetic patients.

## Cassava

Cassava is another orphaned food which is mainly a root vegetable and a perennial shrub that has many health benefits. One of the unknown benefits of cassava is that its leaves can be used on wounds and for smoothening of the skin. It also supports hair growth and aids in digestion. Due to its unique properties, cassava is also used to treat diarrhoea and aid in reducing headaches and migraines.

## Cook cassava well

Cassava is good for improving appetite and is excellent for eye health due to its rich vitamin A content. It is rich in zinc and has great gastrointestinal properties. However, it is important to know that raw cassava can be very fatal to humans as it contains toxic substances that are usually destroyed when cooked. Therefore, make sure that your cassava is well cooked before consumption. There are many other orphaned crops, including seaweed, chick peas among others. In the next edition we will publish more neglected crops also known as orphaned crops.

**Additional Information:** <http://www.infonet-biovision.org/crops-fruits-veg>



Pearl Millet



Cassava



Baobab

# Biovision-funded bee project sustains itself

From a paltry 4 tonnes of honey in the year 2004, the CABESI Honey Project now produces more than 120 tonnes of high quality organic honey per year, increasing beekeepers income and encouraging environmental conservation in semi-arid region of West Pokot.

*Peter Kamau and Racheal Wangari*

It is not easy to start and sustain a project in one of the most remote and isolated regions in Kenya where insecurity, poverty, illiteracy and poor infrastructural development prevail. But, this is exactly what Biovision Foundation together with the International Centre for Insect Physiology and Ecology (ICIPE) have managed to do in West Pokot County.

Back in the year 2003, a discussion held at ICIPE cafeteria gave birth to one of the most successful projects for Biovision Foundation in its development work in Africa. Beekeeping is an important activity practised in the most arid and semi-arid regions in Kenya. It is an important activity among the Pokot, a pastoralist community in North-Western Kenya. Under Prof. Suresh Raina, then ICIPE's bee project leader, it was decided that improving beekeeping and honey processing to modern standards would help increase the pastoralists' income while enhancing environmental sustainability by reducing the felling of trees for charcoal production.

## Camels

The Pokot pastoralists owned camels in a few areas. It was, therefore, thought that the development of camel production



Processed organic honey



Mercy Kiyapyap (left) tests honey at CABESI processing facility in Kapenguria town

would help address the problem of malnutrition among the children by providing milk to pastoralist families. The camels would also be used to help in the transportation of honey and other products to the market since their hooves are less damaging to the soil compared to donkeys or oxen.

## Wild silk

The presence of wild silkworm in the region also fitted well with ICIPE's mandate of using beneficial insects for social-economic development. The camel, bees and silkworm project targeting women was initiated.

Out of the three projects (camels, bees and silkworm) was coined the acronym CABESI as the project name. With hiring of field staffs to help in the running of activities, the project took off in the year 2004. Later, with funding from the European Union's Community Development Trust Fund (CDTF), about 30 camels were bought from Wajir and given to the community.

Selected pastoralists' families were trained as camel handlers. They were required to apply the skills in training the animals for transport purposes. Honey collection and processing centres were set up and some individuals in each centre were trained by ICIPE on the proper methods of honey harvesting and processing.

The communities in the region were trained on silkworm rearing and harvesting. But not many people were eager to engage in the activity since their traditional

beliefs associate insect handling with witchcraft. So, the project could not take off as planned. As for the camel project, the three year project period could not sustain a successful camel breeding programme. So it was also phased out.

## Beekeeping

However, the beekeeping project has become a great success due to the local communities' experience and love for beekeeping. The beekeeping project began with the setting up of three collection centres in Lomut, Konyao and Psigirio where quality control and extraction of honey and other products would take place. Other honey processing and packaging centres were later put up in Orwa, Chemale and Chirkil.

About 350 beehives were distributed to the beekeepers of which most of them were women and trained on the management of the beehives for the production of honey and other products. The modern beehives replaced the log hives previously used which helped prevent the destruction of the bee nests and loss of the bee colonies during honey harvesting. The modern frame hives have also made it easier to harvest honey mostly by women. Local traditional knowledge on beekeeping was also incorporated in the project.

The CABESI project now produces high-quality organic honey, beeswax and propolis that have found a ready market in Nairobi and other markets. The collection centres, which are locally

managed buy the honey from the farmers at slightly higher prices than the market prices ensuring better income and improved livelihoods for the beekeepers. Once extraction of honey is done in the collection centres, the honey is transported to CABESI's marketplace located in Kapenguria town for further processing, bottling, labeling, packaging and sale.

## Organic honey

The CABESI honey has become very popular among the consumers because of its high quality method of production, harvesting, processing, and packaging. The wild honey is produced in areas free of chemicals and is certified as organic, which has attracted premium prices in the local and export markets.

Ms Mercy Kiyapyap, the Project Manager says that last year, the project processed 120 tonnes of honey, up from the 4 tonnes produced when the donors supported the project. She says the demand for CABESI honey is very high adding that at the current production level, they cannot meet the demand. The number of beekeepers has increased from 200 at the start of the project to more than 4000 beekeepers at the moment. This is one reason why the project is looking for funds to train more beekeepers in West Pokot and East Baringo region.

"Our target is to train a total of 15,000 beekeepers in Baringo and the Kerio Valley Belt to be able to meet the demand." She adds.

**Additional Information:** <http://www.infonet-biovision.org/AnimalHealth/Beekeeping>

# Test your soil before planting any crops

How can I do soil sampling and testing in my farm?

Dear Farmer,

If farmers were to keep to the standards of modern farming, they would not plant any crop without knowing what soil nutrients are on the land they plan to grow the crop. This would help them to know if the nutrients are adequate for the particular crop they want to grow. To be able to tell the nutrients in the soil before planting is one of the most important measures that a farmer should take before they plant.

## When to do a soil test

Soil tests should be done every 1 or 2 years. Having the soil tests done regularly, especially if the farmer is planting maize or any other crop on the same portion of land is important. This is done because the crop takes the same type of nutrients from the soil, leading to depletion of the nutrients.

Although several soil testing kits have been developed to do soil testing in the field, comprehensive soil tests can only be

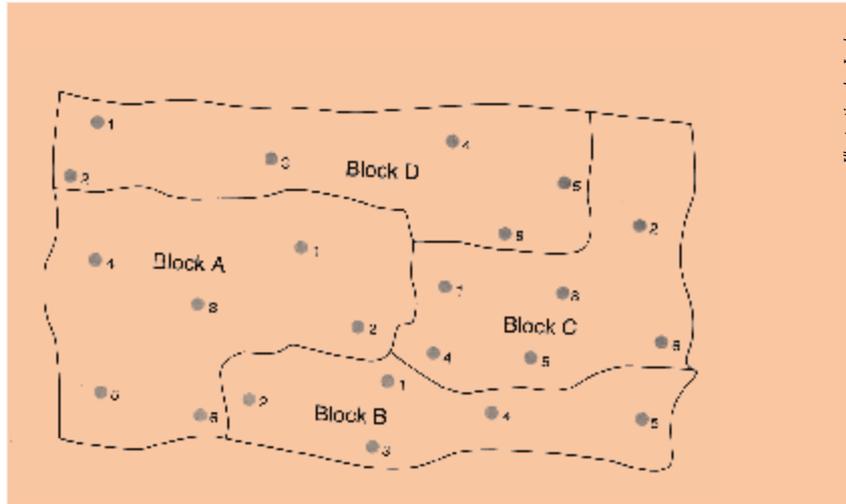


Illustration by Igah

Soil samples should be taken from different parts of the farm to show the general condition of the soil

done in a laboratory to determine what nutrients are lacking and get recommendations on how to restore them. It is wrong for farmers to apply any fertilizer without knowing what is lacking in the soil for any crop they intend to grow. (For this, seek advice from any KALRO station)

## Recycle organic matter

One of the best methods of

replenishing soil fertility nutrient deficiency is to use organic methods such as recycling of crop residue, and the use of farmyard manure and compost. Crop residues should not be burnt in the field during land preparation. They should be left on the farm where they gradually decompose releasing nutrients into the soil for plant uptake. In order to reduce the cost of purchasing external

inputs to enhance soil fertility, farmers are advised to recycle organic materials available in the farm.

Continued use of organic materials in the farm and crop rotation not only ensures appropriate soil pH levels but also enhances the soil fertility, structure and water holding capacity. Different crops planted take up and release different nutrients into the soil and the interactions have a way of maintaining a balanced soil nutrient.

Send soil samples to KALRO-NARL, Tel: 020 267 2957, Email: [soillabs@yahoo.com](mailto:soillabs@yahoo.com), Nairobi or any other KALRO station near you. The results are ready within a week.

Additional Information: [http://www.infonet-biovision.org/soil\\_Management](http://www.infonet-biovision.org/soil_Management)

Answers by Elkana Isaboke

# How to control other pests in your farm

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tools before moving on to other farm areas. This will reduce the speed of invading insects.

## Use of pest resistant plant varieties

Some plants and plant varieties are more prone to pest attack than others. Preventing pests in your farm is sometimes as simple as choosing pest-resistant plant varieties.

**Use non-toxic home-made remedies:** Home-made remedies are inexpensive and the farmer is sure of what he/she is applying to the crops in the farm. Many home-made remedies have been used with good results to control harmful insects. They usually involve harmful (but non-toxic) ingredients such as garlic, neem, cinnamon, e.t.c. which are diluted in water and blended ready to be sprayed on the plants.

**Pheromone-baited traps and barriers:** These are biological mating scents that attract insects to a trap that is coated with



Stemborer

a sticky substance. Pheromone traps are effective, but remember they are "attracting" the insects. Use of sex pheromones traps can also reduce the male moths and reduce their multiplication. An example of a barrier is an insect net which acts as physical barrier between the pests and the plants.

**Beneficial insects:** Beneficial insects are insects that can be attracted by conserving the biodiversity especially the live hedges and prey on harmful insects or their larvae. Examples are parasitoids and predators such as parasitic wasps, lady birds, lady



Whiteflies

beetles, e.t.c.  
**Other natural controls for common insect pests:** Farmers are advised to increase plant diversity around their farms to attract aphid predators. This includes planting pollen and nectar-rich varieties in and around your farm or locating your farm next to natural landscapes where these plants thrive. Farmers are also advised to plant seeds and transplants into healthy soil without excessive nitrogen, and remove straggling or weak plants



Thrips

as the season advances.  
In conclusion, farmers should know that the fight against the common insect pests requires an Integrated Pest Management (IPM) approach where several options are employed. There is no control method that can work alone. These control measures combined together enable a farmer to eradicate those pests to low levels which are manageable without causing damage.  
Additional information: [http://www.infonet-biovision.org/natural\\_pest\\_control](http://www.infonet-biovision.org/natural_pest_control)

Photos: IN

## 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.

# Managing weevils in the seed of mangoes

**Musdalafa Lyaga** | Anastacia Ndunge from Makueni County asks TOFRadio how she can control mango seed weevil in her farm.

Mangoes are a favourite fruit for both local and export markets. Hence, a major source of income for small-scale farmers especially in arid and semi arid areas. However, some insect pests attack mangoes lowering their quality. This can result in the rejection of mangoes especially those meant for the export markets.

The mango seed weevil is one of the major pests that causes losses to farmers. It damages the mango pulp, contaminates the edible portion and damages the seed.

The damage caused by mango seed weevil may result in reduction in yield from premature fruit drop, fruits being downgraded at the market and reduction in seed viability for seedling production.

### How does a mango weevil develop?

A female mango seed weevil lays up to 300 eggs over a period of three months. She lays her eggs in small cavities that she makes in the skin of young fruit.

After 3 to 5 days, the eggs hatch into little worms, also called larvae. The young larvae penetrate the fruit and eat their way to the seed where they will continue feeding until they develop into adult weevils.

These eventually emerge from the fruit stone by tunnelling outwards through the flesh and skin of the fruit leaving a patch where rotting soon sets in.

Once the weevils have left the fruit they search for a hiding place beneath the loose tree bark or under fallen leaves and dead wood under the trees.

The adults cannot fly, so they do not go far from where they left the fruit.

### Weevils live for 300 days

Weevils easily live up to 300 days on the ground, until the time is right to lay eggs again usually when the mango fruit is young.

### So, how can we tell our farm has been infested by mango seed weevils?

Infested fruits are difficult



A mango fruit infested by the mango seed weevil (inset)

to detect by an the untrained eye, but, with a vigilant eye, the mango seed weevil can be detected.

### How to detect weevils

When you see a lot of young fruits drop before they have reached maturity, this may be a first indication. In that particular section of the farm check for brown marks at the tail ends of the mature low hanging fruits. Infested fruits can also be distinguished from the uninfested ones by the hardened, amber-coloured secretion.

You may also notice reddish-brown spots and water-soaked areas in the pulp of immature fruit. You can also use insect traps to check if you have weevils in your orchard. How do you manage the mango seed weevil after detecting its presence in your farm?

As the mango seed weevil does not fly, it mainly spreads into clean areas through the movement of infested fruit for propagation or during consumption.

Many farmers start spraying pesticides when they detect mango seed weevils in their farm. Chemical pesticides are also costly and have adverse effects on both our health and the environment. Instead, farmers can use simple cultural practices which are inexpensive. Natural methods do not harm people and the environment.

### Orchard sanitation

One of these methods is orchard sanitation. As weevils may still live in the seed, it is crucial to collect and destroy all fallen mango fruit. This practice also helps to control fruit flies, another mango-damaging pest.

Weed regularly and clean your orchard as mango seed weevils mainly hide in waste materials under trees.

Since the adult weevils emerge from fallen fruits, collect the fallen fruits and seeds after harvest and burn them or bury them about 50cm deep in the soil.

You should also restrict movement of fruit from old orchards or areas known to have mango seed weevils to young orchards.

The most suitable stage for controlling mango seed weevil is during the emergence of the adult weevil.

The first step to suppress the weevil population is implemented at the beginning of the mango flowering season by using traps.

Place sticky traps at the upper end of tree trunks when the trees start flowering. This helps in reducing migration of weevils to branches for egg laying.

To make your own sticky trap, spread petroleum jelly or used motor oil on yellow painted plywood, 6 cm x 15 cm in size or 30 cm x 30 cm.

### For sticky traps, contact

Real IPM, Thika Tel: 0725 806 086

Additional Information: <http://www.infonet-biovision.org/PlantHealth/Pests/Mango-seed-weevil>

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