



A worker with Laikipia Organic Farmers Group gathers dried stinging nettle leaves for processing. The group is one of the few in Kenya who have managed to add value to their produce increasing their income and improved their livelihoods.

Pig farmers, beware of swine fever

Peter Kamau | There is an outbreak of swine fever, a viral disease that affects pigs causing mass deaths and a big loss to farmers. The African Swine Fever (ASF) is incurable and so far, no vaccine has been developed to prevent it. This means that any pig infected by the disease has no chance of survival.

Farmers in Central Kenya are

most affected by the outbreak. The disease has been reported in Thika, Juja, Ruiru, Isinya and Limuru in Kiambu and Kajiado Counties with Thika reporting the highest number of pig farms affected.

Symptoms of swine fever

Infected pigs become depressed, stop eating and huddle together. The pigs have difficulty walking, tending to lie down for long periods of time. They have difficulty in breathing, and experience diarrhoea or constipation with skin and eyes turning red (conjunctivitis) and have red spots or purple colour in the ears, abdomen, inner thigh or tail.

Highly contagious

The African Swine Fever is highly contagious, meaning it can only be transmitted through direct contact between infected and susceptible pigs, people, vehicles or even equipment transported from infected pig farms to other farms. In Kenya free-range pigs feeding in dumpsites or those that come into contact with wild pigs have been the major carriers of the disease. The disease does not affect humans.

How to prevent the disease from spreading

Other methods of the disease

transmission include:

- Direct pig-to-pig contact.
- Consumption of contaminated feed especially leftover food that is fed to pigs.
- Vehicles that enter pig farms without disinfection such as passing through a disinfection bath which contains an effective disinfectant such as Magadi soda (sodium bicarbonate) or jik solution.
- All feed given to pigs must come from reputable companies.
- Pig buyers and traders should not be allowed into pig farms unless they change clothing or are disinfected.
- Maintain a high level of hygiene in pig sheds.
- All farm workers should be provided with disinfected overalls, gumboots, hand washing and foot bath facilities to ensure they do not infect the pigs.
- Veterinary personnel should be disinfected before they are allowed into the pig shed.
- All dead pigs should be buried or burned to stop the virus from spreading.

For more reading: <http://www.infonet-biovision.org/AnimalHealth/Pigs>

Dear farmer,





Value addition could help farmers to get good returns from their agricultural activities when more food is stored up for future use reducing wastage. More than 50 years after independence, many countries in Sub-Saharan Africa including Kenya are yet to fully take advantage of the opportunities available in the agricultural sector such as value addition to industrialise. Many countries still remain producers of raw materials which are exported to the industrialised countries where the products are processed and then sold to the developing countries at prices almost 10 times the buying price of the raw materials.

Value addition is now the next big step that African governments need to take to support farmers' earnings and generate more revenue for development. Governments can regulate and create a conducive environment and the right incentives for the farmers to support industrialization.

In Kenya for instance, since the establishment of counties after the new constitution was enacted in the year 2010, agriculture became a devolved function. This means that County governments should plan their development needs around the identified agricultural value chains in their respective regions. The reason given by many County governments for a lack of complete embrace of their value chains is that most of the money they receive goes into the payment of salaries leaving little funds for development.

In this issue, we have featured a farmers' group from Laikipia, which has started production and processing of stinging nettle, which they grow organically. The returns from this enterprise are quite good due to the high demand for the product in the country. The group has not obtained any form of financial support from their county government. Instead they have come together, put up their own drying shed and a simple mill to process their products which have found a ready market. If other farmers' groups in various parts of the country took the same initiative to start their own income-generating enterprises through value addition of their farm produce, they can transform agriculture in a big way. (page 4)

We would encourage other farmers' groups to embrace value-addition. All they need is to survey the market where they can sell the product, identify a niche product, and explore a simple method for processing. They should then seek ways to upscale their production and work hard to ensure they meet their customer needs. Farmers should stop waiting for the government to do everything for them.

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Young farmer discovers the benefit of bees in farming

When Lemond Koome first planted tomatoes in a greenhouse, lack of pollination reduced his yields and income. Now he has embraced beekeeping to benefit from their pollination services and honey.

Clifford Gikunda | When 29-year-old Lemond Koome decided to try out agriculture, he never thought of the many challenges he would be faced with. As a young man doing online business or academic writing by then, he thought of doing farming which he thought was as easy as what he saw his mother do, "My mum had been practising agriculture for many years. I thought it would be as easy as the same way I saw her do it, little did I know it would be an uphill task," Koome says.

Started with greenhouse

With a wide variety of crops to choose from, Koome decided to go for greenhouse farming. He believed it would be his gateway to not only financial freedom but also independence and a very successful enterprise. He would practise farming activities right from his village of Muchicha-Kithaku in Abothuguchi, Imenti Central. This region is predominantly a tea growing zone where horticulture crops like potatoes, kales, cabbages, coriander and carrots among others are grown. The diseases posed problems.

His farm lies 1600m above sea-level. This makes it ideal for horticulture. In the year 2016, Mr Koome invested Ksh 100,000 to put up a greenhouse structure for optimum production, "I opted to go the greenhouse way because of many environmental factors that make agriculture very unprofitable in this region. One of the major challenges we face is bacterial wilt, fusarium and late blight. These diseases affect potatoes, toma-



A bee gathers pollen from a plant, pollinating it in the process. Mr. Koome (inset) has embraced beekeeping to benefit their pollination services

atoes and fruits with great losses to farmers," he says. "They are less risky to grow in a greenhouse environment," or so he thought.

Tomatoes faced disease problems

Bacterial wilt is widespread in the potato growing areas and can lead to losses of up to 100% in seriously affected soils. It spreads through contaminated seed, farm implements or when crops are planted in infected soils. Late blight is more prevalent in the cold conditions when the disease-causing pathogen multiplies more rapidly leading to declined yields.

Pollination is difficult in a greenhouse environment and Koome had an issue with this forcing him to do the pollination manually by shaking the plants in the greenhouse from the top. By shaking the plants, he had been advised by experts that the pollination would take place and it worked. At harvest, he made Ksh 45,000 from sales that season, which fell short of his expectations.

Lack of pollination affected French beans

It was in his second crop that he

explored other crops. He planted French beans but unfortunately he could not harvest anything "Unlike the shaking, I did in tomato, I was not able to do the same on the beans and thus there was no pollination at all, the harvest was poor," he says.

"Bees are very important in food production because they are critical in pollination and therefore should be integrated into farming systems as a companion to a farmer," says Dr. Lusike Wasilwa Assistant Director in charge of crop protection at the Kenya Agriculture and Livestock Research Organization (KALRO).

Started beekeeping

On learning the important role bees play in horticultural crop production, young Koome took a very unlikely route taken by few farmers. He decided to go for beekeeping, not only to get honey but also to ensure his crops were well pollinated. He bought 30 beehives at Ksh 5,000 each and had them placed on one part of the farm.

"I learnt about bees from an expert who works with big farms like Kisima farm, in Likipia. I was very interested in incorporating the bees in my farm when I learnt that in the

big farms, beekeeping is a prerequisite not only for pollination but also to monitor any harmful chemicals sprayed on the crops in the area," Koome says.

Hopes bees will increase yields

Incorporating bees will be the first trial for him to observe how his French beans and other horticulture crops perform. He is preparing his greenhouse to do a variety of crops in the next few years but believes the bees will not only be of benefit to him but also to the other farmers who neighbour him.

Mr Koome says he will be consulting experts to find out how best to attract bees into his greenhouse which sits a few metres away from the homestead where he also keeps livestock. "With minimum disturbance, bees are the most friendly insects to live within a farm," he adds.

When we visited the farm recently, the hives were full of activity and the buzzing bees were busy in search of pollen and manufacturing the brown gold product naturally- honey.

Additional reading: <http://www.infonet-biovision.org/Animal-Health/Beekeeping>

The Organic Farmer is an independent magazine produced monthly for the East African farming community. It promotes organic farming and supports discussions on all aspects of sustainable development. The articles in the *The Organic Farmer* do not necessarily reflect the views of ICIPE nor Biovision Foundation or Biovision Africa Trust (BvAT).

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How FAMEWS works to monitor fall armyworm

In the last issue (*TOF No. 159 August*) we introduced a Fall Armyworm (FAW), application that has been launched by the United Nations Food and Agriculture Organisation (FAO) to help farmers, extension workers, community workers and anyone involved in the fight against the pest to identify, report and understand how the pest is spreading. The application will also help describe its natural enemies and take measures that are effective in managing it.

Beritah Mutune | The Fall Armyworm Early Warning (FAMEWS) application provides important information to help farmers understand how the pest changes over time and space, to improve farmers' knowledge on its behaviour and guide them on the best way to control it before it causes the destruction of their maize crop.

Farmers who do not have smartphones can seek assistance from their sons or daughters, fellow farmers or any agricultural extension officer with a smartphone which runs on Android software to help them by downloading the FAMEWS application using the following step by step instructions:

Step 1: Open your phone and install the FAMEWS application by opening the following link:

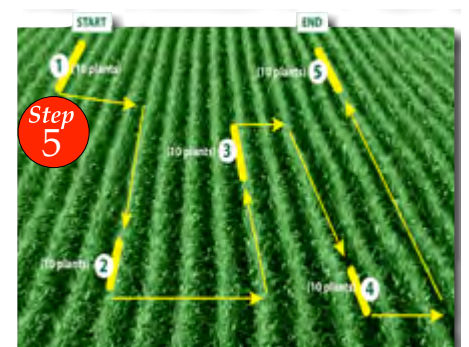
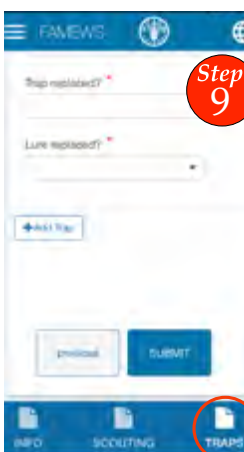
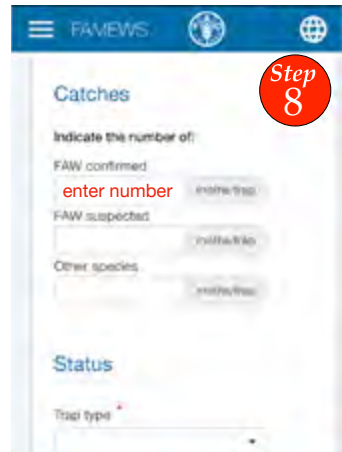
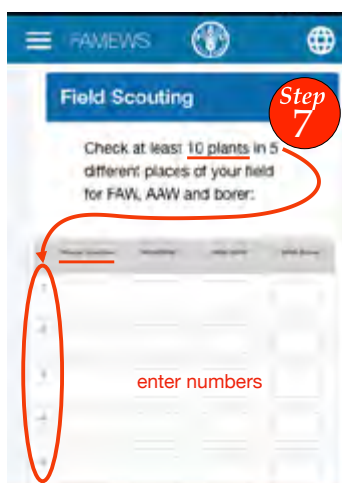
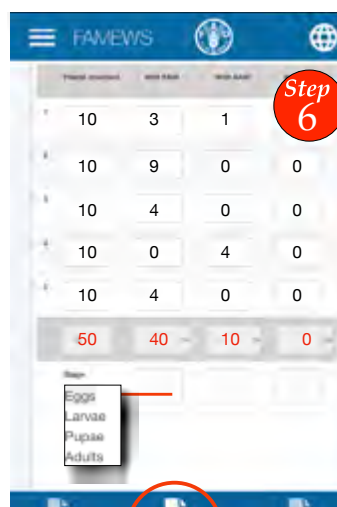
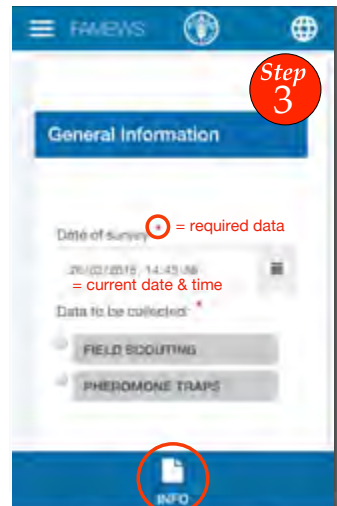
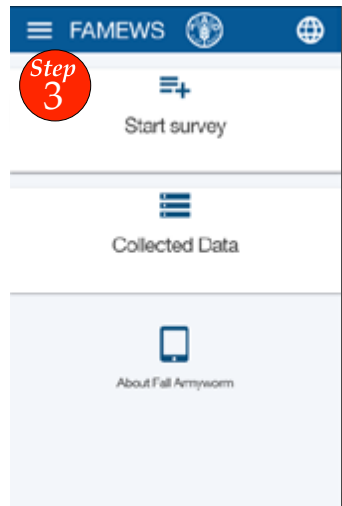
tiny.cc/FAMEWS_Android search and then go to downloads to install the application.

Step 2: Click **INSTALL**. Your phone will display the icon FAMEWS. Click on the icon FAMEWS which will display the icon.

Step 3: Click on the icon **START SURVEY**, the site will give you options of the general information you need to enter such as data collected (click on both field scouting and pheromone traps) the screen will show the date of survey, location, GPS position, planting date, irrigation or rained, pheromone trap etc. Enter all the information on the space provided.

Step 4: Once you have entered all the information, click **NEXT**.

Step 5: After clicking **NEXT**, the application will request you to start scouting your farm. Move



in your field in a zigzag manner that imitates letter W (as shown in the green sketch as shown bottom of this page).

Step 6: Indicate the number of Fall Armyworm (FAW) and other species of insects you see in 10 maize plants at each of the five location sites as you moved in the W pattern.

Step 7: Enter the number of plants with the Fall Armyworm you have seen in the field scouting page. Indicate what you see in the plants you have selected such as eggs, larvae, pupa or adult pupa and even any natural enemy you see in the 10 maize plants.

Step 8: Click **NEXT**. If you click **NEXT**, the screen will display the pheromone trap. In the space provided, fill in the type of pheromone trap you have placed in your *shamba*, including its name (ID), trap location, number of catches in the bait (or lure used) and the condition of the trap. Indicate if the trap and lure have been replaced.

Step 9: Click the icon **SUBMIT** to send the information you have gathered.

All the information you have collected will be sent to the country Fall Armyworm (FAW) national focal person, who will verify the information and submit it to FAO headquarters in Rome, Italy. FAO will then contact the country FAW coordinator who will receive the information and find the best way to assist you and other farmers in your locality affected by the fall armyworm.

NOTE: The smartphone user must have its **GPS** turned **ON** to help show the exact location of your farm when using the FAMEWS application. Farmers without smart phones can seek help from anybody with such a phone to help them do the survey.

Organic stinging nettle raises group's income

The Laikipia Organic Farmers' Group chose to grow and add value to their stinging nettle. Now they are reaping good returns after certification, which has made the product popular with consumers.

Beritah Mutune | The medicinal and nutritional benefits of stinging nettle (*Urtica dioica*) are recognized by many communities in East Africa. For communities in Central Kenya, the plant (called thabai) has many uses and it was traditionally used as a vegetable for making popular traditional dishes such as *Mukimo* (mashed potatoes mixed with vegetables). In every homestead, stinging nettle would be grown around the kitchen garden where farmers would use goat or sheep manure to fertilize it. It was also harvested in the wild where it would be used for blending with other herbs and used to cure various ailments or address nutritional deficiencies.

Started commercial production

When members of the Laikipia Organic Farmers Association wanted to start an income generating activity back in the year 2011, stinging nettle became an obvious choice. The group, which is based Ruai village in Ngobit location in Laikipia County decided to commercialise stinging nettle by planting it in their farms and later processing it for sale to consumers in major towns in the country.

The members decided that all the stinging nettle would be organically produced to enable the association to provide a healthy product to consumers that would fetch more money in the market as a niche product.

Contribution from members

The members contributed funds for the purchase of material for a drying shed and drying racks. Since they did not have funds for the purchase of a milling machine, they would take the dried stinging nettle leaf to local posho mills for grinding into powder, which they would then package in polyethylene bags for sale to consumers within the village and retail shops in Nyahururu town.



Stinging in a drying rack



Milling the stinging nettle leaves at the groups processing shed



The fresh stinging nettle powder



Ready product: Stinging nettle powder packaged for market

Demand increased after certification

As consumer demand increased, the group produced more stinging nettle products and made more money that eventually enabled them to buy a milling machine. Mr David Kiruhi, the group's Chairman says that

in better drying shed which has improved the packaging to make the product more appealing to customers.

Stinging nettle sales have increased boosting income for group members, except for the recent financial problems at Uchumi supermarket which led to non-payment of some of their deliveries to the retail chain.

"We had taken a bank loan to be able to buy processing and packaging equipment to expand our operations but non-payment for deliveries has delayed the loan repayments. We hope this will be sorted out soon when the supermarket starts paying the suppliers," says Kiruhi.

Mr Kiruhi says the group's 103 members are able to supply stinging nettle worth more than Ksh 200,000 per month. Members are later paid according to the quantity of stinging nettle delivered. He says the group is recruiting more members to increase stinging nettle production in order to meet the increasing consumer demand for the herbal powder.

Group maintains quality

He says new members are trained on organic production of stinging nettle including how to prepare compost and slurry for use as fertilizer. Members are also trained on how to manage and handle stinging nettle during and after harvest to ensure it is clean and is good quality for processing.

After harvest, stinging nettle is delivered to the groups processing facility where it is graded, sorted and dried to a moisture level of 10 per cent. It is then ground into fine powder and put into packages of between 50g to 500g according to the requirements of various customers who place orders with the group.

Plans to diversify

Mr Kiruhi says members are taken for study tours to various companies and groups to learn and improve their knowledge of stinging nettle production and processing.

He says the group is exploring the possibility of selling stinging nettle in the export market once they meet local demand to increase member's earnings and also diversify their operations to be able to sell other products apart from stinging nettle.

Additional reading: http://www.infonet-biovision.org/processing_and_value_addition

their next move was to have their stinging nettle certified as organic. He says the group approached the Kenya Organic Agriculture Network (KOAN), which trained them on organic certification requirements. After certification, they are now able to sell their product as organic under the Kilimohai Organic certification mark. The product also bears the Kenya Bureau of Standards (Kebs) mark of quality.

Supplying supermarkets

When the group got organic certification in 2016, the demand for organic stinging nettle increased, this enabled them to get supply contracts with Clean Shelf Supermarkets and other retail outlets in Nairobi, Nyahururu and Kerugoya. The supply contracts have increased the group's earnings. They have invested

Stevia is a good sweetener that can replace sugar

With uncertainty in the quality of sugar in the market, farmers can grow and use stevia. Stevia is healthy and easily grown. It can be used by people with diabetes since it has no calories.

Nobert Okare | Stevia (*Stevia rebaudiana*) is a sturdy green plant whose leaves contain a unique source of natural sweetness. It's grown all over the world and is fast becoming one of the most popular crops on the market as more food and drink manufacturers look to use stevia plant extract as a zero-calorie sweetener to reduce the amount of sugar in their products. A non-calorie source of sweetness is an obvious diet solution in theory. But a few studies show that replacing sugar with artificial or low-calorie sweeteners may not ultimately lead to weight loss in real life.

Stevia is very low in calories. Its dry leaves possess roughly 40 times more sweetness than sugar. This sweetness quality in stevia is due to several compounds including stevioside, steviolbioside, rebaudioside A-E, and dulcoside. Stevioside is a non-carbohydrate sweetener that can be used by people with diabetes.

Sweeter than sugar

Stevia has no sucrose that other carbohydrates possess. It has been found to be 300 times sweeter than sugar. Besides being a near-zero calorie food ingredient, stevia extracts have several unique properties such as long shelf-life, high-temperature tolerance, non-fermentative. All the parts of the plant are sweet; however, the sweet



A farmer working in his stevia farm in Kericho, Kenya

glycosides are typically concentrated in its dark green serrated leaves.

Preparation: Farm fresh stevia plant leaves can be used directly in drinks as a sweetener. However, most often its dried powder or stevia syrup can be used in cooking.

Remember to use dried stevia sugar in small proportions, as it is nearly 300 times sweeter than cane sugar. Roughly, one teaspoonful of dried leaves powder is equivalent to one cup of sugar; therefore, use it in small quantities, adjusting the amount to achieve your desired levels of sweetness.

You can also make stevia syrup by adding a cup of hot water to 1/4 cup of fresh, finely-crushed leaves. This mixture is allowed to settle down for 24 hours, filtered, and then refrigerated. You may also want to buy stevia sugar rebaudioside-A which is a white, crystalline powder, approximately 300 times sweeter than cane sugar.

Planting: While it is relatively

easy to cultivate stevia, it is also easy to get planting material. Usually, the plants are propagated as cuttings, but if you cannot find any in your *shamba*, you can use seeds as well. As the seeds are rather small, it is advisable to germinate them in pots before you transfer them to your *shamba*.

If you want to cultivate more than just a few plants for your own use, plant them in rows with a spacing of 40cm between rows and 25cm between plants.

Soil preparation: Prepare the soil with some compost, working it into the surface layer of the soil. Light, loamy soil with excellent drainage is as important for stevia as for most herbs. Do not add manure, as the plant grows best with moderate nitrogen levels. It is advisable to heap and mulch the soil around the plants to protect the shallow roots from drying out. For the same reason, it is best to plant stevia in the shade – under a tree would be ideal and intercropping with maize could be worth a try.

Management: Do not let the soil dry out completely, but wet soil should be avoided, as it will cause the roots to rot. Once established, stevia is a low water, low maintenance plant. Furthermore, the plants are prone to breakage by wind, which can be prevented by supporting them with a stick or by clipping the tips of the plants every 3-4 weeks to make the plants grow stronger.

Similarly, flowers should be cut regularly unless you want to harvest seeds. However, you will not have any problems with pests in your stevia plantation

because most insects hate its taste. The sweet leaves can be harvested continuously.

Maturity: However, if you want to sell stevia, you will get the best harvest if you wait for about three months and cut all the branches, cut from about 10cm from the base.

The plants will subsequently re-grow. You should only redo the heaps around the plants before the rainy season to avoid standing water, which can damage the roots. As such, the plants only need to be replaced after a few years when they lose their growth vigour.

Harvesting: At the end of September or beginning of October, harvest the entire plant once flower buds have appeared but before they've opened. Ideally, harvest in the morning when the plant is at its highest in sugar content. Also, be sure to harvest before many flowers (four to five buds) have opened. If most of the flowers have blossomed, they will leave behind a bitter aftertaste throughout the entire plant.

In general, fresh leaves can be sundried (to 10 per cent moisture content), ground into powder and stored in an airtight container for future use. To store, place it in cool, dark, humid-free place like the one you do for other dried herbs where it will stay fresh for several months.

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Processed stevia

Storage bag reduces post harvest losses

Farmers in Africa lose between 10 to 40 per cent of their maize, beans and other cereals after harvest. New chemical-free technologies such as the PICs bag can now be used to store grains for up to 2 years.

Mary Mutisya | Once again the farmers are approaching the harvesting season especially in maize growing areas in Rift Valley's Uasin Gishu and Trans-Nzoia Counties where the bulk

of the country's maize is grown. One of the major challenges that farmers face every year is storage, which leads to huge post-harvest losses.

Post-harvest losses do not only pose a serious threat to food security at the household level but also to the countries food security. It is the dream of every farmer to obtain a bumper harvest and thereafter be able to sell it at a reasonable price or keep it for later consumption. Food traders also maximize on the profits by buying the product in bulk quantities during harvesting, preserve it and then wait for

favourable conditions at the same time trying to maintain the commodity in good condition.

Huge post harvest losses

Many times, this is not achievable as the available indigenous cereal preservation methods, and poor storage conditions often fail to prevent wastage from pests and diseases. Harvested food losses occur throughout the food chain, from the farmers level all the way to the consumption stage. The losses occur during harvesting, threshing, shelling, drying, storage and in the transportation process.



New technology

For many years, many cereal farmers have struggled with cereal insects majorly maize weevil (*Sitophilus zeamais*) and Larger Grain Borer (*Prostephanus truncates* or LGB). These insects have led to huge losses which affect the quality and quantity of cereals. To reduce the damage, the Hermetic Storage Technology (HST) or Purdue Improved Crop Storage (PICs) bag is the latest innovation that has been made in an effort to reduce post-harvest losses and raise the income of small-scale farmers to increase food security.

How the PICs bag works

The principle behind this technology is that, once the product is adequately dried, and kept in the bags and proper closing done, no gaseous exchange occurs between the inside of the bag and the outside. This ends up suffocating any insects pests in the bag at whatever stage of growth they could be in. Eventually, all the insects die and are unable to cause any further damage to the grain. The shelf life of the cereals stored in the bag is prolonged enabling the farmers to sell or use the grains when they need it. Farmers can also wait and sell their grains when market prices are favourable.

Reduces use of harmful chemicals used for storage

Hermetic bags do not use any chemicals, and it has been proven to be safe and cost-effective at the household level. The bags can be used to store maize, beans, cowpeas, green grams, sorghum, millet, chickpeas among many other bowls of cereals. The stored products can last for over two years if the grains are dried properly before storage in the bags. Other than just insects, hermetic bags can protect grains from birds, rodents and fungi.

The hermetic bag's design con-



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Continued on page 7

Vaccinate your chickens to protect them from diseases

How can I prevent diseases in my chickens to improve productivity?

Dear Farmer,

In our last article on protection of chickens against diseases arising from the above question from a farmer, we look at the importance of vaccination as the first step in keeping chickens free from diseases. Vaccinations should be done in the correct way to offer effective protection. Farmers should always learn how to vaccinate their chickens or seek the services of a qualified veterinarian to do it if they do not have the right skills.

Vaccination is the first line of defence against chicken diseases. A vaccine is a weak form of a viral or bacterial pathogen which when administered to a healthy animal helps to boost its immunity to fight the disease caused by the virus or bacteria. Vaccines help protect chickens from infectious diseases although they cannot treat the diseases. Particular vaccines protect chickens from particular diseases; this means that no one vaccine can protect chickens from all diseases.

Farmers are required to know all potential diseases and vaccinate their chickens against them. Apart from vaccinations, chickens should be well-managed to enable them to remain strong and healthy to overcome diseases. Vaccines can only work well if the chickens are well managed.

Important facts about poultry vaccination

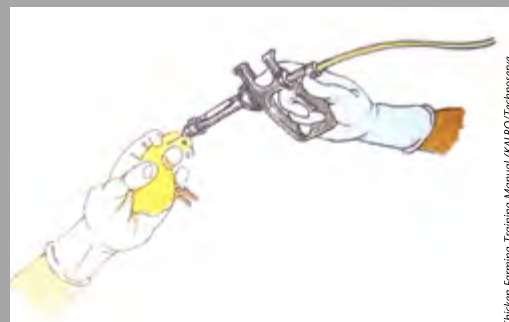
Disease-causing viruses, fungi and bacteria are always present in the environment. These disease-causing agents are difficult to control even with the best biosecurity measures. Vaccines help to reduce the chances of disease outbreaks and even death if they are given at the right time and in the right way.

Vaccinations can reduce the chances of poor egg and meat production and even deformities in eggs. Farmers should know that chickens can still fall sick from other diseases even if they are vaccinated against a particular disease. This is why it is important to vaccinate chickens against all diseases that can infect chickens. It is important for farmers to know that vaccinations cannot offer 100 per cent protection against diseases. Hence, other preventative mea-

How to administer vaccinations



Eye drops



Injections (breast/thigh/neck muscle)



Skin piercing (wing web)



Orally (in feed or water)

Adapted from: Indigenous Chicken Farming Training Manual (KALRO)TechnoServe

asures such as hygiene and other biosecurity measures are equally important.

Note: Poultry farmers should never vaccinate chickens when they are already sick.

How to handle vaccines

Vaccines should be stored at between 4°C and 8°C (a cool and dry environment such as a cool box is required). They should be protected from heat or direct sunlight. All equipment used for vaccination need to be disinfected in boiling water.

Note: Farmers should never use chemicals to disinfect vaccination equipment. For each type of

vaccine, read carefully the manufacturer's advice or recommendations and take all necessary precautions in handling of vaccines.

- It is advisable to vaccinate chickens when it is cool, either in the morning or evening.
- All vaccines should be used within 1 hour (60 minutes) after preparation.
- Farmers should always consult a veterinarian when vaccinating their chickens.

Important vaccination tools: Vaccination tools include vaccines, distilled water, sterilised needles, syringes, a cool box, clean overalls and gumboots.

Answers by Elkanah Isaboke

Additional reading: <http://www.infonet-biovision.org/AnimalHealth/Chicken> and <http://www.infonet-biovision.org/AnimalHealth/Disease-Prevention>

Storage bag reduces post harvest losses

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tains an outer woven polypropylene bag and inner liners (number varies in different companies that make the bags). The outer polypropylene woven bag protects the inner layers. The inner layers work by blocking gases and water vapour from getting into the produce. The top-quality brands currently available in the market are the Purdue Improved Cowpea Storage (PICS), the Grainer-Super Grain, Agro-Z, Zero fly and the elite bags.

Research has shown that rats cannot identify the maize in the bag since they sense their food through smell, which is always the fear of many farmers about rat damage. Farmers can buy it from any agroveter shops in their regions or in major towns.

Additional reading: <http://www.infonet-biovision.org/PlantHealth/Pests/Storage-pests>

Vaccinations against the following diseases is recommended

Type of disease	How vaccination is given	Age at vaccination
Mareks disease	Injection	Day-old chicks
Newcastle disease	Intra nasal (drop)	At 2 to 3 weeks
	In the eye (drop)	At 18 weeks and at 6 months
	In drinking water	
Gumboro	In drinking water	14 days and at 28 days
Fowl typhoid	In drinking water	At 8 weeks and at 6 months
	Intramuscular	
Fowl pox	Wing web method	At 18 weeks

TOFRadio answers your questions

TOFRadio is broadcast on KBC on Tuesday and Thursday at 7:30pm 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 422 460, email: admin@theorganicfarmer.org

Push-Pull technology spreads to Southern Africa

Musdalafa Lyaga and Shanon Macharia | Maize production in Sub-Saharan Africa is largely affected by insect pests, notably stemborers, the parasitic weed known as *Striga* and poor soil fertility. Over the past 20 years, ICIPE and Rothamsted Research, United Kingdom, including the Bio-vision Foundation have developed the Push-Pull technology, which simultaneously addresses these challenges.

In the second part of the ongoing series on this technology, Musdalafa Lyaga of TOFRadio talks to Prof. Zeyaur R. Khan, ICIPE's Principal Scientist from Mbita Point field station on the uptake of this technology by farmers in Zimbabwe and its efficacy in Fall Armyworm (FAW) control.

Q. How has been the uptake of Push-Pull technology by farmers in your project areas?

The adoption of the technology has been very high and recently we learned that there are more than 2,000 farmers who are practising this technology in Zimbabwe. Two years ago, we came to learn about Kushereketa Rural Development Organisation (KURDO), a farmers group from Zimbabwe who says they have immensely benefitted from the technology. This caught us by surprise because of how the farmers' group, through their leader Mr Jona Mutasa how he passed on this knowledge to them about Push-Pull technology after he read about it in the Spore magazine.

Q. What kind of support did ICIPE give these Zimbabwean farmers to enable them to set up, manage and upscale the Push-Pull technology in the country?

When I received a letter from the farmers' group asking for our support in setting up the Push-Pull plots in their farms, I was very happy about it. I collected all the training materials we had developed on the Push-Pull technology, including farmer field school guides, comic books and brochures.



Professor Khan inspects a maize field affected by striga weed in Mbita, Homa Bay County

Since our research mandate only covered East Africa, that is the only support we could give to the farmers at the time. Unfortunately, I lost contact with the farmers. Recently, I learned that the farmers not only read about the technology, but also they had implemented it successfully, trained other farmers from the neighbouring regions on the benefits of Push-Pull technology. The farmers were also able to set up desmodium community seed banks and they distributed the seeds to other farmers in need. The Zimbabwean case is one of our most successful stories on the adoption of Push-Pull technology in Africa. It still amazes me that a technology developed in Kenya could be adopted by farmers in a far away country.

Q. Many farmers have told us that the Push-Pull technology has been quite a success in the fight against stemborers. Farmer now face a new threat, the fall armyworm. Do you have any plans to help farmers to address the emerging challenge of this destructive pest?

By surprise again we have learnt that farmers who practise the Push-Pull technology informed us that the destruction of their cereals was not as much as that of their neighbouring countries not practising the technology. We are

investigating which chemicals in desmodium, Napier or brachiaria grasses will manage to repel fall armyworms (FAW). This is a new project we have started. But, I am optimistic that we will soon have an answer. At the moment, it seems that the desmodium is repelling the fall armyworm

moth from laying eggs. So, we are trying to select another type of grass which will not only control the stem borers but also trap the fall armyworm to help reduce on their damage to crops.

Q. What kind of challenges do you have with farmers' adoption of the Push-Pull technology?

We have observed several challenges with the adoption of Push-Pull technology. However, I must say that there is no single technology that is adopted by everybody. There are people who are early adopters. They make a deliberate choice to adopt a technology while their next-door neighbours do not. Many of them say that Push-Pull technology is labour intensive while others have challenges in accessing the seeds. We are now working with farmers who have adopted this technology to help us to pass the knowledge to fellow farmers in what we refer to as a farmer to farmer learning.

Q. How does it make you feel to see how Push-Pull technology has changed farmers livelihoods?

As far as impact is concerned, am very happy that our farmers have significantly increased their yields which have a profound impact on their families' food security. There are farmers who used to harvest less than one tonne per acre and now they are

able to harvest up to 3.5-4 tonnes of maize. This is a great improvement since these farmers didn't even have enough to eat and now they are food secure.

We recently did a study on nutrition which showed that most of the farmers who have adopted the Push-Pull technology had very good nutrition status and their children's health had improved tremendously. The research undertaken targeted both Push-Pull farmers and non-Push-Pull farmers' families. It was such a joy for me to see how Push-Pull is addressing the food security especially food insecure households.

My aim is to take this technology to one million farmers' households with more than 5 million people. But we can only do this with more partners on board. We have set up a Technology Transfer Unit (TTU) to convince partners and governments to work with us. I am happy that the Governments of Ethiopia, Uganda, Zimbabwe, Kenya and Malawi among others are taking the Push-Pull technology very seriously and have made a point to help in ensuring their farmers adopt this technology.

Additional Information from [push-pull.net](http://www.push-pull.net/1.shtml) <http://www.push-pull.net/1.shtml>

Radio Taifa frequencies for our TOFRadio programmes

Town	FM frequencies	MW (Medium Wave frequencies)
Nairobi	92.9 MHz	
Mombasa	100.8 MHz	
Kisumu	104.5 MHz	
Kakamega	104.5 MHz	
Bungoma	104.5 MHz	
Eldoret	88.6 MHz	
Nakuru	104.1 MHz	
Meru	90.4 MHz	
Nyeri	87.6 MHz	
Kisii	103.3 MHz	
Malindi	90.1 MHz	
Kapenguria	93.3 MHz	
Kitale	93.3 MHz	
Voi /Kibwezi	96.9 MHz	
Namanga	89.9 MHz	
Lodwar	88.6 MHz	
Lokichoggio	89.3 MHz	
Garsen	93.1 MHz	1107 KHZ
Kajiado	92.9 MHz	1152 KHZ
Kitui	92.9 MHz	675 KHZ
Lamu	96.3 MHz	567 KHZ
Maralal		1107 KHZ
Wajir		1152 KHZ
Marsabit		675 KHZ
Garissa		567 KHZ