



Photo: TOF

Ms Florence Muganda, the chair of Yetana Women Group in Tembatemba, Kimilili Bungoma County shows a farm worker how to turn compost for use in her banana orchard. The group is one of the few in the country that have managed to get organic Certification under the Participatory Guarantee System (PGS) Page 2.

Encourage sustainable agriculture in schools

Peter Kamau | Kenya's education system tends to prepare learners for non-existent white collar jobs, where on graduation, students always dream of getting office jobs. As the government reviews the education system, one area they will need to look into very carefully is the role of sustainable agriculture in the economic development of the country.



Photo: TOF

Students learn how to make compost for use in a school farm

One area our development planners fail to focus on is the role sustainable agriculture can play in providing employment especially in rural areas where 80 per cent of the population lives. It is not right that a sector that could transform the economy is ignored even in our education system. Right now, agriculture is treated as a peripheral subject in schools where students can decide if they want to take it or not. Sustainable agriculture is also shunned although it is the common practice in the developed world. Sustainable agriculture is more holistic as it takes care of our environment, soils and avoids use of harmful chemicals and fertilizers.

It is always refreshing to see young pupils and students in a few primary and secondary schools engaging in agricultural activities in the school farms or gardens such as making compost,

milking cows, planting trees or simply weeding crops. But all these activities end there because our curriculum developers do not see the sense in making sustainable agriculture a compulsory subject in schools.

Agriculture is largely viewed as an occupation for those with no formal education. This should not be the case; indeed, it is time our development planners started to recognize this sector as a key driver of the country's economy and give it the attention it deserves. It would also give the private sector and development agencies a good reason to unlock funds to support agro-industries that produce niche products for local consumption and for export. Ultimately, our youth both in rural and urban areas would get jobs.

Dear farmer,

For close to 13 years now, TOF magazine has been promoting the adoption of organic farming technologies. The reason we continue to do this is to enable small-scale farmers who represent 80 per cent of the farming population in Kenya to produce healthy food that also takes care of the environment around them. Any production system that does take care of the environment is not destructive, but also unsustainable.

If you visit most farms today, the first impression you get is that farmers no longer take care of farm resources that enable them to produce food. One of the most important resources is the soil. Farms especially those in slopy land have lost many tonnes of soil through soil erosion. Overuse of chemical fertilizers have also led to acidification of the soil making them unsuitable for crop production, yet farmers continue to add more fertilizer every season.

Very few farmers take their soil for testing, which is a very important measure since it helps the farmer to know what the soil requires in order to correct deficiencies. The result of not testing the soil is low crop yields because most crops cannot do well in acidic soils, which have a low pH.

Most farmers opt to use chemicals in place of environmentally friendly biopesticides. The overuse of chemicals poses serious health risks not only to consumers but also to important insects that are useful to the environment. Most farmers growing fruits and vegetables such as pumpkins complain that the crops are not able to produce fruits. One of the reasons for this is that the chemicals used in crop protection have killed bees, which help in pollination and hence fruit production.

Most of the chemicals used in the farms are washed down into rivers where they cause more problems since most households use the same water for domestic purposes such as cooking, drinking and washing. The chemicals also promote the growth of noxious weeds.

If we are to have a clean environment, then farmers have to use environmentally friendly alternatives to chemicals. But the main problem in Kenya is that big multinational companies selling chemicals conduct huge promotion campaigns to get farmers to use chemicals. These companies do not warn farmers of the dangers or side effects of using the same chemicals some of which are banned in many countries.

Farmers urgently need to change the way they produce food to make it safe for themselves and other consumers.

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Organic certification improves income for group

Four years ago, Yetana Women Group members were trained under the Participatory Guarantee System (PGS) organic certification model. Their products now fetch good prices in the market and improve their livelihoods.

Amina Day Ojijo | Members of Yetana Women Group used to practise conventional farming and would take their produce to open air markets in Kimilili, Misikhu and other open air market centres in Bungoma County. Their earnings from indigenous vegetables, bananas, millet, soybeans and groundnuts sales were low and would fluctuate especially whenever there was oversupply in the market. The group is the first in the region to get certification under the PGS model.

Trained on PGS system

However, their earnings from these products changed when they underwent training in organic production under the

Participatory Guarantee System (PGS) offered by the Kenya Organic Agriculture Network (KOAN) in partnership with the Development in Education Services for Community Empowerment (DESECE) organization in the year 2014.

The group was trained on soil fertility management, pest control, value addition and how to conduct their farming activities as a business. The group composed of 20 women and 7 men went into full production immediately after the training and have fully embraced organic production under the PGS system which has significantly changed their lives through the production of healthy food and good prices offered by consumers.

Organic produce better in taste

“The organic produce has become popular with our customers because they know the difference in taste. There is also the added benefit of the organic produce being free of chemicals, which has encouraged many consumers to go

PGS certification system is based on integrity, transparency and trust

Participatory Guarantee Systems (PGS) is the same as other organic certification systems in providing a credible guarantee for consumers who want genuine organic produce. The difference is in approach. As the name suggests, direct participation of farmers and even consumers in the guarantee process is required. The involvement of farmers is important since they are expected to supply local and other direct markets. The involvement of the farmers results in greater empowerment and also greater responsibility. The system places a high priority on training farmers, producers as well as consumers.

The direct involvement of farmers makes the PGS system less bureaucratic in implementation. This is an important component of the system as it strives to bring small-scale farmers into organic production. Unlike other organic certification systems, the PGS system is based on integrity relying more on trust than other systems where the farmer has to prove their compliance with the set organic standard. Under the PGS model farmers are encouraged to show transparency, openness and equality which allows them to run their activity without supervision and many other requirements involved in organic certification. **Jack Juma, KOAN.** *Source: IFOAM (2005)*



Member of Yetana Women Group check their organic product sales in their office in Tembatemba market

for the produce,” says Florence Muganda.

Grace Fuchaka, a group member has 120 banana mats and a half-acre of groundnuts. She says her earnings have improved since she converted to organic production. She ripens her bananas and sells them locally. “I was lucky to join this group, except for the labour, I do not use fertilizers to grow bananas. Instead, I have learnt to make compost which I spread around the banana mat several times in a year, which has led to increased yields. For pest control in my groundnuts, I use plant extracts introduced to us during the training,” she adds.

Increased demand from consumers

Organic production has led to an increased demand from consumers. Ms Muganda says banana buyers from as far as Lodwar come for the organic bananas, which they prefer because they have a longer shelf life. Hospitals too buy indigenous vegetables, millet, pumpkins and even eggs from the group. Currently, more than 32 groups supply organic produce to the group for sale to consumers.

Due to the increased demand for organic produce from various institutions, Yetana Women Group has now engaged 10 other groups in the region who have been trained and now supply their organic produce to the group.

Improved livelihoods for members

Yetana group now grows seeds and seedlings in the demonstration plots which they sell to other groups to enable to produce and sell various products to the group.

The benefits to the group have been immense. Several members are already putting up permanent houses, bought dairy cows and goats and can now send their children to school and even colleges.

Ms Muganda says the group plans to buy drying chambers and improve on packaging and branding of their products to make them more appealing to customers. This, she says will enable more consumers to identify and buy the products.

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

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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FAO launches fall armyworm mobile phone info service

The mobile application is crucial for early detection of fall armyworm and helps provide guidance on the best response mechanism against the pest.

Beritah Mutune | The United Nations Food and Agricultural Organisation (FAO) has launched a mobile application to enable farmers, extension officers, selected community workers and all other people involved in the fight against Fall armyworm in Africa to identify, report, know how the destructive pest is spreading, describe its natural enemies and the measures that are most effective in managing it.

Application guides the farmers

The Fall Armyworm Monitoring and Early Warning System (FAMEWS) mobile phone application provides valuable information on how the insect changes over time and space to improve knowledge of the behaviour of the pest, which is new in Africa and guide farmers for the best response to control it. The application can be downloaded from android phones using the link provided.

The pest has infested millions of hectares of maize in Africa - a staple crop across the continent - threatening the food security of more than 300 million people, mainly small-scale farmers who are already struggling to make ends meet and to produce enough food for their families.

Assists farmers know level of infestation

The application helps in building collective knowledge of fall armyworm in Africa from how and where it spreads to what makes it weaker and less destructive and come up with ideas of how best to manage it by preventing further infestations. It is also important for all actors involved in managing fall armyworm in Africa to provide vital analysis on risks, spread and management.

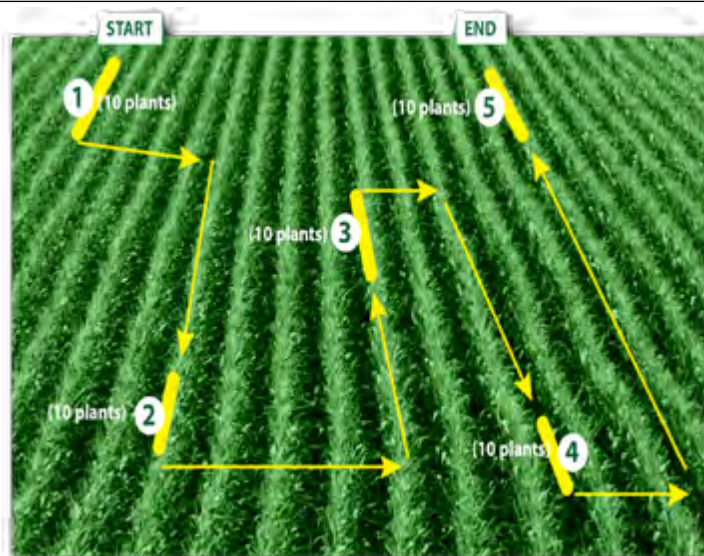
Informs farmers to take appropriate action

Once the farmers and workers check their crops for infestations and upload the required data, the application calculates infestation levels so that farmers can take immediate actions to stop its spread.

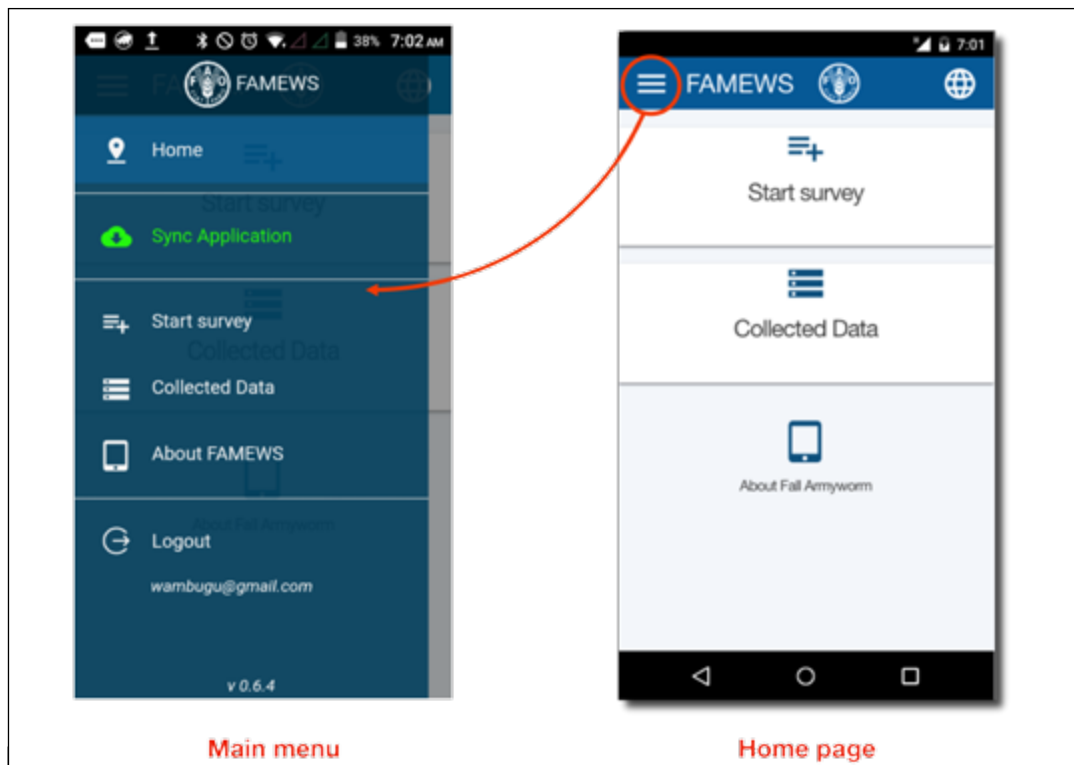
How to scout for the fall armyworm in your shamba

- Walk in W transect (as shown right).
- Inspect 10 plants in a row at 5 places (stations) in the field.
- Count plants with recent leaf damage or fresh FAW waste in the funnel.
- Ignore plants with damage to older leaves but no signs of current damage.

Note: For small-scale farmers (typically <2 ha)



Using the FAMEWS application, farmers can easily scout for fall armyworm presence as shown in this sketch and take preventive measures



The above 2 screen captions illustrate how farmers can use their smart mobile phones to get information on fall armyworm and how to control it

The data is validated by the national fall armyworm centre and transferred to a global web-based platform. Later, it is analysed to give a real-time situation overview with maps of fall armyworm infestations and a recommendation on measures that are most effective in reducing its impact.

Promoted through Farmer Field Schools (FFS)

The application is now being rolled out across all countries in Sub-Saharan Africa affected by the invasive pest through

the FAO-supported Farmer Field Schools (FFSs) as well as other community-based forums including community focal persons leading the fight against fall armyworm.

FAO has joined forces with Pennsylvania State University to develop and launch a mobile app, Nuru, to help African farmers recognize fall armyworm. With the new application, farmers can hold the phone next to an infested plant and Nuru can immediately confirm if fall armyworm has caused the damage.

According to FAO, Nuru uses cutting-edge technologies involving machine learning and artificial intelligence to immediately spot if fall armyworm has infested a crop. It supports all stages of fall armyworm management, from early warning and monitoring to response and risk assessment.

In the next issue we will provide a step-by-step guide on how to use the FAMEWS application.

Additional reading: <http://www.infonet-biovision.org/PlantHealth/Crops/Maize>

Growing pumpkins for food and market

Many farmers do not grow pumpkins. However, Pumpkins are one of the most nutritious crops that do not require a lot of care. They can be grown in your kitchen garden or even in large-scale for the market.

Joan Mukiri | Pumpkins are becoming an orphan crop because many farmers ignore it. However, its high nutrient content, yield and short maturity period are making it more attractive for commercial production.

Pumpkins belong to the cucurbit family. Currently, pumpkin is one of the most underutilized crops and its production in Kenya is threatened due to neglect. Additionally, people's perception of the pumpkin as a traditional crop and lack of awareness of its nutritional value makes it remain unexploited.

Pumpkin production has expanded over the years due to awareness created by various institutions. Promotion of cultivation of this multi-purpose, high yielding and nutrient-rich food crop is most desirable for the purpose of food security, malnutrition and poverty alleviation. Its production stands at over 630Ha in Kenya with Kirinyaga, Elgeyo Marakwet, Embu and Meru being the leading counties in its production.

Importance of pumpkins

The pumpkin fruits can be boiled and served with pounded groundnuts, mashed with potatoes and used in making soups. Pumpkin seeds can also be roasted and eaten as a snack. The seeds are rich in protein, fat, fibre, carbohydrate, vitamin E, magnesium, phosphorus, calcium, and zinc and could be used as a valuable food supplement.

The seeds are a rich source of phytosterols (compounds that help reduce cholesterol in the bloodstream) which can stimulate immune response. Dry and ground seeds have medicinal properties that are used in management of diarrhoea. The oil content of the pumpkin seeds is comparable to that of edible oils such as cottonseed and olive oil which are used as oilseeds, hence are roasted to produce oil.

Pumpkin stalks are used as medicine for deworming and treating ulcers while their leaves, which are rich in vitamin A, vitamin C, calcium and iron are utilized as cooked vegetables or

in soups.

The pumpkin varieties and sources of seeds

One of the major differences in pumpkin varieties is fruit size. Some of the common varieties in Kenya include: Banana, valenciano, butternut, carnival squash and crown prince.

Many farmers dry and keep their seeds to plant for the next season. However, with the increasing popularity of pumpkins, seeds can be bought from various agrovets. One company that produces seeds for butternuts is the Simlaw Seed Company Ltd. The Company has Pluto F1 and Atlas F1 hybrid varieties which are high-yielding and produce three to five times the yield from traditional butternut varieties. The Pluto F1 is characterized by a nice flavour, cooks well and is good for processing as well as export while Atlas F1 produces more fruits and has a long shelf-life.

Climatic requirements

Temperature: Pumpkins are warm weather crops. They do well at a temperature range of 18°C to 27°C for growth. Therefore, a prolonged warm season is essential to obtain quality pumpkins. Temperatures above 35°C favour production of male flowers resulting in fewer fruits. Growth stops at temperatures below 10°C and the plants may be severely injured and maturity delayed in temperatures below 5°C.

Soil requirements: They perform well in well-drained sandy-loam or loamy soils with good water-holding capacity, rich in organic matter content and a pH of 6.0 to 7.5 (optimum pH). For soils whose acidity is more than 5.5, there is a need to add lime. Preference is for light-textured soils. However, heavier soils can be used if they have good drainage. Soils with poor drainage promote root rot, so they should be avoided. The ideal soil depth is 40 cm.

Propagation: Propagation of pumpkins is done by direct seed sowing in the field. The seeds can also be sown early in small pots under protection and transplanted in the field once the weather is favourable.

Soil preparation: The soil is prepared by ploughing or using a hand hoe. In large open fields, the soil should be ploughed to a depth of 15 cm, especially if it contains sods at least one month before planting. This is followed



A pumpkin vine: Pumpkins are highly nutritious and easy to grow

by harrowing and rolling until smooth two weeks before planting. Dig a round hole at least 45cm in diameter and 25cm to 30cm deep. Mix a forkful or two of manure or compost with the soil removed from the hole; replace this material in the hole; tread it down slightly, and make a dish-like depression in the middle. Cover crops can be planted and worked into the soil 4-6 weeks before establishing the crop.

Planting: Planting on a raised bed especially during wet seasons promotes drainage, reducing disease problems. Pumpkins are usually planted in hills. Cucurbit seed is planted 3.0 to 4.0cm deep in the dish-like depression. Plant 2 to 3 seeds per hill, thin after 2-3 weeks to 1 plant per hill, leaving the healthiest seedling. Spacing varies with variety and vine size. Bush or short-vined varieties are planted 0.5m to 1m apart in the row and 1m to 1.5m between rows.

Normally the field should be thoroughly irrigated before planting. The seed should make good contact with the seedbed and be covered with dry soil or soil that is only slightly wet to avoid forming a crust.

Plant seeds on land that has not been on any member of the cucurbit family for at least 2-3 years.

Pollination: Pollination of cucurbits depends on bees to transfer pollen from the male to the female flowers which are open for only one day. Adequate pollination results in increased yields and fruit size. The effectiveness of bees in pollination is hindered by poor weather and presence of competing blooms during its flowering stage.

Pumpkin pollination requires

a minimum of one bee per ten female flowers to maximize production. Wild bees play a major role in pollination but use of domesticated honeybees is more effective in maximizing pollination especially in commercial cucurbit production. Therefore, one would require at least one honey beehive per acre for effective pollination.

Pumpkin management

Fertilisation: The plants respond well to generous dressings of manure and compost throughout their growth period.

Weed control: Mechanical weeding is the most commonly applied method used. The first weeding can be carried out 15 days to 20 days after seed sowing and can be done thrice during the growing period. Weeding should be done only 1 to 2 inches deep because pumpkins are shallow rooted and sensitive to root pruning. One can also opt for hand weeding or consider using polyethylene mulch to manage the weeds.

Mulching: Organic mulch such as wheat straw can be used. Using mulch comes with several benefits. It increases the soil temperature, accelerating plant growth and development, conserves soil moisture and reduces several common problems, such as soil compaction and crusting, reduce fruit rot, evaporation and competition from weeds.

To buy seeds farmers Simlaw seeds Company Limited
Tel: +254 (20) 2215067/8 +254 (20) 2602191/93 Mobile: 0722-200545/0734-811861

Additional reading: <http://www.infonet-biovision.org/PlantHealth/Crops/Pumpkin>

The bittersweet truth about excessive sugar

Your body can get all the sugar it requires from the carbohydrates in food you eat every day. But many consumers take large amounts of sugar which the body does not need. Excess sugar in the body is converted into fats that are responsible for lifestyle diseases such as diabetes, high blood pressure and even the increasing cases of cancer.

Nobert Okare | There are high chances that you already know that taking too much sugar or sugary food is not good for your health. Yet you're probably still addicted to it. Sugar is eight times as addictive as cocaine.

Sugary drinks, sweets, baked goods, and sweetened dairy products are the main sources of added sugar. But even savoury foods, like bread or tomato sauce can have sugar, making it all too easy to end up with a surplus of glucose or sugar in your body. To complicate it further, added sugars can be hard to spot on nutrition labels since they can be listed under a number of names, such as corn syrup, nectar, palm sugar, cane juice, or sucrose.

Sugar has a bitter-sweet reputation when it comes to health. Sugar occurs naturally in all foods that contain carbohydrates, such as fruits and vegetables, grains, and dairy. Consuming whole foods that contain natural sugar is okay. Plant foods also have high amounts of fibre, essential minerals, and antioxidants. Dairy foods contain proteins and calcium.

Since your body digests these foods slowly, the sugar in them offers a steady supply of energy to your cells. A high intake of fruits, vegetables, and whole grains also has been shown to reduce the risk of chronic diseases such as diabetes, heart disease, and some forms of cancers.

In a wide array of foods, sugar is one of the most important ingredients of food that our taste buds recognize. However, there is a dark side to this sweet substances. We know about the dangers of becoming overweight or the threat of diabetes, but did you know that cardiovascular disease is another serious side



Consuming food with too much processed sugar is not healthy

effect from the intake of sugar as part of your diet? Sugar is actually the new fat.

It turns out that it is sugar—not fat, that makes you sick and overweight. Sugar in all its forms is one of the root causes of obesity and most of the chronic diseases that increase health cost in many countries. You name it, it's caused by sugar: Heart disease, cancer, dementia, type 2 diabetes, depression, and even acne, infertility and impotence.

Reasons why sugar is bad for your health

Risk of cancer: Insulin is one of the key hormones regulating the growth of new cells – and when something goes wrong, cancerous cells can thrive. Many scientists now believe that having constantly elevated or fluctuating insulin levels (caused by sugar overconsumption) can accelerate development of cancer.

Cholesterol build-up: There is a clear relationship between sugar and cholesterol (bad fat that clogs blood vessels). Studies

have shown that people who eat food with the highest levels of added sugars experience the biggest spike in bad cholesterol levels and dangerous triglyceride blood fats. Such people have the lowest good (HDL) cholesterol levels. Unused sugar is deposited in your liver and later converted into fat, which is later deposited in various parts of your body such as the stomach, blood vessels and the heart which later creates serious health problems such as heart disease.

Immune system suppression: Studies have shown that sugar can interfere with the way your body fights disease. Bacteria and yeast feed on sugar, so excess glucose in the body causes these organisms to increase and cause infections.

Chromium deficiency: Chromium, a trace mineral, helps regulate blood sugar in the body. While it can be found in meats, seafood, and plant foods, a larger percentage of people still do not get enough chromium because too much sugar

depletes chromium levels. Other carbohydrates can also rob foods of their chromium supplies, reducing sugar intake is the best way to increase mineral levels in your body.

Tooth decay: When sugar remains on your teeth after eating sugary food, it causes decay much more than any other food. It's important to brush your teeth at least twice a day to stop sugars from fueling plaque and bacteria.

Blood pressure: Added sugars cause excess insulin in the blood. Chronic high insulin levels cause the smooth muscle cells around each blood vessel to grow faster than normal. This causes tension in artery walls that leads to the development of high blood pressure, increasing the risk of stroke or heart attack.

Suppresses mineral intake: People who consume the most sugar have the lowest intakes of essential nutrients—especially vitamins A, C, B-12, and calcium. This is especially dangerous for children and young people, who need the nutrients most.

Now that you understand the negative effects of sugar in your body and mind, it's time to be more careful when choosing foods. The first step is getting educated about how to find added sugars. When it comes to convenience and packaged foods, let the ingredients label be your guide—you will be surprised to learn how many low carbohydrates or "diet" foods contain added sugar.

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



It is wise to reduce sugar intake to avoid serious health complications that come with too much sugar consumption

Factors influencing seed quality and viability

Farmers should always be careful when buying seeds. It is always advisable to check the expiry date to be sure that the seed is still viable and it can germinate when planted.

Rachael Wangari | Seed is very important input in crop production. Seed quality determines whether a farmer will have a good crop yield or even complete crop failure. It is therefore important that farmers have

good quality seed at all times to enable them get a healthy crop that will provide the desired crop yields.

Strong and healthy seed is very essential for every farmer to ensure their crops are able to germinate under the right conditions of light, temperature and soil moisture. The seed viability is influenced by the storage conditions of the seeds as well as the period the seeds are to be stored before use.

Seeds should be stored under cool and dry conditions

and should also not be stored for long periods of time since the viability declines with time. Seeds for various crop varieties have varying storage periods which will not have an effect on the seed viability as indicated below:

Other than the storage conditions, the duration of storage, the kind or variety of seed crops and there are other factors that also affect the viability of seeds and these include:

Moisture content of the seeds: High moisture content in seeds

during storage increases the rate of deterioration of seeds, in this way lowering the viability of the seeds. The high moisture content in most cases leads to formation of moulds or generation of excess heat as biological activities take place within the seeds. Extremely low moisture content may also lead to removal of moisture, affecting the viability of the seeds.

Seeds therefore require to be stored under safe moisture conditions which are influenced by the length of storage, type of storage structure, kind/variety of seed, type of packaging material used to ensure their viability is maintained.

Initial seed quality: Seeds that have not deteriorated in any way will have a higher viability unlike the deteriorated seeds. The extent of damage and degree of the deterioration may depend on various factors such as the extent of withering damage, mechanical injury, flat, wrinkled or otherwise damaged seed. A farmer should ensure that they only store high quality seeds to ensure that their viability is maintained.

Origin of the seeds: Obtaining seeds from different sources may indicate varying viability of these seeds. This may arise from pre-harvest conditions of these seeds which may lead to seed deterioration hence low quality and poor seed viability.

Other factors that may affect the viability of seeds include effect by organisms such as bacteria, fungi, mites, insects, rodents and birds, exposure of the seeds to direct sunlight on the seeds as well as the seed treatment that have taken place.

Fumigation: Most cereals such as beans and maize stored in bulk in such institutions such as National Cereals and Produce Board (NCPB) are usually treated or fumigated to preserve them to stay longer. Cereals that are fumigated cannot sprout when planted because the chemicals used to preserve them often kill the embryo (part of the seed that grows when the seed is planted). Farmers should not plant such seeds as they cannot germinate.

Additional reading: <http://www.infonet-biovision.org/PlantHealth/Hot-water-treatment>

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we farm

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Poultry farmers can prevent diseases

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

Dear Farmer,

This month, we continue with the answer to the above question which was sent to us by a farmer. We feel the question is relevant to other poultry farmers across the country who face many challenges in disease control and general management of their chickens.

The following are the most common diseases that affect chickens, their symptoms and how to control them:

New Castle Disease (NCD)

Newcastle is a viral disease that can survive in infected birds or their excretions for up to 12 months. The common signs of the disease are coughing, gasping (loss of breath), drooping wings, paralysis, twisting of the head and neck, swelling of the head, greenish watery diarrhoea, blood spots in eggs or eggs laid without shells. The diseases can kill many chickens within a short time. Affected birds drop in egg production leading to heavy losses for farmers.

Control measures: The best way to protect chickens from NCD is only through vaccination combined with other biosecurity measures as explained in our last issue (TOF No. 158, July 2018).

Gumboro

Gumboro is a viral disease that affects young chickens (between 14-28 days). The chickens start showing signs between 4-6 weeks. The disease is transmitted through the mouth or respiratory tract. Common signs are pecking, diarrhoea, dehydration, swollen kidneys. Gumboro causes a few deaths mainly coming from secondary infections.

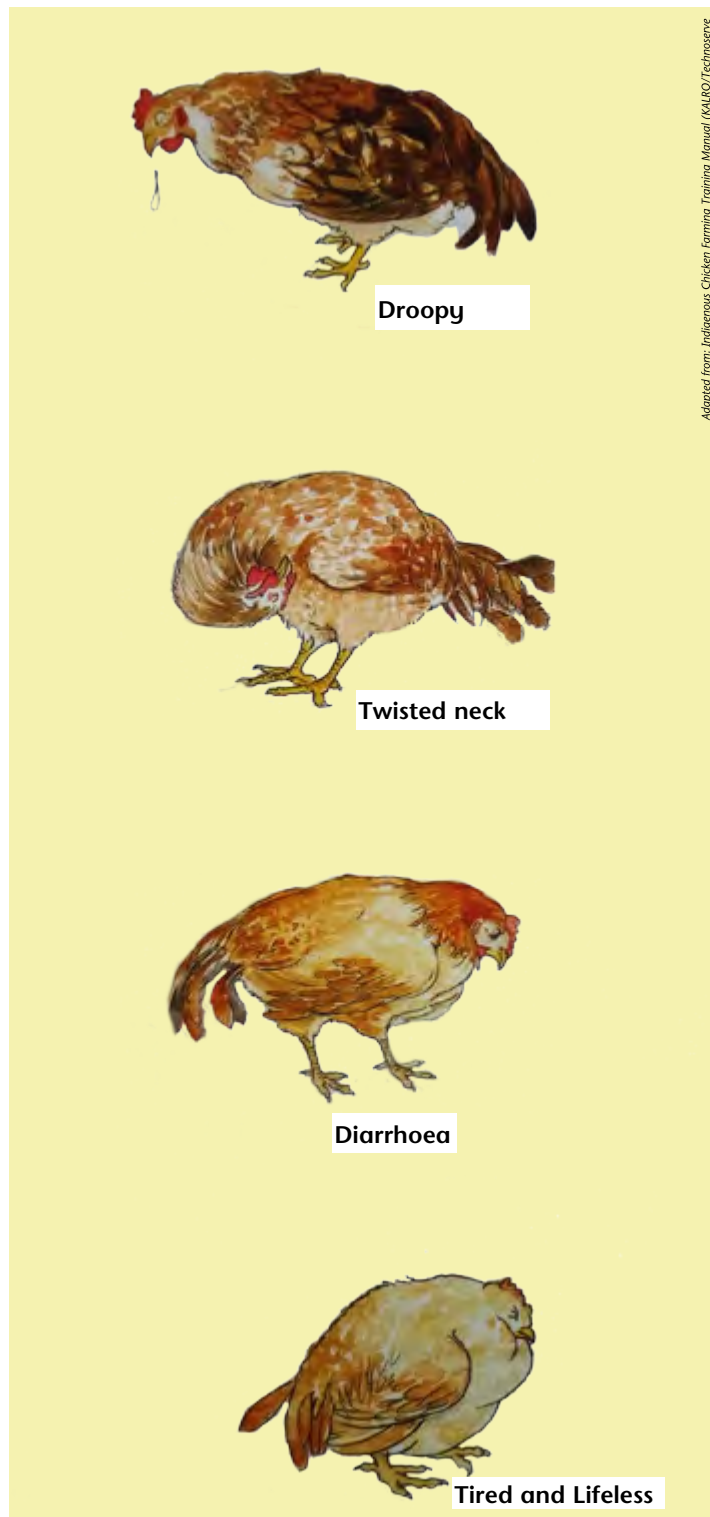
Control measures: Gumboro can be controlled by regular vaccinations.

Fowl pox

Fowl pox is a viral disease. Birds can get infected with fowl pox when they come into contact with other infected birds.

Symptoms: Infected birds have wounds on their skin and respiratory tract and mouth. Other symptoms are retarded growth, decreased egg production and a few deaths.

Control measures: The best



method to prevent infection by fowlpox is through vaccination of healthy birds. Infected birds should be quarantined and treated.

Infectious coryza

Infectious coryza is a bacterial infection in birds mainly observed in eyes and noses of the infected flock. The disease-causing bacteria can survive outside the bird's body for 2 to 3 days. The incubation period of the disease is estimated at 1 to 3 days and can affect the entire flock within a short period.

Symptoms: Infected birds have swelling in the face, running nose, sneezing and difficulty in breathing. The infected birds deteriorate in body condition, show a sharp decline in egg production while a few birds may die from the infection.

Control measures: Infectious coryza can be treated with antibiotics. There are also drugs that can keep the flock disease free if there is a reported outbreak. Proper management of the flock including biosecurity measures such as hygiene in the chicken shed can prevent disease out-

breaks. Farmers should consult a veterinarian should they notice any of the above symptoms in their flocks.

Fowl typhoid

Fowl typhoid is caused by a bacteria and it can easily be transmitted through contact with infected birds. The disease can cause mass deaths in chicks, sometimes causing up to 90 per cent in chick deaths. Infected birds show poor growth, poor feathering of birds which survive and decrease in egg production.

Symptoms: Infected birds have white chalk-like dropping which stick around the cloaca (anus).

Control measures: Healthy birds can be vaccinated against the disease. Veterinarians can treat infected birds with antibiotics.

Coccidiosis

Coccidiosis is caused by a protozoan, which multiplies within the cells of the infected birds eventually causing the disease. The disease is mainly transmitted by birds eating feed that is contaminated through poor feeding especially where feed gets mixed with droppings. The disease is very common in chicken housing sheds where the birds are crowded and living in unhygienic conditions.

Symptoms: Infected birds produce blood stained droppings or yellowish diarrhoea. The disease can cause many deaths especially for birds of between 6 to 8 weeks in age. Infected birds show poor feeding, uneven feeding and growth. There is low egg production in infected flocks.

Control measures: Infected birds should be treated immediately with coccidiostats. Improved hygiene in housing sheds can reduce chances of infection. Farmers should feed their birds in clean feed containers that are frequently washed.

All dropping should be removed by sweeping and cleaning the chicken sheds to avoid wetness. Avoid overcrowding the flock. Coccidiostats can be mixed with feed. Some feed companies incorporate coccidiostats in their commercial feeds to reduce chances of infection especially, for young birds. **Answer by Elkanah Isaboke**

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

TOF Radio 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 can improve livelihoods in Africa

Musdalafa Lyaga and Shanon Macharia | Africa faces serious problems in feeding its rapidly growing population, resulting in hunger and poverty increase. Farmers face major production constraints due to threats from pests, weeds and degraded soils. The main staple foods in the average African diet are cereals. However, in spite of the availability of a number of cereal varieties with improved yield potential, the productivity of staple cereal crops remains low, around 1tonne per hectare mainly due to pests such as the stemborer. One of the technologies that have been developed to address issues of food security is the Push-Pull technology. Recently, TOFRadio producer Musdalafa Lyaga talked to Prof. Zeyaur R. Khan who developed the Push-Pull technology in Kenya:

Please tell us something about yourself and how you came up with the Push-Pull Technology.

I am a principal scientist with the International Centre of Insect Physiology and Ecology (ICIPE) based at Mbita point field station. I was responsible for developing the Push-Pull technology. It is a novel technology especially good for small-scale farmers in Africa. I was born and educated in India. I came to Kenya in 1993 at the invitation of Professor Thomas Odhiambo the founding ICIPE Director-General. After working for many international organisations I had acquired knowledge and experience working on plant-insect interaction and chemical ecology.

How did you discover Push-Pull?

Professor Odhiambo challenged me to use my experience in developing a technology that will address the challenge of stemborers which posed a serious threat to maize yields. I begun first by understanding why the stemborer is attracted to maize and not other crops. I investigated other crops it may be attracted to by checking where it moves when the maize has been harvested. I was always thinking about it and one day while walking in a field of grasses, I discovered that the stemborer also attacks grasses but the damage on grasses was not as high as that of maize.



Prof Zeyaur Khan developed the Push-Pull technology which has helped thousands of small-scale farmers in East Africa protect maize from stemborer damage

This compelled me to think even more on how nature has provided the grasses with properties that enable them to defend themselves against the pest. This laid the foundation for my work.

So for you it was a eureka moment?

Yes in a way. I travelled extensively throughout East Africa where I surveyed almost 500 different species of grasses. I was trying to look for the relationship between the grasses and stalk borers. What I found out was astounding! I discovered that some of the grasses like Napier grass could be highly attractive for egg laying, but not suitable for the development of the stem-

borers.

I also discovered that some legumes also repel the stalk borers while the Napier grass attracts them but destroys them. This gave me the idea that led to the development of the Push-Pull technology.

What steps did you take then?

This technology was developed in close collaboration with farmers. The farmers in East Africa gave a lot of contributions to the design of Push-Pull technology. They helped in identifying the beneficial companion legume crops that repel the pest such as desmodium. We also discovered that the companion crop

apart from protecting the maize against stemborer, desmodium also protected the maize against striga. The crop also provided farmers with good fodder crop for their animals.

In our next issue in this series, Prof. Khan talks on the adoption of the Push-Pull technology by farmers in other African countries such as Zimbabwe.

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

Organic food festival set for September 2018

The Kenya Organic Agriculture Network (KOAN), the Wangari Maathai Institute for Peace and Environmental Studies and the University of Nairobi have organised the first Organic Food festival in Kenya to be held on September 21st to 22nd 2018 at Wangari Maathai Institute for Peace and Environmental Studies. The event has been set to coincide with the International Organic day to be held at the same day. To celebrate the day, a number of activities have been planned to coincide with the day such as discussions of various topics about food safety and nutrition, exhibitions, recipes, cooking competitions food shows, tasting, poetry, music and nutritional talks that help create awareness on consumption of healthy food and nutrition.



A Push-Pull plot in Nyanza region