The Organic Farmer

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Photo: TOF

Mr. Nteere Gitonga tends to potatoes in a demonstration plot at Kilimo Biashara Resource Centre in Ngenyia Village, Laikipia County. Many farmers are forced to recycle ware (commercial) potatoes due to lack of certified seeds

Kenya faces a serious potato seed crisis

Peter Kamau | Kenya is facing a serious potato seed crisis with many potato growers across the country being forced to recycle their commercial (ware potatoes) as seed. This practice has caused a reduction in potato yields while spreading diseases and pests.

A *TOF* Magazine survey conducted in the last two months has established that the seed shortage is severe especially in major potato growing areas such as Elgeyo Marakwet, Nyandarua, Nakuru, Mau Narok and Laikipia, which farmers blame on the collapse of the Kenya government's seed potato production programme.

The KALRO Seed production Unit at Tigoni no longer produces basic seeds for farmers. The production Unit was condemned in 2016 following the discovery of Potato Cyst Nematodes *(Globodera rostochiensis)*, a devastating potato pest that can remain in the soil for up to 30 years, and can wipe out up to 80 percent of potatoes in an infested farm. The KALRO seed multiplication farms were also found to have the pest, making them unsuitable for seed multiplication.

Due to exchange of potatoes between farmers, including recycling of potatoes as seed, the pest has spread to potato growing areas of the country with Counties such as Nyandarua, Nakuru and Elgeyo Marakwet and West Pokot having between 87% and 100% infestation.

The pest is likely to spread to more potato growing zones unless farmers are trained and provided with certified seeds. This will reduce the exchange of infested potatoes between farmers which will also reduce the spread of PCN. Another major driver of pest and disease spread is the farmers' preference of only one potato variety- *Shangi*. Farmers claim that one reason they prefer this variety is due to its huge market demand. They say another advantage is its characteristic of breaking dormancy with a short time, which enables them to replant it many times in a year, hence giving them good returns.

The government has allowed some multinational companies to import potatoes to bridge the gap in seed production but farmers have rejected these varieties claiming the market does not like them. The importation of potato tubers has also been blamed for introduction of pests and diseases into the Country. Two years ago, the Kenya Plant Health Inspectorate Service (KEPHIS) at Mombasa port condemned more than 70,000 tonnes of potato tubers imported from Netherlands due to the presence of pests and diseases. *We feature more on potato seed crisis in the next issue.*

In this issue

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Dear farmer,

The heavy rains currently pounding many parts of the country have come with mixed blessings; causing flooding and landslides that have killed more than 100 people with West Pokot bearing the greatest loss, where more than 52 people have died. As we condole with families that have lost their loved ones, we would like to remind farmers that they can turn the misfortune into a blessing.

One way they can do this is to plant more trees especially on hillsides which are prone to landslides. Trees can hold the soil and stop such catastrophes in future. Human activities such as farming and deforestation in steep slopes are directly to blame for landslides where the loose soils break under the weight of water carrying debris of fallen trees, top soils and mud. They can also harvest enough water for irrigation since its difficult to predict how the rains will behave between January and March next year.

County governments in landslide-prone areas should initiate soil conservation measures in hilly and steep areas and train farmers on the need to plant trees and make terraces that help slow down the speed of water in the event of above normal rains. Indeed, the national government can work together with County government in all landlide prone areas to plan settlements while initiating such measures to reduce recurrence of such a nature. Safe areas for human settlement should be identified and people encouraged to settle in these areas where they cannot face calamities such as flooding and landslides.

For farmers harvesting maize and beans, we would encourage them to dry their maize well before storage to reduce the danger of rotting which creates conducive conditions for development of aflatoxins in maize, wheat, groundnuts and other cereal crops.

The rains will no doubt lead to a good harvest which is expected to bring down the level of inflation. This is good especially at this time when Kenya's economy is not doing well. So money that would have been used to import food will hopefully be used in other sectors of the economy such as repairing the infrastructure that has been damaged by the rains.

But farmers should by now remain prepared for such calamities in view of the changing climatic conditions. These climatic phenomena which began three decades ago is expected to get worse in the coming years unless industrialised countries take drastic measures to reduce pollution and green house gases.

Reduce post-harvest losses through proper storage

Farmers lose up to 40 per cent of their maize due to poor harvesting and storage practices. Poor storage can also lead to the development of aflatoxins that render the crop unfit for human and animal consumption.

Lilian Maina | As the year ends, it is time for maize farmers to harvest and store their maize crop. The crop that was planted in March and April matured and was ready for harvesting in October and November especially in warm areas. Farmers are advised to harvest maize immediately it matures. This is to prevent pest infestation and decay if left in the field long after maturity. When maize is left in the field, the husk opens exposing the cob to pests e.g. weevils and water from the rain. It has been noted that farmers lose up to 40% of their harvest to pests and decay during harvesting and storage.

After certifying that the maize is mature and ready for harvesting, the farmer can decide to harvest directly by picking cob by cob from the stock or cutting the stocks together with the cobs and pilling them together in the field for further drying. Staked maize may take 1 to 3 weeks to dry depending on the weather. It should then be dehusked and stored ready for shelling.

Testing maize moisture level

There is a simple test a farmer can perform to check whether the grains are at an appropriate moisture content level for storage using an empty glass or bottle. Put a handful of grains into the glass or bottle add a handful of dry salt. Shake for 2 to 3 minutes then allow to settle. If the salt sticks on the glass or bottle walls then the grains are not dry enough. Keep drying. After sometimes repeat the test, if the salt does not stick to the walls, then the grains are dry enough and ready for storage.

Measures to reduce post-harvest losses

Post-harvest losses are mainly caused by rodents, pests and moulds. Below are a few methods that help in dealing with rodents, pests and moulding.

Sorting: A farmer should go through the harvest after dehusking and removing rotten maize, damaged by moulds or pests. When left together with the good cobs, the rotting spreads very fast destroying a larger part of the harvest.


Photo: TOF

Drying: Dry the cobs in direct sunlight for 2 to 3 days.

Shelling: This is the separation of maize grain from the cob. This can be done by hand for small-scale farms or on large-scale shelling, using a shelling machine. It should be done when the maize is dry and its moisture content ranging between 13 and 14%. Shelling is important as pests prefer maize still on the cob as it is easier for them to move throughout the cob.

Second Drying: After shelling it is advisable to further dry the maize for 3 to 4 days ensuring that it has the right moisture content of 13.5% for long term storage (most maize buyers and farmers now have moisture meters). Drying to this moisture content level is vital especially for long term storage as it gets rid of excess moisture which brings about decay and the development of aflatoxins during storage. Direct sunlight also kills pests that are not in the grains already. Turn and stir the grains for even uniform drying.

Treating maize before storage

It is advisable to treat maize after it has been dried as a further precaution in dealing with pests. Some of the methods that a farmer can use are highlighted below:

Use ash and chilli mixture

Sieve cold wood ash from the fire place. Mix 2kgs of wood ash with 1 tablespoon of chilli powder. Make sure to mix them thoroughly. Add the mixture to maize in a ratio of 1 to 4 (1 part mixture to 4 parts maize) this mixture is known to keep away the Large Grain Borer (LGB).

Red soil

Pick dry red soil and crush it into a fine powder. Rub the red soil dust onto maize grains. This prevents pests like weevils from drilling holes into the grains or even laying eggs onto the stored grains. The laterite in the soil rubs on the waxy coating of the pests' body dehydrating and killing them. When the grains are stored in sealed containers, the pests suffocate when enough red soils dust is poured in together with the grain excluding air.

iii) Use of pyrethrum dust

Pyrethrum flowers are picked and dried in the sun on a hot day. When the flowers are dried completely, they are crushed into a fine powder and then mixed together with the grains.

iv) Use of Diatomite

This is a powder made up of fossilized microscopic plants called diatoms. Apply 1/2kg of diatomite to one sack of maize.

CAUTION: Wash maize that has been treated thoroughly before consumption!

The use of chemical dusts is no longer effective on pests e.g. the Large Grain Borer (LGB). It maybe as a result of the market being saturated with fake powders. It is very hard for a farmer to tell between real and fake dust. Farmers have also noted that the diatomite they use today is not as effective against pests as it used to be. We are talking to African Diatomite Industries (ADL Ltd) to find out the quality of diatomite they are selling to farmers.

Preparation of the storage area (store)

A good store should be made of wire mesh instead of timber off-cuts. This is because the cracks in the wood provide a home to weevils where they stay and lay eggs. Weevils can lay in wait until the next harvest in wood cracks. The store should have 40% to 60% open space for maize storage ensuring maize dries properly. This allows air circulation which discourages pests' infestation as pests flourish in warm environments. The floor of the store should be raised 60-90cm above the ground. The raised store is vital in fighting off rodents. The floor and walls can be plastered with cow dung to discourage pests. Iron sheets are the preferred roofing material as they do not habour pests unlike grass and wood.

Cleaning the store

Thoroughly clean your store before placing your harvest into it. Ensure that the remnants of the previous harvest are completely removed and destroyed as they may be infested with weevils.

Neem leaves can also be used and they have a longer lasting effect. Farmers can use cypress leaves and burnt eucalyptus tree leaves to repeal pests in the store although the effects are not long lasting. Wood ash can be poured around the store as it prevents movement of pests.

For more information on storage pests http://www.infonet-biovision.org/PlantHealth/Pests/Storage-pests

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.

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Use natural methods for *Tuta absoluta* control

Instead of using harmful chemicals many of which are ineffective against the *Tuta absoluta*, tomato farmers can use mass traps, lures and new biochemical products that can control the pest.

Shepard Ndlela and Samira Mohamed*

Tomato farmers need to be very careful when growing tomatoes right from the nursery bed to harvesting time. At the nursery, in most cases, seedlings are transplanted into fields or greenhouses when already infested while at the nursery.

This results in tomato plants being attacked when they are still young thereby dying before fruiting stage. It is important that seedlings are raised in pest-free nurseries to ensure that they are healthy prior to transplanting. This can be achieved by using lures and general cleanliness in the nursery or field.

Use of *Tuta absoluta* male lures and traps

Lures are substances which attract male insects. In the case of *Tuta absoluta*, lures are specific to Tuta male moths only. *Tuta absoluta* lures, attractants and traps are readily available from suppliers and distributors of pest control products in Nairobi. Traps come in various shapes and sizes, while lures are also manufactured and packed by various companies.

Traps and lures can be used for monitoring purposes or mass trapping. In monitoring, a few traps per unit area (consult the supplier for advice as product requirements may differ) are deployed and the farmer constantly checks and records the number of moths caught. This informs the farmer on the population levels of moths thus giving information on when to start controlling *Tuta absoluta*.

Monitoring *Tuta absoluta*

Farmers are advised to monitor *Tuta absoluta* using traps and lures 2 weeks before establishing the nursery. If traps catch any moths, the farmer must proceed to lay out water traps in the nursery so that moths are captured and removed from the system prior to establishing the nursery. Most farmers usually cry foul because they begin mass trapping when the pest is already established in the farm making it very difficult to manage. Always remember that prevention is better than cure!


Mass trapping


Water trap


Natural enemy: *Dolichogenidea gelechiidivoris*


Photos: ICIPE

Many farmers rely on chemicals to control *Tuta absoluta* many of which are ineffective and are harmful to humans, animals and the environment

Mass trapping

In mass trapping, more traps per unit area are deployed so that male moths are captured and killed. This deprives female moths of males to fertilize them; thus, unmated females lay unfertilized eggs which do not hatch. Mass trapping results in *Tuta absoluta* population reduction in the field or greenhouse.

The lures are usually replaced after every 6 weeks as their effectiveness decreases with exposure period in the field. Traps can be expensive since the adhesive material inside needs to be replaced regularly. The water trap is much preferred for mass trapping compared to delta traps because the farmer can make use of any low-cost plastic basin or containers, then purchase the lure only.

Ordinary detergent is added in the water in the basin to ensure that moths drown and die. The water can be replaced anytime whenever the trap is full. Mass trapping is very effective and can result in more than 80% reduction in Tuta populations when started early and used consistently with other management measures.

Field sanitation

When tomato fields are attacked by *Tuta absoluta*, farmers usually select infested tomatoes and throw them away. Sometimes they completely abandon the fields and only clear plant remains only when they want to plant a new crop. This practice is ineffective and should be discouraged.

Farmers must collect infested tomatoes or cut down infested plants after harvest and bury them at a depth of at least 1m underground. This ensures that all maggots in the leaves and tomato fruits fail to develop further and die. When plants are left undestroyed, the maggots continue to develop into adult moths which will lay eggs and start another destructive cycle.

Minimise insecticide sprays

It is difficult to do away with pesticide sprays for now. However, synthetic insecticides do not seem to work and are costly. Farmers can use green label pesticides registered for the control of *Tuta absoluta* especially before tomato fruits are formed. Once tomato fruits are formed, it is advisable to eliminate pesticide usage at all costs.

Note that this advice works when farmers begin monitoring and mass trapping way before transplanting and continue practicing sanitation throughout the growing season. It also helps when these control and management options are religiously practiced by all farmers in an area. This calls for unity of purpose among farmers and their agricultural extension officers.

Biopesticide

ICIPE is currently evaluating a fungal biopesticide, which will be commercialized and availed to farmers in the near future. The biopesticide has shown more than 70% efficacy in controlling *Tuta absoluta*. It is against this premise that scientists are confident that this will be an additional control option in the *Tuta absoluta* IPM package.

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Group gets PGS organic certification to access market

The following is an excerpt of TOF Radio Kilimo Hai broadcast that will be aired on the 26th December 2019 on KBC Idhaa ya Taifa at 7.30 PM focusing on the PGS certification of Isembe FAT Group from Kakamega.

A video grab of two members of Isembe FAT organic farmers group showing off a sweet potato from one of their farms. The group has been certified as organic under the PGS system

Musdalafa Lyaga | "During the farmer field schools, I was always assured that I can increase my yields drastically if I shifted to ecological sustainable agriculture. True to their word, my yields have increased drastically since I started practising kitchen garden technologies. My garden has even become a demonstration plot to train other farmers. With the increased yields has come the challenge of finding market for my produce," says Gladys Nasike, a farmer from Bungoma.

She was speaking during a *TOF* Radio farmer listener group session where she requested the *TOF* Radio team to run a farmer radio series on how organic farmers can maximize their earnings from organic produce through organic certification.

Increased earnings from organic certification

Organic farming is a good way to provide for healthy soils, healthy plants, healthy food and a healthy environment. In addition to these, farmers who practise organic farming can make more money in the market from customers who prefer organic produce due to its health benefits and advantages such as nutritional benefits, being chemical-free and tasty food.

However, the consumers who want organic vegetables and fruits are willing to pay more for what they know is safe for their families. How do you make sure that you are using the best organic farming practices, technologies and innovations to meet market needs? What needs to be done to get the best quality and price? The first priority for any farmer is to realize that farming is a business. They can only sell if they produce high quality organic produce that the market needs.

Changing trends in farming

Says Ms. Catherine Akhayali, "Before, farming was mainly done as a bragging right. A farmer would boast of the number of livestock they had, the acreage of land they owned but had very little to show for it. With time we have had a paradigm shift. We now understand that agriculture is our source of employment with a promise of income that will cater for our financial needs. By keeping a close check on quality, the hard work in the field is not lost."

Ms. Akhayali is the chairperson of Isembe Faithful, Available, Teachable (FAT) Group.

Mr. Michael Wangalwa who is Biovision Africa Trust (BvAT) facilitator at the KALRO Kakamega Resource Centre says the group has been trained on organic food production methods.

Organic certification opens up market

"Mike" as he is fondly referred to by the group members sits in the Peer Review Committee, which oversees all the production operations of the group. He says the Isembe group has the potential to sell organic products to the urban towns closeby such as Kakamega and Kisumu. This is one reason the group has been trained and certified through the Participatory Guarantee System (PGS).

"The PGS certification will open the group to markets such as high-end restaurants, supermarkets, schools and hospitals who are all big buyers and conscious of what they consume," observes Mr Wangalwa.

PGS certification is affordable

The PGS system is affordable and puts emphasis on the participation of all stakeholders, particularly the producers.

"Isembe FAT Farmers Group was formed in the year 2013. The group is in Shibuli Sub-location, Kakamega County and is currently composed of 36 farmers, 28 women and 8 men, all trained in organic farming and PGS certification," adds Mr. Wangalwa.

Ms. Akhayali who is the group's chairperson says the members mainly produce crops such as cereals, legumes, local vegetables, sweet potatoes and fruits. The members who are small-scale farmers also keep livestock and poultry targeting the local market.

Like other forms of organic certification, Participatory Guarantee Systems approach provides a credible guarantee for consumers seeking organic produce.

PGS encourages farmers to work together

In contrast to the Independent Certification System (ICS) favoured under international norms, PGS emphasizes participation and ownership by the producers. The direct participation of farmers and other stakeholders in the certification process is not only encouraged but also often required.

Active participation on the part of the stakeholders not only results in greater empowerment but also greater responsibility. This requires PGS programs to place a high priority on knowledge and capacity building.

Selling together increases volumes

With the Isembe Farmers Group, the guarantee function of PGS is combined with joint marketing. A marketing committee works closely with the production committee to train the members on organic production, participate in production plans and also organises the marketing of their produce.

PGS system involves all stakeholders

The decision to engage the group into PGS was agreed by the group in 2019.

Biovision Africa Trust working closely with The Kenyan Organic Agriculture Network (KOAN), provided the initial training and guidance on PGS documentation.

Biovision Africa Trust invited other stakeholders at the initial PGS training, such as the County Government and Ministry of Agriculture, Livestock, Fisheries and Irrigation.

PGS system ensures compliance

The members of Isembe are at the centre of the PGS. They were involved in the development of procedures, regulations, and PGS documentation. They also participated in all the PGS activities through their Annual General Meeting (AGM) and are involved in the approval of new members and participate in peer reviews (where members examine the performance of each one of them to ensure they maintain organic standards and practices).

The non-complying members are usually sanctioned as per the established set of sanctions ranging from fines, written warning to more severe penalties such as expulsion from the group.

BvAT provides advice to groups

In cases where the PGS faces questions with regard to the use of certain inputs, advice is sought from BvAT. Thinking of farming as a business entails learning from other successful farmers including what changes are needed to be done in each farm to increase the quality of the crop.

Working out what needs to be done to improve your fields is only the beginning. The emphasis has to be on improving quality to get better returns.

Additional information from Participatory Guarantee Systems in East Africa; case Studies from Kenya, Tanzania and Uganda by International Federation of Organic Agriculture Movement (IFOAM).

You can make your own, healthy yoghurt at home

If prepared in the right way, yoghurt has many benefits. It is a rich source of vitamin B12, riboflavin (vitamin B2), phosphorus and magnesium. It can boost immunity against diseases that affect the digestive system.

Joan Mukiri | Yoghurt is thought to have first occurred thousands of years ago accidentally when milk that was being stored in animal skins curdled as a result of the action of bacteria.

Better than milk

Yoghurt is a nutritious option for people who find it difficult to chew their food. It also offers an alternative for people who have lactose intolerances since it contains less lactose than milk because the lactose is used up in the fermentation process. It also contains bacteria that aid digestion and people who get bloated or develop gas after taking milk can often tolerate yoghurt without any symptoms.

Can yoghurt be bad for you?

The health benefits of yoghurt vary depending on the type of yoghurt consumed. The types without added sugar or unnecessary additives like natural yoghurt can be a healthy, low-calorie, protein-rich addition to your diet. However, many yoghurt manufacturers add high quantities of sugar, artificial sweeteners and other ingredients that are unhealthy.

Home-made yoghurt is a better option

Making yoghurt at home is easy, you can have it any way you like it; plain or flavoured, light or thick and creamy. Commercial yoghurts also lack fresh active bacteria necessary to kill bad viruses and help with digestion. If you love natural yoghurt, try out homemade yoghurt. It is easy to make and extremely economical too.

It's loaded with vitamins and minerals

Yoghurt is a rich source of vitamin B12, riboflavin (vitamin B2), phosphorus and magnesium. Riboflavin helps in the metabolism of carbohydrates, fatty acids and amino acids, while vitamin B12 is essential in the production of red blood cells and for maintenance of a healthy nervous system. The mineral phosphorus helps to keep bones and teeth strong, and is necessary for converting proteins, carbohydrates and fats to energy.

It triggers vitamin B production

Our body can barely produce vitamins on its own. Vitamin B is produced through a biological reaction in our bowels. Regular consumption of yoghurt helps the body to produce vitamin B in the bowels. Vitamin B helps in regulating the energy balance of the body while protecting it from neural (nerves) and autoimmune diseases.

High in calcium

Dairy products are rich in calcium which is essential in promoting healthy bones and teeth, blood clotting and maintaining normal blood pressure.

Probiotics in yoghurt boost immunity

Probiotics are a type of healthy bacteria that benefit the gut. They help regulate the digestive system, improve the body's absorption of essential nutrients, prevent the production of cancerous cells and growth of harmful bacteria like E. coli, boost the immune system function as well as decrease gas, diarrhoea, bloating and constipation. Basically, yoghurt is the perfect immune system booster. The bacteria in yoghurt have important effects in preventing cancer, infections, gastrointestinal diseases and asthma.

The two most common bacteria used to ferment milk into yoghurt are *Lactobacillus bulgaricus (L. bulgaricus)* and *Streptococcus thermophiles (S. thermophiles)*, but many types of yoghurt contain additional bacterial strains. In most cases, the fresher the product, the more live bacteria it will contain.

Disease prevention

The lactic acid in yoghurt helps prevent Helicobacter pylori infection by preventing multiplication of the bacterium and eliminating it in the stomach. *Helicobacter pylori (H.pylori)* has been ranked as the highest cause of peptic ulcer and stomach cancer.

Since yoghurt is rich in conjugated linoleic acid, it is a protective food against colon and breast cancers. Yoghurt also prevents atopic diseases such as dermatitis, asthma and food allergies. It's also beneficial when it comes to preventing hypertension, kidney and heart diseases as well as lowering blood pressure and keeping colds away.

It promotes weight loss

Yoghurt may help in weight loss by promoting abdominal fat loss, the most challenging area for dieters to lose weight. For more effective weight loss, take plain yoghurt or sweeten slightly with honey or fruits to avoid unnecessary sugars.

Offer faster recovery after a workout

Yoghurt, particularly high-protein yoghurt in combination with carbohydrates, makes an excellent post-workout snack. The protein provides the amino acids needed by your muscles to repair themselves while the carbohydrates replace your muscles' energy stores, which get depleted after a hard workout.

Immune benefits

Beneficial bacteria known as probiotics in yoghurt provide considerable immune benefits, including increased activity of white blood cells and increased production of antibodies - protein molecules that rally the immune system against pathogens.

How to make yoghurt at home

Yoghurt starts with as little as a spoonful of yoghurt. You only need the following:

Starter yoghurt

You need to buy some yoghurt to make your yoghurt for the first time. After that, put aside some yoghurt from your first batch and store in a refrigerator and use it for your next batch. Also note that you should ensure that you use plain yoghurt because a flavoured one will give your home-made batch an odd taste.

Milk

You can use either raw or pasteurised milk, semi-skimmed or whole milk. Note that whole milk will give you thicker and creamier yoghurt.

Equipment

You will need a sufuria, spoon, container with lid, jars to store your final product and towels for keeping it insulated and warm – an oven or fireless cooker can be used too. If you have all the ingredients, keep to the following steps in making your yoghurt:

Boil the milk: Heat 1 litre of milk over a medium-low heat until almost is bubbling. Keep stirring with a spoon, preferably a wooden one, so that it doesn't stick on the bottom. Add 2 tablespoons of sugar (A healthier option is using honey instead of sugar). After boiling, reduce the heat and let it boil for 5 more minutes.

Cool it: Take some towels and spread them on the surface you will be making your yoghurt and place your container on top. Plastic containers are better since they don't lose heat fast. Do not move the container until it's ready. Pour your milk into the container and leave it to cool.

Test your milk with a thermometer (many chemists stock thermometers) to determine if the yoghurt is ready. If it feels pretty hot (about 46°C) it's ready.

Add the culturing yoghurt: Now you can add the culture to the milk. Ensure that it's at room temperature. Add some little hot milk into your culture and mix it well to make it warm and thinner so that it easily blends with the milk. Then pour the mixture into the milk and mix well.

Incubate: Cover your container with a lid and then cover the container with the blanket and leave it for 5 hours. After 5 hours, uncover it and leave it open for a half hour to 1 hour. You now have delicious and creamy yoghurt. You can make your yoghurt thicker by letting it to incubate for a longer period up to 8 or 10 hours.

Alternatively, incubate your yoghurt in the oven if you have one: Turn the oven on for 5 minutes, then turn it off and leave your yoghurt inside. Repeat that every 2 hours. You can also place the container with yoghurt in a bowl of hot water and replace the water every two hours or put in a fireless cooker. The temperature of the yoghurt should not remain above 48.9°C and not below 32.2°C.

Cool and sweeten the yoghurt: Store the yoghurt in your jars and put in the fridge and consume it within a week or two. To make your yoghurt more yummy, add more honey or vanilla or banana or some fresh fruits like strawberries.

Lacking space? Try vertical gardens to grow vegetables, fruits

Many people with little space in towns or living in small plots can still grow vegetables and fruits and save money putting up vertical gardens in their backyards and even balconies.

Lilian Maina | In the urban and peri-urban areas (areas surrounding big towns), where there is very limited space to establish a vegetable garden, enthusiastic farmers have resorted to vertical gardening. Vertical gardening can also be referred to as bag or sack gardening. This refers to the creative method of growing plants going up or down or on vertically mounted surfaces using recycled or cheap materials e.g. bags, pots, sacks, holed up pipes, car tyres etc. In Kenya, there are special bags available for vertical gardening. These bags are of varying sizes. Some can even hold up to 100 plants.

Advantages of vertical gardens

Some of the advantages of vertical gardening are:

- It requires less space, the bags or sacks can be arranged in a small area each containing very many plants, therefore a lot of vegetables can be obtained from a small space.
- Less weeding, it is easy to pull weeds out as soon as they appear.
- Fewer maintenance chores.
- Improved air circulation and ease in pests and disease control.
- Maximum harvest in minimum space and easy to harvest.
- It is also easier to handle plants as one can fertilize, plant, water, prune and do all the work while standing unlike where one has to constantly bend while working.
- It is not influenced by weather conditions. This farming technique utilizes farming under controlled environment therefore production is constant regardless of the weather.

The major challenge faced by farmers using the vertical gardening especially in controlled areas is pollination. Under the controlled environment, farmers are advised to grow crops that do not rely more on pollination, although pollination can take place depending on the site where the vertical bags are placed.

How to set up a vertical gardens

Below is the procedure to follow when establishing a vertical bag garden:

i) Thoroughly mix soil with manure.

ii) Spread out your bag to identify the top, bottom and the sides.

iii) Turn the bag inside out and hold the middle bottom part and place it on the ground.

iv) Start filling the bag with the soil and manure mixture.

v) Ensure that the bag is on stable ground and the holes on the side are well visible. Fill the bag to the brim.

vi) Wet the bag thoroughly and start planting your vegetables in the holes.

vii) Place the curled section of the riser pipe fitted with bottom drippers on the top of your bag. One can plant lettuce, coriander, carrots, kale, tomatoes, strawberries etc. on the top section of the bag.

When establishing a vertical garden ensure that all plants are able to access optimum sunlight and do not shade over each other. It has been noted that vertical gardening takes more water due to evaporation. The farmer is advised to mulch their crops. This prevents excess water loss and provides additional nutrients to the soil with time. When watering the plants ensure that you water plants at the base. This will prevent spread of fungus and mildew and also prevent the growth of weed as only the crop is watered.

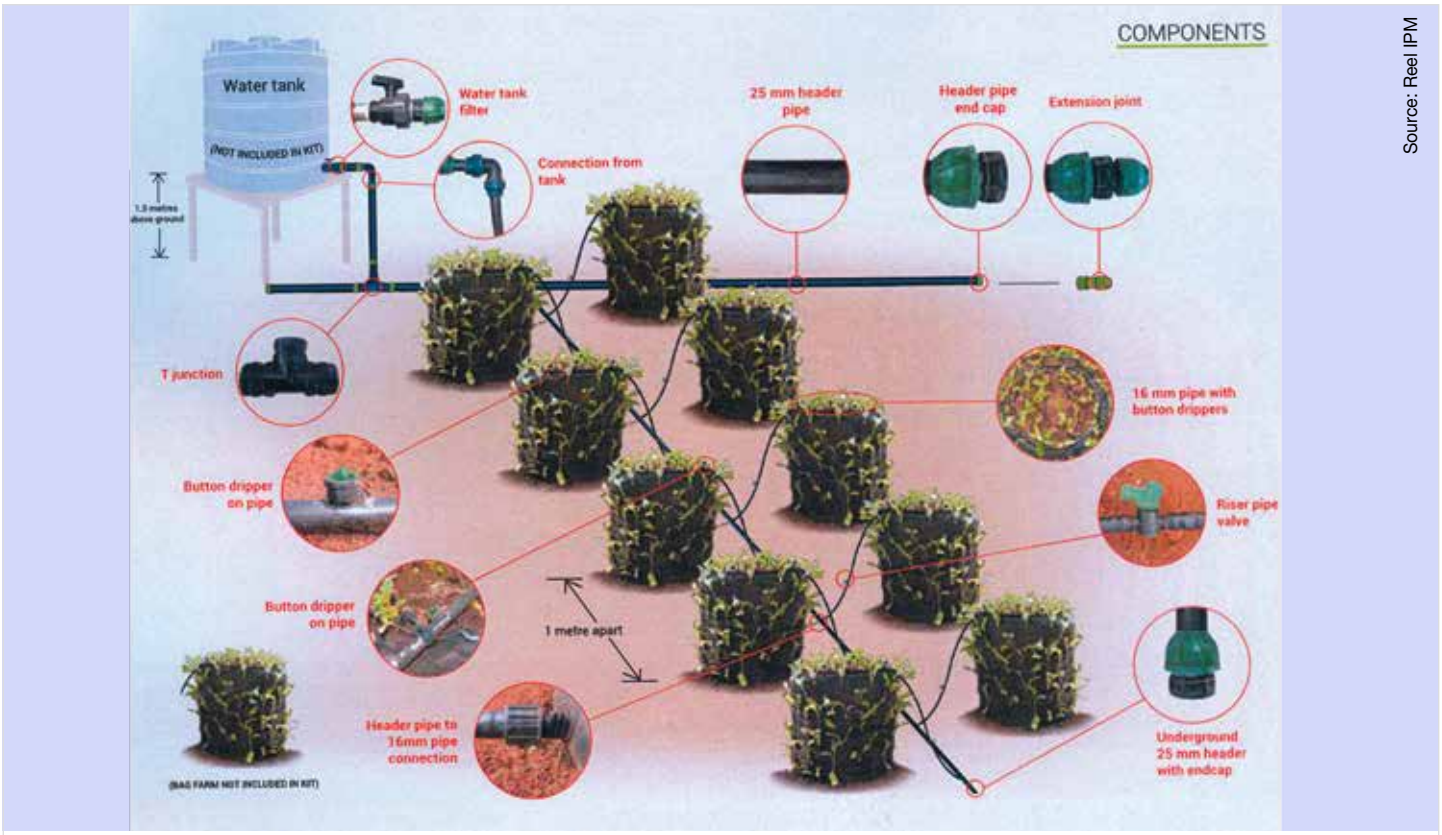
It is also advised to give the plants a lot of water at one go rather than to give a little water time after time. This ensures that the water goes deep hence the roots penetrate the soil deeper. Base watering together with mulching further discourages the growth of weeds.

Support climbing plants

In the case of climbing plants e.g. tomatoes or climbing beans, pumpkins use metallic supports as they provide long time use.

The farmer should also train the plant to go up the support providing space to all the plants without haphazardly climbing over each other. When plants reach maturity ensure that they are securely held by the supports you have put in place to avoid them falling off. You can use a strong string to secure the plants to the support. One can use a ladder when taking care of the plants to easily reach up to the plants without pulling or straining. When done correctly and creatively, vertical gardening can be very beautiful it can therefore be used to cover unattractive walls and structures.

****Lilian Maina is a Nairobi-based journalist.***



Source: Reel IPM

A vertical bag farm: Farmers can grow vegetables and fruits at any time of the year using an integrated irrigation system as shown in this sketch. Farmers interested in this kit can call Real IPM (0725 806086, Thika).

Help, my hens are not laying eggs

I have 100 indigenous chickens *(kuku wa kienyeji)*. Although they are healthy and have reached maturity, they are not laying eggs. What could be the problem?

Indigenous chickens in a shed: Chickens can stop laying eggs due to many reasons

Chickens start laying eggs when they are between 24 and 30 weeks old. Ideally, a healthy hen should lay one egg every day. At times, a farmer may notice that the chickens have slowed down or altogether stopped laying eggs. At times this maybe an indicator that something is wrong with the chickens. There are many factors that contribute to reduced eggs production or failure to lay eggs. These factors can be easily remedied and the problem solved permanently. The following are some causes of reduced egg-laying or failure to lay eggs:

Diet: This refers to all the feeds chickens eat. Water and a balanced diet are important for healthy chickens. A balanced diet contains energy giving foods, proteins, vitamins and minerals. If a farmer has recently changed their chicken feeds and they are not sure of the composition of the new feeds this may cause a decrease in the number of eggs especially if the new feeds are not well-balanced.

For the scavenging chickens, a farmer should provide additional balanced feeds to supplement to what they have scavenged. Place watering points at strategic locations to ensure that the roaming chickens have easy access to water at all times. A farmer has the option to buy the already made layers mash or to use readily available foods to mix with their own feeds. When mixing their own feeds, they should take note of:

Energy feeds: Energy feeds should make up 75% of the chickens diet. These are important as they offer maintenance energy for the chicken e.g. movement, body temperature etc. Locally available sources of energy feeds are maize, sorghum, millet, wheat, rice cassava, yam and sweet potatoes.

The roots and root tubers should be soaked in water for an hour or boiled then dried to get rid of harmful substances that they may contain. Their portions should also be reduced by 10%of the total feeds. *Fats also offer energy*. Fats are important especially in hot areas as the heat produced by fats during metabolism is lower compared to carbohydrates. Sources of fats include; animal fats and oil seeds cake meals. Such fats should also be provided at a 10% reduced rate.

Proteins: Proteins are needed for growth and development of the chickens' body. Lack of adequate proteins in the animal feeds leads to stunted growth. Common sources of proteins include termites, pumpkin seeds, mealworms, soybeans, cottonseed cake, sunflower and fishmeal.

Minerals: Minerals are ingested in much smaller quantities compared to proteins and energy feeds. In chicken rearing, the most important minerals are calcium and phosphorous. Calcium is important in bone and eggshell formation. These two minerals should be given in equal measure as they are both important in the optimal health of the chickens. Sources of minerals include limestone and burnt eggshells.

Vitamins: Vitamins are also ingested in small quantities like minerals. Many health problems arise when chickens face a deficiency of vitamins especially vitamin A, B and D. Common sources for chickens include grass for A and B vitamins, cow dung (for scavenging chickens) provides vitamin D. For confined chickens vitamins are added to the feeds.

Diseases and parasites: Diseases can cause chickens to slow or stop laying eggs. If your flock suddenly stops laying eggs, it is likely that they are sick. The overall health of the flock is important for them to lay eggs. A farmer should constantly examine their chicken flock to ensure they are healthy.

Some of the signs that may alert the farmer that some or all the chickens are sick include: Dull eyes and comb, tired and lifeless appearance, constant sitting or lying down, diarrhoea, loose or ruffled feathers, droppings with blood or worms, coughing, sneezing and breathing noisily.

When the flock displays such signs and symptoms, the farmer should know that the flock is sick or has been infested by parasites. Such chickens cannot lay eggs. It is important to seek for a Veterinary officer's advice and opinion. Healthy chickens are always alert and on guard, their eyes and comb are bright, they walk, stand, run and scratch constantly, continuously eat and drink, have smooth and neat looking feathers and their droppings are soft and compact. Healthy chickens lay eggs regularly without fail.

Sometimes, chickens get respiratory diseases; in such cases the farmer will notice running nose and snoring. The farmer should isolate the sick ones and treat them immediately. Some methods for treating such ailments include giving aloe vera (2 or 3 tablespoonfuls) as it is considered an antibiotic or garlic which should all be added to their drinking water at all times.

High levels of hygiene should be observed in the chickens coop to prevent the spread of disease-causing microorganisms. Some parasites like lice bring a lot of discomfort to the flock. The chickens scratch themselves constantly in a bid to get rid of the lice. Periodic sprinkling of ash in the chickens coop keeps off most of the parasites.

Age: When the chicken are 24 weeks old, some will immediately start laying eggs while others will not until they are 30 weeks old. This is okay and the farmer should not be worried. Chickens are at their best egg laying age for the first two years. As the chickens get older, the frequency and number of eggs they lay also decrease.

Some indigenous chickens can lay eggs for more than two years but at this age the eggs produced are very few and sometimes have deformities e.g. shell less eggs. A farmer should rare a new flock every few years to ensure that he has a constant supply of eggs all the time.

Stress: Stress can affect chickens, and cause them not lay eggs. Stress can result from moving from one place to another i.e. after being sold or from one coop to another, hunger, thirst, flight, introduction of new chickens, fights or disruption of the pecking order.

Predators, overcrowding, too hot or too cold coops may also cause stress. A farmer should be keen to notice any change for instance if the flock being nervous resulting in twisted necks and trembling. The farmer should immediately identify the cause of stress and rectify it instantly. When order is restored, chickens take a day or two to go back to normal egg laying frequency.

Light: This is a major factor contributing to the regularity of chickens laying eggs. Chickens require a minimum of 16 hours of light. Light stimulates the pituitary glands to release the Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH).

These hormones play a very important role in development and production of eggs. It has also been noted that chickens reared in increased day-light produce more eggs compared to those that have limited access to day-light. During the cold season when there is limited day-light, farmers are encouraged to make use of artificial lights by installing light bulbs in the chicken coop.

Moulting: This is a process where chickens shed their feathers and grow new ones. Chickens may stop laying eggs for a while during moulting. When a farmer notices that their flock are shedding feathers he should not worry as this is a normal process. After a whole year of laying eggs chickens may stop for a while to regain energy before continuing.

Answer by Elkanah Isaboke

Isaboke writes on agricultural issues- He holds a diploma in Organic Agriculture.

TOF Radio answers your questions

TOFRadio is broadcast on KBC on 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

Organically grown mangoes healthy, fetch good prices

Charles Kimani and Purity Sumbule | Mango trees are easy to grow and can be grown in orchards, in hedges, or around cultivated fields, or they can be intercropped with other plants. Some farmers plant mango trees on the edges of the *shamba* so as to save on land by planting other crops in the farm. They can be grown in a wide range of soils.

Good organic management of mango trees starts with selecting appropriate cultivars (a plant variety that has been produced in cultivation by selective breeding).

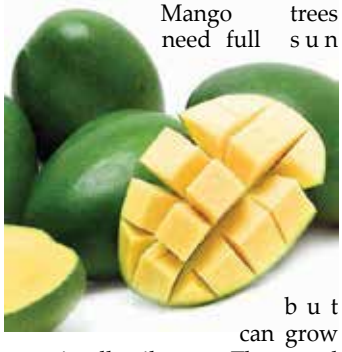
Diversification of the orchard reduces disease pressure and promotes beneficial insects. Crop diversification is a method of introducing other crops in the farm.

Proper maintenance of trees and regular monitoring of pests and diseases contribute to better harvests and better fruit quality.

Planting

Planting is done by deep ploughing. Spacing depends on the variety of mango tree being grown and the type of climate in the area. Planting of mango trees depends on the type of crops the farmers desire to intercrop. If mangoes are the main crop, then it is advisable that the farmer plants the trees at a row and tree distance of ten metres. The tree is not difficult to plant and so is its maintenance.

Mango trees can also be grown as border trees around cultivated fields. When grown as border trees, they can improve diversification on the farm. The mango tree can protect the soil and other crops against wind and enhance the income for the farmer.



Mango trees need full sun but can grow in all soil types. They need regular watering when young, but less water once established.

Pruning

Mango trees normally need pruning in order to shape young trees and increase branches and enhance fruit population.

There are two processes of pruning mango trees:

Formative pruning: This is done in the first years of the young tree to guide the tree into the desired shape.

Benefits from pruning:

- Fruit is produced on the outside of parts of the tree.
- Fruit hold to maturity on the trees.
- Open tree structure allows for easy harvesting.
- Tree produces larger fruits.
- Crops can be grown under the trees.
- Tree benefits from natural conditions of sun and wind movement. This helps in reducing relative humidity within the canopy and also creating environment less conducive to disease development.
- It controls tree height and prevents excessive spreading of limbs.

Structural pruning should be done after fruit harvest: The canopy should be at least 1m above the ground. Remove all dead branches and all sucker branches from the main structural branches.

In flowering and fruit formation, in the first four years, pluck all flowers to encourage tree development. Smoke moist organic material under the tree towards dry season to induce flowering and reduce insect pressure.

Pest management

The most common mango pests are *fruit flies, cotton scales, mealybugs, cicadas and black flies* (create honey dew). They can cause a lot of damage. Yet they all have natural enemies, such as *ladybird larvae, wasps, spiders* and *parasitic fungi* (e.g. with cicadas and black flies).

Keep to the following guidelines on pest management:

- Monitor regularly.
- Remove and destroy infested fruits.
- Avoid movement of fruits from one orchard to another.
- Apply sticky bands around the trunks.
- Promote natural enemies.
- Use bait traps to monitor infestation.

Post harvest handling

Wash fruits immediately to remove sap.

Dip the newly harvested fruits in hot water to minimize fruit fly damage and anthracnose.

The mangoes should be well prepared, graded, dried, waxed, packed, pre-cooled, palletized before transportation.

Careful handling during harvest, transport and storage reduces fruit damage and post-harvest losses.

Where to buy your traps and biopesticides

Organic production of mangoes is now possible thanks to the presence of many organic bio pesticides and other Integrated Pest Management (IPM) products in the market such as traps and lures. Farmers in need of this products can get in touch with TOF Magazine for advice. Some of the prominent companies selling these products is Real IPM (0725 806086, Thika).

For more information on growing mangoes http://www.infonet-biovision.org/PlantHealth/Crops/Mango

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 9	3.3 MHZ	
Voi/Kibwezi	96.9 MHZ	
Namanga	89.9 MHZ	
Lodwar	88.6 MHZ	
Lokichoggio	89.3 MHZ	
Garsen	93.1 MHZ	
Kajiado	92.9 MHZ	
Kitui	92.9 MHZ	
Lamu	96.3 MHZ	
Maralal		1107 KHZ
Wajir		1152 KHZ
Marsabit		675 KHZ
Garissa		567 KHZ

Continued from page 3

Natural enemy

ICIPE has also imported a wasp from Peru (where *Tuta absoluta* originates) and evaluations are almost complete to pave way for field releases. The wasp controls *Tuta absoluta* by laying its eggs inside the caterpillars of the pest. The wasp eggs develop slowly and eventually emerge as adults thereby killing the pest. When released in large numbers, wasps spread rapidly, looking for infested plant material. These wasps do not affect plants, animals and humans in any way. Their target is specific to *Tuta absoluta*. Thus, they are generally referred to as the farmer's friends.

In conclusion, icipe through the generous support from Biovision Foundation, is currently training agricultural and extension officers and farmers in Kitui, Taita Taveta and Kirinyaga on *Tuta absoluta* management.

Demonstration learning sites, which will act as centres of technology and information dissemination are being established in these areas, in collaboration with County agricultural departments. For advice and information on where to get traps and lures, farmers are encouraged to liaise with their extension officers from the County offices.

Dr Shepard Ndlela and Dr Samira Mohamed are ICIPE scientists working in the Tuta absoluta control project.

For more information on Natural control methods https://www.infonet-biovision.org/natural_pest_control