

**Dear reader,**

SHOWERS OF RAIN have hit the dry ground and farmers are sighing in relief after a prolonged dry season. As shoots sprout up from the soil, and nourishment pours, remember to make the most of it by storing as much water as you can, for future use when the rain is no more.

To empower you with knowledge on water harvesting techniques, this edition of TOF, features a new technology of water harvesting that makes maximum utilization of water paths during rain; by collecting water from the roof top gutters and infiltration pipes on the ground to drain water into a concrete underground reservoir. As we take advantage of the rains, remember to plant trees around your farm to enjoy the benefits of agroforestry. This edition of TOF provides guidance on the factors to consider when choosing the type of trees to establish in your garden.

Read on to learn from one John Ndung'u, a commercial vegetable farmer in Kiambu, who is now growing chemical free vegetables for his family and customers, thanks to a visit by a field officer from Biovision Africa Trust.

We tell you about the first Eastern Africa Agroecology Conference held on 21st to 24th March, that brought together stakeholders from all over the world who participated in knowledge sharing presentations and exhibitions. As you will learn from Sylvia's diary this month, knowledge sharing is a key principle of Agroecology.

*Enjoy the read!*

## AGROECOLOGY CONFERENCE

# BvAT hosts a remarkable Eastern Africa Agroecology Conference



**Speaking during the event, Dr David Amudavi, the Executive Director of Biovision Africa Trust, expressed gratitude over the overwhelming attendance of delegates from all parts of the world**

**By Caroline Mwendwa**

THE FIRST EASTERN AFRICA Agroecology Conference hosted by Biovision Africa Trust between 21st and 24th March 2023 at Safari Park Hotel, was attended by participants from over 20 countries around the globe.

Participants hailed from parts of Africa, Europe, North and South America and Asia, to be part of this timely event themed 'Strengthening resilience and sustainability in food systems for environmental and social economic development'. Speaking

during the event, Dr David Amudavi, the Executive Director of Biovision Africa Trust, expressed gratitude over the overwhelming attendance of delegates from all parts of the world, which turned the regional conference into an international conference.

In his speech, read by Mr. Leonard Kubok Director, Capacity Building and Knowledge Management in the State Department for Crop Development in Kenya, the Chief Guest Hon Mithika Linturi, Cabinet Secretary, Agriculture in Kenya underscored the pivotal role played by the women and youth in promotion and adoption of agroecology. "Women and youth among other marginalized groups play a key role in agroecology and therefore I commend the support given to these groups by players in the sector," he stated.

Passionate participants among them actors in the development sector, farmers, representatives from various national gov-

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## Store your water underground

In this time of unexpected rainfall and season changes, this tank comes in handy as one is able to use water collected in the tank during the rainy season. PAGE 2



### AGROECOLOGY CONFERENCE

## 1st Eastern Africa Agroecology Conference

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ernments, the donor fraternity and researchers engaged in candid discussions on the opportunities that lie in agroecology, as a solution to the overbearing effects of climate change. The conference featured eye opening presentations by researchers, exhibitors of agroecological technologies, and practices as well as by farmers whose effort in adopting agroecology have borne evident results in improving livelihoods.

Hon. Fred Bwino Kyakulaga, the State Minister of Agriculture in Uganda applauded the attendees for demonstrating their conviction in the potential of agroecology in transforming food systems in Africa. He remarked that the lively participation was proof of belief in what they advocate for.

Among key presentations made was by Dr. Hans Herren, the President of Millennium Institute and Board Chair of Biovision Foundation who gave a compelling analysis of the milestones achieved in adoption of agroecology in various countries and the opportunities of further advancement.

While launching the call to action following the deliberations, Ms. Venancia Wambua, the Ecological Organic Agriculture – Initiative (EOA-I) project manager at Biovision Africa Trust said, “The Eastern Africa Agroecology conference has been a great success and shall be held every two years going forward.” She reiterated that Biovision Africa Trust, the convener of the conference will work with its partners, most of whom were key participants in the conference, to bring to life the ideas born from the deliberations as presented in the call to action.

Among the countries represented in the conference include Belgium, Colombia, Ethiopia, France, Switzerland, Germany, Tanzania, Zimbabwe, Ethiopia, Madagascar, Tanzania, United States, Rwanda, United Kingdom, Italy, Malawi, Netherlands, Sweden, Ghana, United Kingdom, and Liechtenstein.

The conference culminated with visits to organic farms in Machakos, and Nairobi counties.

### NEW TECHNOLOGIES

## Store your rain water underground

In most cases, the rain water collected is used mainly in agricultural practices such as irrigation of small land plots and watering animals. They can be constructed in different shapes and sizes at a good cost and offer large storage for small scale farming

By Mellen Nyabuto

UNDERGROUND TANKS ARE storage structures that are constructed below ground purposely for water storage. They can be designed to collect and store water from ground catchments such as open lands, pavements, and footpaths. Water from roof gutters can also be channeled into this tank. In most cases, the water collected is used mainly in agricultural practices such as irrigation of small land plots and watering animals. They can be constructed in different shapes and sizes at a good cost and offer large storage for small scale farming.

### Testimonies from farmers

“It’s hard to tell when it’s going to rain, even if it does, we don’t know exactly when. Last year I experienced challenges, I couldn’t plant in time because the rains delayed and because of that I suffered some losses since we couldn’t supply as much vegetables as we usually do to the market. I intend to look into building underground water tank surfaces that can harvest water from runoffs and gutters to use in the farm during the dry seasons,” says Peninah a vegetable farmer in Murang’a County.

“In this time of unexpected rainfall and season changes, this tank comes in handy as I am able to monitor and water my greenhouse plants during the dry periods using water collected in the tank during the rainy season,” says a seedling producer from Thika.

### How to construct underground water tank

Below is a stepwise description of how an underground water tank can be constructed.

**Site Selection:** Choose an appropriate location for the underground water tank. The location should be level, free from obstacles like rocks, trees, or underground utility lines, and should have good drainage to prevent waterlogging.

**Design:** Determine the required capacity and dimensions of the water tank based on the water demand, the available space, and the budget. Engage a qualified engineer to design the tank and specify the materials and construction methods.

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**Excavation:** Excavate the site to the required depth and size of the tank. The excavation should be slightly larger than the size of the tank to allow for the installation of reinforcement and formwork.

**Foundation:** Prepare a strong foundation for the tank by leveling the base and pouring a layer of concrete.

**Reinforcement:** Install steel reinforcement bars inside the excavation to provide structural support for the tank. The reinforcement should be placed in a grid pattern and secured in place with wire ties.

**Formwork:** Build a formwork to the shape and size of the tank using plywood or steel sheets. The formwork should be strong enough to withstand the pressure of the concrete during pouring.

**Plumbing and Electrical:** Install the necessary plumbing and electrical lines inside the excavation. This may include pipes for water inlet and outlet, drainage pipes, and electrical conduit.

**Pouring the Concrete:** Pour the concrete into the formwork in layers, ensuring that each layer is properly compacted using a vibrator. The concrete should be of the right mix and consistency, as recommended by the engineer.

**Curing:** Allow the concrete to cure for at least 28 days. During this time, keep the concrete moist by sprinkling it with water and cover it with a plastic sheet.

**Waterproofing:** Apply a waterproofing membrane or coating to the interior of the tank to prevent water seepage. The waterproofing material should be compatible with the type of water stored in the tank.



**Backfilling:** Backfill the excavation around the tank with soil or sand, compacting each layer as you go.

**Access and Ventilation:** Install an access hatch and ventilation pipe to allow for inspection, cleaning, and ventilation of the tank.

Overall, constructing an underground water tank can be a complex and time-consuming process. It is important to engage the services of a qualified engineer and contractor to ensure that the tank is constructed to the required standards and specifications.

*Mellen Nyabuto is a plant pathologist working with International Institute of Tropical Agriculture Email: [mellennya96@gmail.com](mailto:mellennya96@gmail.com)*



THE ENVIRONMENT

# What to consider when tree planting

Before coming up with a tree planting plan, the farmers need to evaluate the future purpose of the tree

By Mourice Barasa

## Criteria for Tree Selection

SUCCESSFUL TREE PLANTING depends on the right choice of trees to be planted. Several factors need to be considered when selecting the type of tree.

**Soil-** it is critical for the farmers to analyze the soil type and its ability to support the plants before choosing the seedlings. Some trees do well in loamy soils, while others flourish in clay. Additionally, soil pH, nutrient deficiency, water holding capacity, and soil depth must be considered since they determine the tree's rate, size, and survival.

**The growth rate-** as a farmer, it's important to consider the growth rate for the intended tree since it gives a clear projection of the project. If the project is short-timed, then faster-growing trees will be favorable. For example, Eucalyptus has a faster growth rate than some indigenous trees like *Cordia africana*.

**The rooting system-** farmers should be aware of the plant's root system before planting it. Some trees have roots that colonize the water catchment leading to the degradation of wetlands hence it is not advisable to plant such trees near water sources; for example, Eucalyptus. Other trees have shallow fibrous roots that can easily be uprooted by strong winds and rains, especially when planted in poorly developed soils; for example, Cypress and bottle-brush.

**The purpose of the tree-** Before coming up with a tree planting plan, the farmers need to evaluate the future purpose of the tree. Farmers should consider trees with faster growth rates that grow taller and broader if it is a wood-log project. Timber trees also depend on whether the farmer wishes for hardwood or softwood trees. For example, *Trichillia* spp. are known to be the best hardwood tree, while Cedar is considered a softwood tree. Some trees are also planted for fruits (*Persia americana*, commonly known as Avocado), while others are for medicinal use (for example, *Moringa olifera*).

**The adaptability of the tree species-** farmers should sample the given trees' survival rate in their region before implementing the project. Different tree species are adapt-

ed to different environmental conditions and zones. Some trees, like acacia, do well in dry environments, while others, like Elgon teak, only flourish in wet regions.

The care cost of the tree- it is critical to analyze the costs required to maintain and care for the tree before planting it. Some trees may require constant pruning while others do not. Some, especially fruit trees, may need chemicals to control pests and fungi, while others are naturally pest-resistant.

## Tree Planting Procedure

- Clear the land to remove the weeds and pests that may attack the seedlings.
- Dig the holes; the hole's depth and diameter depending on the tree type and rooting system. The distance between the holes should be two meters.
- Add the manure to form the base layer for young roots.
- Gently place the seedling at the center of the hole, ensuring that it's vertically placed without interfering with the root system.
- Add the soil mixed with manure to fill the hole up to  $\frac{3}{4}$ . Press to enhance the anchorage of the seedling.
- Water the plant well (Repeat every morning and evening for two weeks, depending on the season).
- Mulch the tree seedling to conserve soil moisture.
- Fence the seedlings to prevent intrusion from animals.

## Cost for Tree Planting

The recommended sources/bodies for seeds are Kenya Forest Service and Kenya Forestry Research Institute. The costs vary with the type of seed/tree. The estimated cost range from Ksh.1500 to Ksh.5000 per kilogram. To maintain a tree nursery, the cost may range from Ksh.10000 to Ksh.3000 depending on the location, size, and season. If farmers wish to get seedlings direct from suppliers, the cost varies between Ksh.10 and 5000 depending on the type and season.

Mourice Barasa is an environmentalist Email: [Barasa561@gmail.com](mailto:Barasa561@gmail.com)



## FARMER'S TESTIMONIAL

# A commercial farmer embraces organic agriculture

**By September 2022, Ndung'u had completely ditched use of synthetic pesticides and had started the journey to shift to organic farming completely**

**By Elsa Oluoch**

JOHN NDUNG'U IS a farmer in Ndeiya Sub-County, Kiambu County who grows and sells a variety of vegetables including: Chinese cabbage, red cabbage, lettuce, celery, courgetti, leak onions, coriander, capsicum, broccoli, cauli flower, beet roots, among others. He also grows avocados, macadamia and asparagus.

Mr Ndung'u has been growing these crops for the market for close to four years now. "Farming has been a consistent source of income for me, the only challenge has been attacks by pests and diseases which require application of pesticides in order to effectively manage them," he says. Mr Ndung'u's use of synthetic pesticides in pest and disease management had been a bother in his conscience as he always knew that they have health implications on consumers who include his family.

Having heard of Ndung'u's vegetable enterprise, I visited him in his farm to interest him in organic farming. Mr Ndung'u was astounded to discover that there are alternatives to synthetic farm input application, which are not harmful to human health and the environment. He was deeply interested in learning about Integrated Pest Management even though he worried that his farm would not yield as much but with my assurance, he decided to give it a try.

To start off, I advised Ndung'u to join a group of farmers, that I train within his locality; Ndeiya Farmers Agricultural

Forum and since the group was far much ahead of him, we decided to do some individual trainings at his farm, while he joins the group members during the monthly training.

Mr Ndung'u subscribed to be receiving The Organic Farmer Magazine monthly, and I ensured he received specific value chain information modules on vegetables he is growing. As months passed by, he had acquired knowledge and skills to prepare compost and plant tea, and whenever it is not enough, he buys organic fertilizer and even foliar fertilizers from our Resource Centre being supplied by Organic Fields, a partnering Organization that trains and produces organic inputs.

Additionally, John also prepares natural pesticides like APICHI, Ash brew, concoctions from plant extracts like *Tithonia diversifolia*, Mexican marigold, pepper and garlic. He also uses organic copper, which he gets from our Resource Centre (a product from Organic Fields), soapy solutions, milk, baking powder, diatomaceous earth, wood ash and even neem oil for pests and disease control.

To ensure that John doesn't struggle much in his farm, I connected him with Ndeiya Field Officer from Effective IPM to supply him with Biopesticides whenever he is in need. Apart from the natural and biopesticides, John also tries to practice cultural methods like crop rotation, companion planting, pruning and even uprooting for pests and disease control.

By September 2022, Ndung'u had completely ditched use of synthetic pesticides and had started the journey to shift to organic farming completely. His openness to learning keeps him ever evolving as an organic farmer. I am currently working to link him up with local organic markets so that he can enjoy the benefits of producing organically, by making better profits.

When I visited him early December, 2022, he made a statement that still brightens my face up to date, "Elsa I am really happy that now I am able to sell to my consumers safe and healthy food, at least I am at peace with myself."

Mr Ndung'u's testimony encourages me to reach out to as many farmers as possible, to support them achieve their dreams of producing safe and nutritious food.

*Elsa Oluoch is the farmer field officer at Ndeiya Resource Centre of Biovision Africa Trust, in Kiambu County*



LEARNERS' CORNER

# Learners defy climate change crisis with agroecology

**Food and nutrition insecurity is a major challenge; caused by low food production, lack of diversified source of income and poor management of the country's food system**

By Samuel Monene

WITH THE INCREASING effects of climate change, everyone is feeling the dire need for a shift in farming systems to more environmentally sustainable methods. School children and staff in various schools are not exempted from the throes of hunger especially due to the prolonged dry seasons, which have left most institutions' farms bare. This article features the story of Kigogo primary school in Kigogo village, Nakuru County, which has overcome challenges of food insecurity and become a learning centre for ecological organic agriculture in the community.

The learners supported by teachers and the school community had a desire to produce food in the school farm despite the persistent droughts. To start off, they set a larger portion of their school land apart with the intention of starting an organic farm. They applied the little knowledge they had on enriching the soil using organic matter and employed conservation agriculture techniques to conserve moisture in the soil.

In their quest to make the garden a model organic farm, they came across Francis Maina, an extension officer working with Biovision Africa Trust, stationed at the Gilgil farmer resource center, who has worked with various schools in training learners on ecological organic agriculture. Maina noticed that the students and staff of the school were highly interested in acquiring the knowledge and practicing it on the farm.

He offered them training on ecological organic agriculture practices they can apply to grow diverse food crops on the farm.

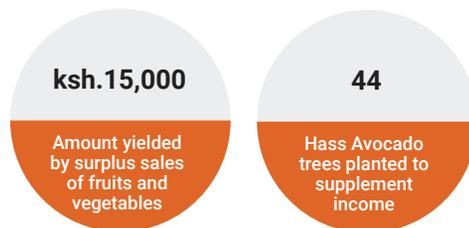
He partnered with Seed Savers Network to provide seedlings of green leafy African traditional vegetables and fruit trees.

A total of 44 Hass avocado trees were planted in the farm, 10 guava trees, 12 oranges trees, 5 passion fruit trees, and vegetables that included kale, cabbage, spinach, and indigenous vegetables. These would help them supplement the school's income and offset the extra cost of buying vegetables from outside sources. Maina also trained them on various approaches of pest and disease management as well



as soil and water management in the farm. The school administration was happy to have the entire school farm regenerated for production.

Maina encouraged the school to take advantage of the rains whenever they come by harvesting water. He trained them on various water harvesting techniques including use of gutters to collect water from rooftops, digging trenches to collect run off water to collection earth dams, recycling kitchen water by purifying with ash and using kitchen waste to make compost manure to use in the farm. Additionally, he trained them on mulching, composting, cover cropping, and the installation of sunken pits and sunken nurseries to reduce the evaporation rate of water in the soil.



As a result, adoption of these practices facilitated a successful first harvest. The school had enough to feed the staff during the day and the surplus was sold to school staff, and mostly to the parents of Kigogo primary school students who were very supportive. The sales of fruits and vegetables yielded a profit of Ksh. 15,000. Demand exceeded supply for the first harvest. However, subsequent harvests increased as the trees continued to mature to reach their peak production. With an increase in production, the school can get income from the farming project and support the students and staff by buying essential school materials such as office and classroom stationery and books that facilitate the student's education. Furthermore, the students can learn firsthand through practical sessions what they are taught in their school syllabus.

This knowledge is replicated in the community as learners and the staff transfer it to their families. Maina's presence in the area, makes it easy for parents to reach out for extension support and provision of information material especially among their farmer groups. In this way, what started as a school's quest for a solution has become a revolution for the entire community in adopting ecological sustainable agriculture, that reduces the cost of production and helps farmers to produce safe foods while conserving the environment.

[Sammonene1@gmail.com](mailto:Sammonene1@gmail.com)



**Subsequent harvests increased as the trees continued to mature to reach their peak production. With an increase in production, the school can get income from the farming project and support the students and staff**

## NUTRITION

# Traditional starch sources for food and nutrition security

Plantains are packed with starch unlike their kin, the banana which has a high percentage of sugar. Plantains find a lot of use in local cuisines, but this potential is yet to be exploited

By Dr. Patrick Maundu

ROOT AND TUBER crops are an important source of carbohydrates in Kenya, second to cereals. A number are considered traditional as they are part of the local traditional cuisines. These include cassava, sweet potato, taro (arrow root) and yam. Up to 15 other types of edible root and tuber plants occur in the wild where they may be an important source of water and carbohydrates especially for herders. Likewise, plantains are packed with starch unlike their kin, the banana which has a high percentage of sugar. Like the potato, plantains find a lot of use in local cuisines, but this potential is yet to be exploited. This article explores the potential of these underutilized organically produced starchy foods for both nutritional and food security.



## Cassava

Cassava is generally a minor crop in Kenya but an important crop in the coastal and western regions of Kenya, and particularly Busia County. Many local varieties exist and are known by different names in different areas. A popular variety at the coast is Kibanda meno, with a reddish brown coat. It is sweet with a dry consistency. Other popular types include Binti Asmani (Binti Athumani) and Tajirika, a new variety with higher yields but not as tasty.

Roots can be peeled and eaten raw but can also be dried and milled and the flour used to make a wide variety of products including crisps, cakes and ugali. In the latter case, it is often milled

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## NUTRITION

# Plantain Recipes

## 1. Fried plantains

### Procedure

- Remove both ends of the plantain.
- Using a knife make a slit along the length and remove the skin (peel).
- Place the plantain on a chop board and make medium-sized slices with your knife held at an angle.
- Heat oil
- Fry the slices as you turn them occasionally until soft and golden brown (about 6 min.)
- Using a perforated spoon, transfer them on to a plate or tray with a paper towel on top to absorb excess oil.
- Season the plantain as desired and serve hot.



## 2. Roasted plantain

### Procedure

- Clean the plantain with the covers on
- Roast on charcoal fire using low heat, turning the plantain regularly
- When soft (after about 30 min) remove from fire and peel
- Add salt (optional)
- Eat as snack or serve with beef or chicken sauce

*Note: This is a snack. Gamooke is pronounced like 'Gamooche'*

*(Source: The Gishu (Bamasaba), Mt. Elgon)*



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together with other cereals such as maize, finger millet and sorghum. Eating raw cassava needs a good knowledge of its preparation to avoid poisoning by cyanogenic glycosides naturally associated with the roots.

Cassava is a rich source of energy but also a good source of dietary fiber, vitamin C and potassium. It also contains some protein and calcium. Cassava leaves are used as a vegetable and are quite nutritious.

### Sweet potato

Sweet potatoes are a common breakfast food in Kenya. Some have white or cream-colored flesh while others (recent types) have yellow or orange flesh. Sweet potatoes are an important source of starch. Orange or yellow fleshed types are rich in beta-carotene, a precursor of vitamin A. Vitamin A not only helps to keep our eyes healthy but also strengthens our immune system. Sweet potatoes are also good sources of other vitamins (C and B vitamins), and minerals (calcium, magnesium, iron, phosphorus, zinc). In Kenya, sweet potatoes are used as raw, roasted or boiled and can be made into a variety of products including chips and crisps.

### Taro or cocoyams (nduma – *Colocasia esculenta*)

They are eaten boiled or fried or in form of crisps and can also be made into stew. Young taro leaves are used as a vegetable. Taro is a well-balanced food nutritionally and is an excellent source of dietary fiber, minerals, vitamins and energy. It has good amounts of potassium, copper, phosphorus, manganese, magnesium and vitamins B6, E and C. These vitamins have good antioxidant effects.

### Yams (Gikwa, kikwa, kiaziki-kikuu)

Yams (*Dioscorea* spp.) were important in the past and are now rare. They are twining plants with prickly slender stems. The tubers are reddish brown, and could be up to 40 cm long with several finger-like projections. A mature plant may yield a sackful of tubers (about 50 kg).

Another type of yam found in Kenya is the aerial yam or air potato (*litugu, liruku*) or *Dioscorea bulbifera*. It is also a twinning plant but the tubers (bulbils) grow on the thin stems above ground rather than below ground. It is mainly grown in the western part of Kenya where it is both used as food and medicine. Air potatoes are grown from the mature bulbils.

Yams have many health benefits. They are rich in energy, vitamins, minerals, and fiber. They are particularly rich in potassium and manganese. Aerial yams are rich in carbohydrates (73%) and are good sources of protein (7.5%) besides other nutrients.

### Plantains

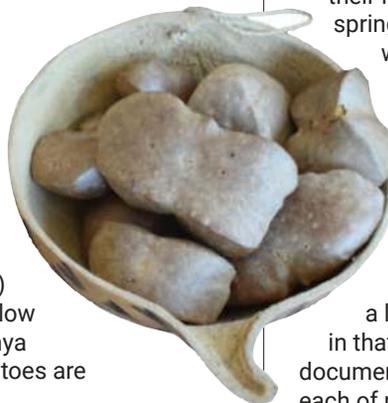
Plantains or cooking bananas are widely consumed in East Africa. They are mainly eaten cooked but may also be left to ripen. Plantains tend to be longer and larger in size than bananas, and have a thicker skin/peel. Plantains are also starchier and lower in natural sugar than bananas and mainly used in savoury dishes. They are primarily eaten steamed, boiled, fried, or baked. Green plantains are a perfect substitute for potatoes and can make great fried plantain chips. They become sweet as ripening progresses from green to yellow then dark brown.

Besides starch, plantains are rich in potassium and carbohydrates but also magnesium, vitamin C, fibre, and many forms of antioxidants.

While bananas are mainly made into sweet banana breads, muffins, cakes and cupcakes, plantains are normally cooked for savoury meals such as Katogo but can also be made into pancakes and chips.

Sweet plantains may be eaten straight but can also be made into an excellent snack by peeling them then roasting on charcoal fire or baking in an oven.

Sweet plantains can also be peeled, chopped and fried.



### SYLVIA'S DIARY

## Co-creation and sharing of knowledge is key in Agro-ecology

### Farmers should be given leadership opportunities at decision-making levels and forums

By Sylvia Kuria

AS WE SHARE more about Agroecology, the principle of co-creation of knowledge is one that I find extremely important to discuss.

I once hosted university professors from a faraway land. And as they were walking on my farm they noticed that as an organic farmer, I had used too much companion planting for their liking. My kales were intercropped with spring onions, cabbages with leek, lettuce with beans, and tomatoes with marigolds. The lead professor took one look at the farm and concluded it was confusing! He went on to ask if I know how much money I was making when I had to calculate the return from the myriad of crops and compare it with the inputs.

This experience got me thinking. To a large extent, the professor had a point, in that, as a farmer I need to take time to document my expenses and learn how to cost each of my products, this will in turn help me know if I am making money and on which products and how to decide which product gives the highest return. As a farmer, I also felt that I had a chance to share knowledge that is important for the professor to incorporate into his work. For example, the reason why I planted leek with cabbage is that over time I noticed these were good companions where the leek was repellent to diamondback moth (a devastating pest).

According to FAO the co-creation and sharing of knowledge are described as, "the co-creation process, agroecology blends traditional and indigenous knowledge, producers' and traders' practical knowledge, and global scientific knowledge."

When I reflect on how farmers can work with scientists, I feel that we still have a very long way to go. There has been a huge gap between science and practice. Scientists who are essentially mandated to use their research tools to come up with solutions for farmers are somehow still not able to infiltrate their knowledge into farmers. As a farmer, many times we are in

## TOF ANSWERS YOUR QUESTION

# How to care for your goat kid

**My name is Jesse Isika from Isinga, Machakos County. I seek to find out how to take care of a goat kid after birth**

**By Susan Wanjiru**

"A WELL-KEPT MOTHER will bear healthy kids. She will recover quickly from the stress of kidding, produce a lot of milk, and become pregnant quickly after kidding," says John Karuru, a 52 year old farmer in Githunguri, Kiambu County who has been rearing goats since 2005.

"Goats will multiply very fast. For example, this goat has given me five more within two years," he adds, pointing at one of the mothers.

Karuru gets at least two to four litres of milk daily from each goat. He uses a litre and sells the rest at 50Ksh per litre. He sometimes slaughters a goat to provide meat for his family.

### Care of the pregnant doe:

A goat's pregnancy lasts between 145–154 days. Pregnancies with multiple kids (twins, triplets, or quadruplets), are of a shorter duration than single ones.

During the first three months of pregnancy, no special care is necessary. You can also deworm your doe without danger.

The last two months of pregnancy (the fourth and fifth months) provide extra feeds for the rapidly growing embryos. Avoid stress and rough handling as it can lead to an abortion. Also, remove all concentrates such as dairy meal.

During the last few weeks of pregnancy, the bones of the unborn kids (mainly made of calcium and phosphorus) develop rapidly. Provide mineral salts/blocks to the pregnant goat ad-lib (always).

If you don't provide adequate mineral salts, the goat will draw them from her reserves to satisfy the needs of her unborn kid/s and weakens and reduces her levels of calcium and phosphorus which can lead to her suffering from milk fever.

### Kidding and kidding preparation

There are three basic rules for successful kidding management:

**Hygiene:** The kidding area must be clean. The female should be in a clean, dry place when she gives birth. Moves her sometime before the expected kidding to avoid stress. Prepare a clean, spacious, and airy shelter (1.5 m x 1.5m x 1m high) free from cold, wind, and hot sun. Keep a box (at least 2 feet x 2 feet) where you will place the small kid after birth.

**Shade:** The kidding should take place under a shelter or shade.

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the dark and are groping wondering where we can get enough information to help us with solutions.

My farm is in a semi-arid area and when temperatures rise, thrips infestation rises in equal proportions. Thrips are one of the most difficult pests to manage as they have over the years developed resistance to almost all synthetic inputs.

As an organic farmer, I was using biological pesticides to manage the thrips but that didn't seem very effective. I decided to visit a local scientist and ask for more advice on how I could handle the pests biologically. You can imagine the shock on my face when he asked which thrips I was trying to eradicate! (There are more than 5,000 species of thrips though approximately 20 species are the ones that affect crops). The crop that was under infestation was onions and when we dug further, I found out that the biopesticide I was using was specifically for thrips on roses. Tell me, how would a regular farmer in a rural area trying to grow organic onions and buying biological products know that his intervention is for roses and not onions?

Most times when I am invited for meetings in the city, I have also found a worrying trend whereby I end up being the only farmer or we are a handful of farmers attending agricultural-related meetings that are aimed at bettering farms. The majority of the stakeholders that decide for farmers are not farmers. I asked earlier, how do we bridge this gap? I have a few recommendations.

### At the farmer level:

- Farmers need to access information from research on how to farm sustainably.
- Farmers should be given leadership opportunities at decision-making levels and forums.
- Indigenous knowledge should be prioritized in decisions that affect farmers.

### At the research level:

- Scientists and researchers set up demonstration plots on farmers' farms and not only rely on lab results.
- A favorable policy framework that recognizes farmers as key stakeholders in any research papers.
- Farmers should be given a desk in research centers to share information.

*Sylvia Kuria is a champion organic farmer and the proprietor of Sylvia's Basket, an organic shop based in Limuru*



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**Water:** During kidding, the doe loses a lot of body liquids very quickly. She will also start producing milk and must have adequate clean drinking water available to restore the fluid balance in her body.

**The kidding—what you need to know:**

- As the birth approaches(kidding), your goat’s udder will enlarge, and her genitals will appear swollen with a thick white discharge.
- She will lose her appetite, breath rapidly, and become restless- frequently sitting down, getting up, smelling the ground, and looking back. When this happens, kidding will likely occur within the next one to two hours.
- Giving birth is a short but stressful experience for the mother and the kid. During labour, leave the kidding goat alone. Goats that are moved around and handled during labour may sometimes stop the process.
- During kidding, the goat loses a lot of body water. Provide enough clean drinking water to restore the body’s fluid balance.
- If kidding has not happened after three hours of labour call your vet.

**Normal Delivery (Kidding):**

- Normal delivery (kidding) starts with the appearance and bursting of the water bag;
- Then two front legs of the kid appear;
- The kid’s head follows resting upon the two legs (the normal birth position);
- After a short time of labour, the kid is born;
- In the case of twins, triplets, etc. kids are usually delivered within or up to 15 minutes apart.

**Abnormal deliveries (kidding) that require kidding assistance include:**

- Only one front leg appears while the other is bent back;
- Two front legs appear and the head is bent back;
- The back legs and tail appear first.

**You will require a vet’s assistance if:**

- Your assistance is unsuccessful;
- the kid is in an abnormal position (hind leg first);
- If the placenta has not yet been dropped within 12



- hours after the last kid has been born;
- If the kidding delays for three hours after the bursting of the water bag;
- If kidding has not happened one week after the calculated date of birth.

**Care of the newborn**

The risk of death is highest during the first week of life. Among single births, losses tend to be highest among the heavier kids. In twins and multiple births, the lighter kid is most susceptible. Weak kids are usually the result of difficult kidding or exposure to cold during/after birth and poor feeding of the doe during gestation.

Kid mortality can also result from milk fever, mal-presentation, unsound udders, death of the doe, and/or accidents.

Immediately after birth, the mother goat licks her kid dry from the nose and mouth to help it start breathing. You can also help clean and dry the newly born kid (starting from nose and mouth) using a clean cloth or towel (as you check the kid’s sex). Rubbing the kid’s skin and thoroughly drying it with a clean towel/ cloth, stimulates its breathing and prevents excessive heat loss.

Disinfect the umbilical cord with an antibiotic, spray, tincture of iodine, G.V., or diluted Dettol.

Record the birth weight of the kid and place it near the mother’s head so that the mother continues licking.

In the case of twins or more, the placenta appears after the last kid is born. Never pull it out to avoid causing a lot of bleeding. The placenta should be removed and buried or burnt.

If undue delays occur between the delivery of twin or triplet kids call your vet.

Tickle the tongue of the kid to encourage coughing by a reflex action that stimulates the respiratory system and clears the airways.

Kids are active and can be on their feet in about 10-15 minutes.

Clean the mother’s udder with a warm damp cloth/towel, check whether the teats are blocked, and then assist the kid(s) suckle.

Suckling promotes the expulsion of the placenta, which generally drops within four to five hours. (If it has not expelled being within 12 hours, consult a vet)

Immediately the placenta drops, gently clean the hind parts of the mother with soap and warm water.

Prepare a mixture of warm

water and concentrate (preferably bran) and give it to the mother goat to drink shortly after kidding.

Kids must receive their mother's first milk (Colostrum) within the first 6 hours of birth. It should be fed to newborn kids for three days. It provides energy, warmth, fat, and soluble vitamins and helps the kid pass out the first faeces (Meconium) that is black. It also provides antibodies that protect against diseases during their early life.

The newborn kid(s) should be kept in a kids' box to prevent them from catching colds and pneumonia.

#### Feeding the newborn up to three months

After one week, add small quantities of good clean feed such as sweet potato vines, tree, and legume leaves. They should feed on milk and fresh fodder for up to three to four months.

For best results, leave kids with their mothers for the first month.

Provide fodder, forage and water to kids early to encourage them to start eating. When providing fresh fodder and forage always ensure you let it wilt for at least two days before feeding it to your goats.

If restrained, let the kids suckle sufficiently three times per day. With triplets, bottle-feed the smallest using goat milk. Sterilize bottles between feeds to avoid infections.

When the kids are born, manage them so that the doe produces milk for the needs of the kids for domestic or commercial purposes as follows:

0-4 weeks of free suckling. If the kid is to be bottle-fed, sterilize bottles and teats before every feed. DO NOT be tempted to substitute with cow's milk if possible. 0.9 - 1 litre of luke-warm milk should be fed, spread over four feeds daily.

- 4-8 weeks suckling three times a day.
- 8-12 weeks suckling twice a day.
- 12-13 weeks suckling evening only for one week.
- 13-14 weeks suckling in the evening, every other day then wean.

#### Record Keeping:

Keep the following simple records: -

- Birth dates, Birth weights, Sire and dam, Milk records, Treatment records, Mating dates. Ensure mating records include the date of covering and buck used.
- Keep breeding records and register your goats with the Kenya Stud Book to avoid inbreeding.

#### Building specifications for dairy goat house:

Raise the house to 1.5 feet or slightly below knee height from the ground. The floor should be wooden, slatted, with small gaps about half an inch wide (or the width of a side of a matchbox) between the planks or rafters so that faeces pass through and the adult goats' or kids' feet do not. Use local materials such as off-cut planks.

For easier cleaning, goat houses should measure 1,5 m x 1,5m x 1m high. If zero-grazing, provide a large exercise pen. For young stock, place old tyres and large stones, in their exercise area, for their play.

"Keeping goats does not have to be expensive. Improvise and use what you have on your farm to build for them and feed them. That is my moto on my farm!" Karuru advises aspiring farmers.

[susannjugi@gmail.com](mailto:susannjugi@gmail.com)

## EARN FROM THE FARM

# Cash in Courgette farming: sow and reap big returns

**The Courgette farming flourishes in regions with a warm climate, low humidity levels, and regular, moderate rainfall. This region covers Central Kenya, a part of Eastern Kenya, the Rift Valley's northern and southern parts, and Western Kenya**

**By Vincent Kipyegon**

COURGETTE, ALSO REFERRED to as zucchini, is a dark green, fleshy vegetable from the squash family that ranges in size from 10 to 20 centimetres. It may be eaten raw, steamed, fried, boiled, or prepared alongside other foods.

The vegetable has numerous health advantages for the body, supplying potassium and manganese minerals as well as vitamins C, K, and B6 that are essential for boosting immunity, maintaining cardiovascular health, and warding off diseases.

Courgette farming flourishes in regions with a warm climate, low humidity levels, and regular, moderate rainfall. This region covers Central Kenya, a part of Eastern Kenya, the Rift Valley's northern and southern parts, and Western Kenya.

The common courgette varieties include the green Zucchini from Royal Seed, the Simba F1 and Ambassador F1 from Kenya Seed companies. On an acre of land, 1 kg of seeds can be planted.

The ideal soil for growing courgettes has a pH range of 5.5-7.5, well-drained, fertile and deeply aerated. They require temperatures between 15 and 22 °C and an average rainfall of 800 millimetres. During dry seasons, irrigation is advised.

Courgette is commonly grown through direct sowing in the field.

The land should be prepared by two weekly plough-



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Location	Frequency
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Kitui	
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Marsabit	88.3

Location	Frequency
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Kisumu	105.3
Mombasa	105.1
Kericho	90.5
Eldoret	91.1

Tuko Mbele Pamoja!

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## Cash in Courgette farming: sow and reap big returns

ing sessions; the land should be levelled to obtain fine tilth and break hard pans.

Broadcast animal or compost manure evenly on the land 2 days prior to actual planting.

Create 15-20 centimetre high soil hills or ridges, sow 2-3 seeds per hill, 90 cm by 90 cm apart, making sure the soil is mixed with some manure before lightly covering with soil.

After 7 days, the seeds begin to germinate; one plant should be removed from each hill to prevent nutrient competition.

After 21 days, apply organic foliar, which is accessible in nearby agro stores, and then wait 10 days between applications until flowering stage.

Once the courgette plants have emerged, mulch the area around them to avoid moisture loss and to add additional nutrients to the soil as the mulch decomposes.

Irrigation should be carried out frequently during dry season. This will keep the soil moist and ensure plants remain

healthy during flowering and fruiting phases.

Once the leaves appear, weeding should be done frequently to decrease competition for nutrients and weeds that draw pests. Since courgette plants are delicate while in the growing stage, weeds should be pulled carefully.

Even though courgettes are resistant to pests and diseases, there are some pests to which they are particularly susceptible, such as cutworms, aphids, thrips, red spider mites, white flies, and leaf miners. Pests can be repelled using simple home remedies like spraying soap solutions on plants or sprinkling them with ash solutions. There are easily accessible organic pesticides and fungicides from agro-vets if they persist.

After two months, the harvesting of courgettes begins and lasts for another two to three months. This can be done at weekly or every three days periods depending on ecological conditions. They can either be eaten raw or refrigerated.

Growing courgettes is a profitable venture; 1 kg sells for between Ksh 80 and Ksh 100, and 1 piece sells for between Ksh 15 and Ksh 25 at open-air markets. Since 1 acre of land can produce 1-2 tonnes of produce in a single harvest, 1 acre of courgette plantations can bring in Ksh100,000 to Ksh200,000 and cost between Ksh50,000 and Ksh70,000 as starting capital.

*Vincent Kipyegon is a freelance journalist based in Kericho County.*



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