

Dear Reader,

The 16th day of this month marked the World Food Day 'themed 'Leave No One Behind', and what better time to celebrate all farmers whose efforts in feeding the nation amid the many challenges are rarely acknowledged. Farmers have had to tackle numerous hurdles, a major one being the struggle to enhance soil quality, after many years of degradation following overuse of synthetic fertilizers. This has been exposed by the recent strain to produce food after the cost of fertilizer skyrocketed from Ksh 2500 to Ksh 6000 a 50Kg bag, a situation that has seen the new government subsidize fertilizers, for farmers to continue growing food.

Ecological Organic farming is an alternative that calls for a mind and practice shift on the part of the farmer, to start building soil health using organic matter, so that food production does not entirely depend on availability of synthetic fertilizers. In adopting organic farming, farmers employ techniques that ensure sustainability of the environment and the resources it provides us. This month as we reflect on the process of food production and consumption, we celebrate the role played by Biovision Africa Trust in empowering farmers with knowledge and skills on safe food production and maintaining a healthy environment. This edition features articles that inspire farmers to diversify the crops they grow, to include climate resilient crops like the tree spinach also known as Chaya and other highly beneficial plants such as the hibiscus.

The edition also features two farmers from Western Kenya, whose interest in organic food production is paying off in leaps and bounds. Enjoy the read.



Farmers still enjoy fruits of their labour in the face of climate change shocks

By Josephat Chengole Mulindo

Climate change and crops

Increase in human activities across the globe including industrialization, agriculture and burning of fossil fuels, has over time increased the amount of greenhouse gases in the atmosphere. The greenhouse gases that include methane, nitrous oxide, carbon dioxide and fluorinated gases have raised the average temperatures and altered the amount, distribution and seasonality of rainfall. In addition, there has been an increase in the frequency of extreme events like floods, droughts, hailstones, storms, heat waves, off season rains etc.

These effects of climate change adversely affect smallholder farmers who depend on rain-fed agriculture for their production. In this article, we explore the effects of climate change on fruit crops and adaptation measures that farmers can undertake for correction.

Smallholder farmers are encouraged to engage in fruit-culture for improved sustain-

able livelihoods. Fruit crops allow efficient utilization of land and other resources leading to higher incomes comparatively, while maintaining their natural resource base. In the face of climate change, it is easier to plan the production of annual crops to take advantage of favourable conditions since their growth cycles are shorter as opposed to fruit crops that are on the most, perennial.

The fruits produced in Kenya are either tropical (guava, papaya, mango, banana, etc.), subtropical (citrus, avocados, pomegranates, etc.) or temperate fruits (plums, pears, apples, etc.). This categorization is based on climatic requirements by the fruits. .

Climate change effects on fruit crops

High temperatures

High temperatures affect plant health and in various ways, namely:

- They lower seed germination
- Increase flower shedding

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- Reduce floral fertilization, fruit setting, and fruit size and fruit weight.
- Shorten maturity period for fruits.
- Delay ripening of grapes that compromises fruit quality.
- Cause flower abortion in female and hermaphrodite papaya plants.
- Result in sex change in hermaphrodite papaya towards males.

At the same time, hot-humid conditions create suitable conditions for:

- Prevalence of fungal infections for fruit plants.
- The fruit fly pest that attacks mango and guava.
- Decline in number of useful insects that pollinate fruit crops.

Low temperatures

Low temperatures reduce the metabolic processes in fruit plants. In addition, oxygen absorption occurs at a higher rate than elimination leading to accumulation of toxic substances in the plant cells.

In general, low temperatures result in:

- Limited flower bud initiation.
- Sooty mould, powdery mildew and anthracnose diseases in mango, guava and citrus fruits.
- Failure to take flight by pollinators during bloom resulting in poor fertilization.

Droughts

Droughts (compounded by high temperatures in Kenya) affect fruit crops through several ways:

- Preventing germination after planting.
- Causing stunted growth of plants with poor performance in maturity.
- Drought at flowering and post-blooming stages reduce yields by causing flower fall, fewer, smaller and lighter fruits e.g. in avocados and mangoes.
- Poorly filled short banana fingers resulting in lower yields.

Floods

Flooding results in waterlogged soils and promotes soil erosion. In addition:

- Submerged flooding kills fruit plants in a matter of days.
- It causes an upsurge in insect pests and diseases, e.g. Panama disease in bananas.
- Prolonged rains promote excessive



vegetative growth and increased flower fall.

- Heavy rains wash off pollen from stigma of flowers causing poor fruit setting.
- Unseasonal heavy rains reduce fruit setting, increase fruit drop and increased heavy incidences of sooty mould and powdery mildew in mango and citrus fruits.

Wind

Strong wind events with increasing frequency are a climate change phenomenon. Reasonable amount of wind at flowering stage aids in securing better fruit set. Orchards exposed to strong winds underperform in terms of yield. Pollinators work well in still weather rather than windy conditions.

Hailstones

Very harmful if they occur at any time between flowering and fruit development. They cause fruit fall and injuries to the remaining fruits reducing their quality. Frequent and severe hailstone events are a consequence of climate change.

Coping mechanisms for fruit farmers

Adaptation to climate change by fruit farmers can reduce their vulnerability to climate change by enabling them to adjust to climate change, minimizes the effects of climate change and improves their coping strategies.

Crop diversification

While a single crop can give heavy

production under good climatic conditions, diversity adds stability to the production system and minimizes disease and pest infestation. Therefore plant mangoes, guavas, apples, pomegranates etc. on your farm in a bid to diversify and so avoid total loss due to changes in climate events.

Use of water saving technologies

- Collect and store rain water.
- Plant climate-smart fruit crop varieties, use hardy and adapted rootstocks.
- Practice low-till or no-till.
- Use compost or farmyard manure.
- Mulch your farm - use crop residues.
- Go organic in fruit crop production.

Establishing windbreaks

Windbreaks modify microclimates of orchard as well as provide shelter for pollinating insects. In addition, windbreaks protect orchards from wind erosion and other natural disasters like lodging (e.g. in shallow rooted plants like tree tomato).

Integrated pest and disease management

- Use resistant cultivars or varieties.
- Use clean planting materials and keep the fields clean.
- Plan and manage production to prevent insects from becoming pests.
- Use biological control, and apply organic sprays.

<https://infonet-biovision.org/search/site/climatechange>



The little known, high protein tree spinach (Chaya)

By Samuel Monene

To overcome food insecurity, we must embrace harsh weather resilient crops most of which are indigenous. In most dry areas, green vegetables are only enjoyed by a few who are capable of harvesting and storing water, or who can afford to tap water by sinking wells. Yet with the right knowledge and appropriate skills, all households can enjoy a balanced diet, throughout the year.

While some vegetables require constant water supply to thrive, some indigenous vegetables can survive in dry climate regions with little water which can be recycled from the kitchen. One such vegetable is Chaya.

Chaya (*Cnidoscolus Chayamansa*) also called the spinach tree, is a perennial plant native to the Mesoamerican region. Since the shrub requires little management, it has found its way into most farms globally. Once well established, plants can stand a great deal of drought or months of excess water, as long as there is good drainage and

roots are not in water-logged soil.

Chaya out-performs most other green leafy vegetables nutritionally. The leaves are rich in protein, calcium, iron, carotene and vitamins A, B and C. The amino acids in Chaya are well balanced, which is important for those who have a diet low in protein and for children and pregnant or nursing mothers.

Physical characteristics

The fast-growing perennial shrub can grow to a height of 3-5 meters in height and 2-3 meters in width. While the leaves vary in size, shape, and texture depending on the variety, it generally produces a lot of large attractive dark green leaves harvested all year round. Leaves are palmately split into 3-5 lobes. Stem tips are broad and blunt, up to 2.5 cm in diameter, and may be very succulent. The flowers (male and female) are borne in long clusters. Chaya grows quickly in warm conditions and new leaves have a rapid growth rate after harvesting.

How it is planted

Chaya is propagated from stem cuttings. The four main varieties that are cultivated are Estrella, Picuda, Chayamans, and Redonda. However, within a single variety, there are those with spines or stinging hairs and those that lack these features; these are also known as spineless. When selecting the variety to plant, always consider the spineless variety as they are less irritable during harvesting as compared to the spined variety that must be harvested using gloves to prevent irritation. The following is the procedure for seedling preparation, planting, and maintenance:

- Cut woody sections of Chaya stems that are 20-30 cm long and contain 2-3 nodes. Take cuttings from the top (Preferred as they exhibit fewer rotting problems during root formation) or bottom portion of the stem.
- Remove leaves and air dry the cuttings in the shade for 3-4 days. (Seal the cut ends to prevent rotting).
- Plant the cuttings in pots, nursery containers, or directly in the ground where there is plenty of sunlight. (Ensure that 1-2 nodes on the cutting stem are beneath the soil).
- Water the cuttings to keep the soil moist until roots form. Cuttings are ready to transplant when mature leaves are produced.
- Transplant in a deep well-fertilized soil, ensuring roots are suspended vertically. Transplanting is done during the rainy season, and if in dry regions, ensure watering is done regularly to strengthen and promote seedling survival.
- Plant spacing is wholly dependent on the purpose of the crop. If planted as a fence/hedge, Chaya seedlings should be spaced about 60 cm apart for a dense setup. For commercial production, rows of Chaya should be planted 1-2 m apart, with 60 cm between plants in a row.
- The first edible leaves are generally produced within 3-5 months of transplanting. Chaya growth starts slow, but after the first year, the plants can be pruned, resulting in rapid new growth. It is advisable to prune Chaya to a height of 1.5-2m to make it easy to harvest leaves.
- Occasionally, the plant should be cut back to a height of 50 cm to promote the production of new growth.

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- Chaya is resistant to most insects and plant diseases, although it can be affected by bugs, broad mites, spider mites, and aphids and it is a host of CCMV (Cassava Common Mosaic Virus).

Nutritional value

When compared to other leafy green vegetables, Chaya contains a higher percentage of essential nutrients. According to a publication by the USAID, the following are listed as the health benefits of Chaya:

- Improves blood circulation through the system, thus helping repair inflamed veins and hemorrhoids and lowering the blood cholesterol levels.
- Helps in digestion.
- Improves vision.
- Boosts calcium in the bones.
- Decongests and disinfects the lungs.
- Prevents anemia by replacing iron in the blood.
- Improves memory and brain function due to improved blood circulation.
- Combats arthritis and diabetes.

How to prepare

The leaves contain inconsistent amounts of a cyanide-producing toxin, a glycoside of hydrocyanic acid. Therefore, it should be boiled for about 5 minutes where the toxin is released as a gas that dissipates safely into the air, leaving the cooked leaves safe for consumption. Vitamin C ends up in the cooking water when Chaya is cooked, but if one drinks the broth in addition to eating the leaves, 25 grams of Chaya leaves can meet an adult's daily requirement for Chaya. Below are some preparation methods to consider:

- Chaya leaves are boiled, then fried and mixed with eggs, onions, and tomatoes.

- The cooking water (Chaya broth) is nutritious with high Vitamin C content.
- The stem tips (4-6 inches) are very delicious. Remove the tough, longitudinal fibers after boiling and fry the tender stem.
- Leaves are combined with vegetables and meat in stews.
- Health drink consisting of dried ground Chaya leaves, lemon/pineapple, and sugar or sugar substitute (stevia, honey, jag-gery).

The same methods used to prepare kale and spinach can be used to prepare Chaya. It can also act as a substitute or complement kale and spinach dishes. However, it should be cooked longer as it is more fibrous.

Value addition processes

- Dried Chaya leaves and stems can be ground to make forage for poultry. They improve egg production and improve yolk quality (deep yellow).
- Chaya leaf powder or capsules are used to supplement dietary requirements. Prepare by boiling the young Chaya leaves for 5 minutes and dry them. Once dry, grind them to make the powder. You can add these to food or drinks (1-2 teaspoons).
- Chaya leaves and stems are an excellent source of nitrogen in compost manure.

For more information on tree spinach and where to get the seedlings visit echocommunity.org

Samuel Monene holds a BSc in Management of Agro-ecosystems and Environment from the University of Nairobi.

Email: Sammonene1@gmail.com

Make your farm productive by keeping the stingless bees

By Evelyn Night

Pollination, the transfer of male reproductive units to female reproductive organs of plants is a crucial process to produce about 35% of the food we eat. This process can occur automatically or use the services of agents of pollination such as wind, water, and animals. Animal pollinators are the biggest contributors to the pollination of crops not pollinated by wind or water, of these, insects make the most effective pollinators.

While some farmed crops such as maize and millet might not need insects, many other crops including beans, pumpkins, avocado, and others can only produce good harvests if pollination is conducted. Therefore, you should ensure that your farm gets pollinators to facilitate fertilization and food production. The benefits of pollinators can be best demonstrated by recent research done by scientists at *icipe* that showed the yield of avocado improved by 20% when honeybee hives were placed on farms.

Pollination by stingless bees

Stingless bees are a relatively smaller member of the family Apidae (bumble bees, honeybees, orchid bees) that have a non-functional sting. The unique feature of members in this group is their smaller size, unique colony architecture, and honey quality. Like honeybees, they form their colonies on tree trunks and roof material in dwelling areas. However, some stingless bee species prefer to burrow in the soil or a rock crevice, occupy a termite mound, or even find residence inside mud walls.

Characteristics of stingless bees:

- i. They have smaller bodies useful in accessing especially small and narrow flowers.
- ii. Stingless bees are true generalists; they will visit any flower that is open and do not choose between plants as honeybees do sometimes.
- iii. Another important aspect of stingless bees is that they are tame, which means that they do not sting, hence they can be kept on farms that are close to residential areas without a problem.
- iv. Stingless bees also like permanence, this means that they will not abandon their hive as often as the honeybees do, hence farmers are assured of an all-year-round pollination provision if the right conditions are met.
- v. While honeybee colonies have hexagonal-shaped combs that are used in rearing brood (young bees) and storage of honey stingless



bees form round pot-like structures made of plant resin that are positioned side by side and bundled in a misshapen circular structure. Each circular level is stacked upon another hence forming a spiral brood as shown in the figure below:



Similarities with honeybees

These are used to rear their brood. Stingless bees, like honeybees, have one reproducing queen. She lays her eggs inside pots that stingless bee workers already filled with food suspensions. The eggs, therefore, hatch in the suspension, and the emerged larvae use the food for their nutrition. Honeypots are stationed on the sides of the brood; these are larger in size and are supported by batumen that the bees use to also seal the contents of the hive from external elements.

Because of the unique food provision by the stingless bees, beekeepers should take care not to drown developing larvae in the food suspension when moving the hives.

How to spot stingless bee colonies

While they might be tiny, stingless bees are common members in our homesteads and farms and you might have confused them with winged ants. This, therefore, is how you can spot a stingless bee colony:

i) Hive entrance

Compared to other members of the family, stingless bees are the perfect builders and even have hive entrances made of plant resin. Whether it's underground, on a tree trunk, or inside your wall, the first sign of stingless bee tenancy is a protruding cylindrical, mostly pale-colored hive opening like the one shown in the figures above. The structure of these openings may vary across species.

ii) Activities around the hive opening

If you see members going in, coming out, or flying around the opening you identified in (i) above, know you have got yourself a great colony. This is because an active hive will have foragers constantly moving in search of food, while others will be patrolling the entrance, watching out for intruders like other insects (wasps are the worst), small animals like rodents, and even people collecting honey. Despite their inability to sting, stingless bees bite.

So how do you adopt these bees?

To adopt stingless bees effectively, you have to provide them with somewhat similar conditions as they had in their colonies. That said, you cannot transfer every colony inside a log or wooden hive. This is because the wooded conditions will not be okay with ground nesters, or those species that are fine with disturbing termite hills. Earthen pots are preferred for these earth-loving species whereas wooden box hives will serve the tree dwellers. Hives must be constructed in ways that will accommodate the entire colony's uniqueness. Transferring a stingless beehive from its original dwelling to a new site is therefore labor intensive and risky process. If they are not being a nuisance then it is advisable to leave them be, and only cultivate flowering plants about 500m around these hives to maintain the colonies all year round. Large colonies will eventually branch out therefore, you could construct a hive and place it nearby for the workers to find it and make a new home in it.

Studies show that honey produced by the stingless bee possesses a higher moisture content, greater acidity, a slightly lower level of total carbohydrates, and higher levels of antioxidant and biological activities than *Apis mellifera* honey.

Note: To know more about stingless bees and how to use them on your farm, kindly contact your nearest agricultural officer or icipe at icipe@icipe.org for more details. I wish you a successful journey into the stingless bee world.

Evelyn Night is a Research Assistant at icipe. Email: nightevelyn@gmail.com

<https://infonet-biovision.org/AnimalHealth/Beekeeping>

Hibiscus; the nutritious flower

By Mary Mutisya

Often, hibiscus is grown for its flowers that blossom in a variety of warm and deep colours. They are mostly planted in compounds to beautify the environment, but the hibiscus is one of the most underutilized plant as it carries many more beneficial aspects to human beings in addition to the aesthetics of its trumpet-shaped flowers.

Farmers in various parts of Africa have discovered the hidden treasure in this perennial plant and started processing it to produce high value products beneficial to human health.

Value addition of Hibiscus

The use of hibiscus as food is varied. The calyx (flowers) of hibiscus is commonly used in the production of soft drinks, juice, jelly, jams and wine. They can also be dried and brewed into tea and spices. The young leaves of hibiscus can be consumed raw as green vegetables while the seeds are a good source of fiber, fat, protein and total sugars.

Hibiscus tea

1. First collect the hibiscus calyx (flowers).
2. Wash them clean. Air or oven dry them at 70 degrees for three days.
3. Peel the calyx off and store it in airtight containers.

To make the tea:

1. Take a few of the dried flowers and crush them into small pieces.
2. Put them in a cup and add boiling water-let it steep for 2-4 minutes. Add sugar or few drops of lemon juice as desired.
3. You can also refrigerate it and make hibiscus iced tea.

Hibiscus Wine

1. Sort the flowers to remove chaff and those of poor quality.
2. Boil the dry flowers in water to obtain the juice and extract.





3. As the leaves boil to get the juice extract, sugar mixed with water is boiled separately to form a liquid.
4. Mix the juice extract with the sugar and water mixture. Stir this well and add yeast to help in fermentation.
5. Put the mixture in fermentation/maturation tanks and let it stay for at least 6 months when it's ready for use.
6. When matured, put it into bottles for later use or sale.

Note: From practicing producers, 10kg of quality dried hibiscus flowers can produce at least 500l of wine.

To make dry wine, you can choose not to add the sugar.

Using hibiscus to make juice

Juice extracts are produced from various parts of plants including leaves, fruits and flowers. Flowers of hibiscus are used to prepare juices. The extract also known as roselle extract has a unique red colour, good flavour, low sugar and high acidic content. The acidity makes the juice sour hence the need for addition of sweetening products. Blending of tropical fruit juices with roselle extract improves mineral composition and antioxidant properties of fruit juices as roselle is a good source of calcium, magnesium and iron.

Medicinal use of hibiscus

Among many cultures, various species of hibiscus have been used for ages in traditional medicine. It is highly valued for its mild laxative effect, relief during hot weather, increasing one's ability to urinate as well as for treatment of feet cracks, wounds, bilious and sores. In some countries like Sudan, it is used for relieving sore throat whereas in India the leaves are used to make healing ointment on sores. Recent studies have continued to prove that hibiscus has more medicinal purposes such as;

- i. **Anti-diabetic activity** - Studies on polyphenol compounds extracted from hibiscus on type two diabetes have

shown that hibiscus has anti-insulin properties at a dose of 200mg/kg and can thus be used in the management of diabetes. Also, similar studies have proven that it is good in the reduction of hyperglycemia (too much sugar in the blood) and hyper-insulinaemia (high amount of insulin in the blood above normal). Hibiscus has also shown to be effective in reducing the ratio of the low density lipo protein and the high density lipoprotein, triacylglycerol and serum cholesterol, hence reducing the risk of heart attack.

- ii. **Lowering blood pressure** - Aqueous extracts of hibiscus have been shown to be effective in treating mild to moderate hypertension with no adverse effects. Daily consumption of hibiscus extracts can result in a decrease in blood pressure.
- iii. **Weight loss, anti-obesity** - When taken after meals, a cup of hibiscus tea has been shown to help in weight loss as it contains an enzyme inhibitor which blocks absorption of amylase. Some compounds in hibiscus have also been proven to be anti-obesity and anti-inflammatory.
- iv. **Hypo-lipidemic effects** - Hibiscus tablets have shown to significantly lower serum cholesterol.
- v. **Anthelmintic and anti-microbial effects** - Hibiscus has antibacterial, antifungal and anti-parasitic actions. All these make it effective in the control and management of microorganisms such as bacillus anthracis, staphylococcus albus and schist soma mansoni.
- vi. **Antioxidant effect** - Hibiscus has shown to have the ability to scavenge for free radicals in the body, and this helps protect the body against a variety of diseases such as certain types of cancers.

Optimal conditions for its growth

More than three hundred species of hibiscus have been documented to date. They are distributed in warm temperate, sub-tropical and tropical regions of the world. Of the many species that exist, *Hibiscus rosa-sinensis*, *Hibiscus syriacus* and *Hibiscus sabdariffa* are the most common. They flourish in the following conditions:

- **Well drained and slightly acidic soils.** For sandy soils, liberal amounts of well decomposed organic matter should be used to adjust aeration, drainage and water holding characteristics. For heavy clay soils, raised beds should be used to prevent excessive moisture.
- **Hibiscus does well in temperatures of between 15 and 29 degree Celsius.** Hibiscus is prone to frost damage and easily succumbs to low temperatures.

- **Hibiscus requires full sun but can tolerate partial shade.** Inadequate lighting limits flowering.
- **Hibiscuses are somewhat drought resistant but can be supplemented with irrigation during dry/hot months.** The water should be directed to the irrigation system as much as possible. Foliage should be kept as dry as possible to limit diseases.
- **Hibiscus is prone to aphids, scales, mealy bugs, thrips and mites.** Foliar diseases such as powdery mildew, downy mildew and botrytis are common and should be managed.

How to plant hibiscus from seeds

- **To stimulate germination, narrowly cut the round end of the hard seed coating, to let in more moisture necessary for the germination process.** Soak the seeds in room temperature for about 4 to 6 hours.
- **Mix soil with compost in a pot and plant seeds about a quarter inch deep in your potting mix.** Ensure to keep it in warm, sunny conditions. After two to three weeks, your hibiscus seedlings should sprout.
- **Once true leaves have started growing, dig a hole in your garden soil large enough to accommodate the hibiscus root ball and loosen the soil up to one foot deep.**
- **Set the plant inside of the hole so that the top of the root ball is level with the soil surface.** Begin filling the hole with soil then stop at the halfway point. Soak the soil thoroughly then continue filling the hole with soil. Do not place any soil on top of the root ball to avoid suffocating the plant. Deeply water the planting area.

Mary Mutisya is a nutritionist at icipe.
Email: mariahmutsiyah@icipce.org

<https://infonet-biovision.org/Publications/Hibiscus-organic-cultivation-guideline-Naturland>



World Food Day

16-17 Oct 2022, Rombo Ward, Kajiado

Biovision Africa Trust participated in the just ended World Food Day national celebrations held in Loitoktok Kajiado County between 16th and 17th October themed 'Leave No One Behind'. Below are photos of the celebrations:



1. Deputy President, Hon. Rigathi Gachagua gives a keynote speech during the event.
2. Deputy President, Hon. Rigathi Gachagua visits the BvAT booth.
3. Deputy President keenly follows proceedings during the event.
4. Photos 4, 5 & 6 BvAT staff joined by partners and farmers in attendance pose for a photo.
7. A farmer beneficiary of BvAT proudly poses for a photo during the event.
8. BvAT farmer champions, Julius Matheka (R) and Muthoka (L) participate in the event.
9. School pupils visit BvAT tent during the event.
10. The Outreach Manager at BvAT, Chris Rwanda showcases BvAT information materials.
11. Farmers visit the Biovision Africa Trust stand.
12. Community members of Rombo Ward, Kajiado County entertain guests during the event.



Tune to Radio Maisha every **Thursday at 7.30 PM** through any of these Frequencies to receive Kilimo Hai, TOF Radio Swahili farmer programs. TOF Radio and Radio Maisha partner to bring you these educational programs.

Location	Frequency
Nairobi	102.7
Kakamega	91.5
Bungoma	
Busia	
Malindi	106.3
Location	Frequency
Webuye	95.9
Garissa	88.7

Location	Frequency
Taita	107.4
Narok	102.3
Nyeri	105.7
Machakos	93.8
Makueni	
Kitui	
Meru	105.1
Marsabit	88.3

Location	Frequency
Nakuru	104.5
Gilgil	
Kisii	91.3
Kisumu	105.3
Mombasa	105.1
Kericho	90.5
Eldoret	91.1

Tuko Mbele Pamoja!

Farmer turns to organic farming to overcome challenges in the farm

By Elias Biwott

Priscah Josiah is a marginal farmer from a remote village of Eshiongo in Shibuli, Kakamega County. She owns two acres of agricultural land where she grows vegetables including amaranthus, black night shade, Ethiopian kales, crotalaria, jute mallow, tomatoes, chilli among others. In addition to vegetables, she also grows bananas, maize, beans and groundnuts.

With increasing cost of production resulting from unavailability of essential farm inputs, Priscah has discovered alternative approach to production through her interaction with Mr. Elias Biwot, one of the field officers at Biovision Africa Trust (BvAT), based in KALRO Center in Kakamega County. The extension officers at the Center have impacted many farmers in the county through training on organic agriculture. In organic farming, farmers use material available in the farm by employing technologies such as composting, conservation agricultural techniques, making own feeds, and using plant extracts to make their own biopesticides. Apart from cutting the cost of production, food produced through organic farming either for home consumption or for sale, is free of any toxic residues commonly found in conventionally grown foods.

Priscah has learnt several techniques from the extension officers. For instance, from her dairy cows, she obtains manure, which she uses occasionally to



enrich her soil and increase its fertility. She uses part of the manure to make tea and foliar fertilizers, a technique she acquired from training offered by Mr. Biwott. "I now know how to make plant and manure tea, ash brew, neem extracts and organic soap solution which I apply on the soil and the crops," she says. Another major technique Priscah has adopted following this training is intercropping crops with companion plants such as Mexican gold for plant nutrition as well as for plant protection purpose. She has wholly embraced the practice of conservation agriculture which involves returning crop residues from the farm directly to the soil, to help in decomposition of in-situ farm resources while enriching the soil with macronutrients.

With the goal to improve the livelihoods of smallholder farmers, the BvAT team at Kakamega also introduces farmers to profit generation activities within their farms. Priscah for example, learnt to produce seeds from indigenous vegetables to sell to other farmers, a venture she says generates profit that caters for some of the household needs.

Avoiding use of synthetic pesticides in the farm, has created a conducive environment for living micro-organisms beneficial to the soil to thrive. "I see earthworms multiply in the soil and their excretion makes it naturally fertile," says Priscah.

While farmers grapple with challenges of rising costs of fertilizers and low yields, Priscah has found solutions to most of these challenges. Her family feeds from the farm produce and she sells the surplus at the local market in Shibuli. "I have built a loyal customer base who like my produce because it is grown organically and it is therefore free of any toxic residues," she says further attesting to the longer shelf life of the produce compared to produce grown conventionally. She also testifies to the complimentary comments from customers on the tastefulness of the vegetables, which is attributable to the nutrients they obtain from the organically fertile soil they grow from.

Looking at the progress she is making in her organic farm enterprise, Priscah acknowledges the role played by the extension officers from BvAT, working in her locality. "I always thought the only way to produce food is by using synthetic fertilizers and pesticides, until I came across Elias Biwott who has gradually changed my perception and helped me to embrace organic farming. I now incur less costs in producing food, and I am assured of the safety of the food on which my family feeds," she says.

Elias Biwott is the farmer field officer at Biovision Africa Trust based in Kakamega.

Email: ebiwott@biovisionafrica.org

<https://infonet-biovision.org/EnvironmentalHealth/What-Organic-Agriculture>



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