Biovision Africa Trust

THE ORGANIC FARMER

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Dear reader,
As the year comes to an end, we are grateful for the opportunity of knowledge co-creation and sharing we have had so far. The economic situation in the country has worsened as consumers grapple with high cost of living, amid increased taxation and political instability. These challenges require strategies that ensure economic resilience and food security at the household level.

This edition compiles articles on various agribusiness ideas farmers can adopt to diversify their streams of income. Did you know that you can plan your planting calendar in a way that allows for continuous harvest in and out of season? Read on to learn more about staggering, a production method that helps farmers align their output with market demand, leading to higher profitability and less post-harvest loss.

Are you frustrated by poor earnings from your hard work, as a result of exploitation by brokers? Learn from farmers in Makueni County who have innovated village markets, where community members converge to sell and buy from each other.

Read on these and much more for inspiration, to optimize yields and make more from your farm.

COMPOSTING

Worthful Waste

By Melody Vulifa

In Kenya, it is estimated that 3000 tonnes of waste are produced daily, with over 70% being organic waste. To deal with this, various waste management processes have been championed to help transform waste into forms that can be used for economic or environmental benefit. Composting, which can also be termed a process of turning waste into "gold," is one avenue through which organic waste is recycled into a valuable product.

For organic farmers, composting is not only a way of practising sustainable agriculture but also a good opportunity to gain sustainable economic benefits. Organic farm waste can be converted into a nutrient-rich fertiliser that can be sold to generate income. Over the recent years, more organic farmers have realised the benefit of organic fertiliser for the soil and environment. Although chemical fertilisers are beneficial in increasing productivity, overreliance has led to a decline in soil health. Moreover, with the increase in the price of synthetic fertilisers, most farmers have opted to use organic manure.

According to Priscah, an organic farmer in Shibuli village, Kakamega, composting is one of the easiest ways to conserve the environment while making money. Pit composting, which is the method she uses, involves digging a pit, filling it with organic plant, animal, and kitchen waste, and burying it for several weeks. By applying a structured composting method taught to her by Biovision Africa Trust field officers in Kakamega, Priscah has been doing aerobic pit composting for the past several months.

Although chemical fertilisers are beneficial in increasing productivity, overreliance has led to a decline in soil health. Moreover, with the increase in the price of synthetic fertilisers, most farmers have opted for organic manure

She became interested in starting a composting business because of the demands of organic farming.. The need for affordable manure that effectively enhances soil nutrients and productivity prompted her to pursue composting, not just for her own farm but also to support other farmers in her community.. From the two large compost pits on her land, Priscah makes enough manure for her personal use and sale. "When ready, the compost manure I produce can fit two lorries, which translates to approximately Ksh. 30,000.

With only the animal and plant waste from her small farm, Priscah's composting business has given her the following benefits;

Income generation
The sale of organic compost has become a good source of income due to the increase in preference for it over synthetic fertilisers.

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Growing more food in less space

A multi-storey kitchen garden can be set up in fields, on balconies, or in house yards. They are essential in reducing poverty

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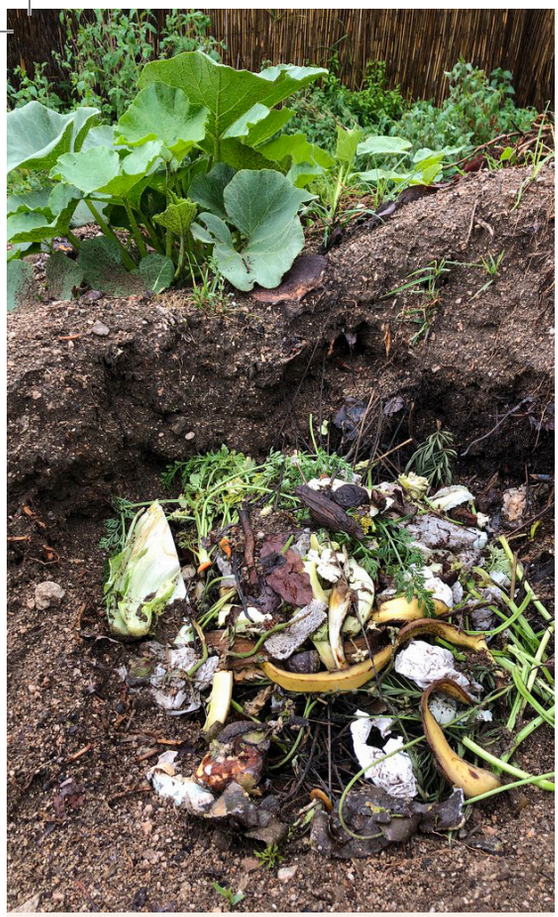

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2. Conservation of the environment
   Since organic compost comprises waste materials, recycling is one of the benefits accrued. Organic waste from the farm is aggregated and turned into manure, thus enabling environmental conservation.
3. Improvement in soil quality
   Compost manure applied to the farm improves the soil quality and health. It increases the cohesiveness of the soil, making it more resistant to soil erosion and increasing its capacity to retain water. The introduction of humus and microbes enriches the soil, resulting in the growth of strong, healthy plants.
4. Enhanced livelihood of the community

By selling compost manure to other farmers in the community, the quality and quantity of food produced in the area have improved. This has led to an overall improvement in the livelihoods of community members.

Composting has now become a profitable agribusiness opportunity that aims to enhance farm productivity and environmental conservation. Farmers like Priscah, who have embraced composting, can pride themselves on enjoying economic benefits while contributing to sustainable agriculture.

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PESTICIDAL PLANTS

Pesticidal plants: A sustainable approach to pest control in agriculture

Pesticidal plants are vital in addressing the above challenges by providing an accessible, eco-friendly pest control option

By Elias Biwott

Pests and diseases pose significant challenges to global agriculture, threatening crop yields and food security. These threats are exacerbated by climate change, which alters pest behaviours, extends their habitats, and creates favourable conditions for outbreaks.

As the global population grows, ensuring sufficient food production becomes increasingly urgent. However, the overuse of synthetic pesticides has led to environmental degradation, pest resistance, and health concerns, further complicating sustainable agricultural practices. Addressing these interconnected challenges requires innovative solutions that balance ecological resilience, food security, and farmers' livelihoods worldwide.

Pesticidal plants are vital in addressing the above challenges by providing an accessible, eco-friendly pest control option. Unlike synthetic pesticides, pesticidal plants are generally safer, easier to access, and can be locally sourced. However, their widespread use requires careful management to avoid overharvesting and protect biodiversity.

Understanding biopesticides

Biopesticides are substances or mixtures of substances naturally occurring and derived from plants used to prevent, destroy, kill, control or mitigate pests. Most plants produce chemicals that deter pests, often producing a mixture of compounds that repel and stop pests from feeding on them.
Economic importance of pesticidal plants
Pesticidal plants offer numerous advantages, as listed below:

1. They decrease the need for synthetic pesticides.
2. They break down rapidly, leaving minimal ecological impacts.
3. They are locally sourced, making them accessible to many farmers.
4. They are safer to handle and pose fewer risks to non-target species than synthetic pesticides.
5. They are cost-effective, and some have soil-health-enhancing properties, such as Tephrosia.
6. Pesticidal plants have economic benefits, as cultivating and selling these plants can generate jobs and income for farmers, reduce reliance on imported pesticides, and promote organic produce markets.

Food security and farmer livelihoods

Small-scale farmers, especially in low-income regions, face significant challenges with pest infestations that can lead to crop failure. Pesticidal plants can help prevent this by, increasing agricultural productivity, supporting food security, and reducing health and safety problems. Their use also reduces costs for farmers who would otherwise need to purchase synthetic pesticides, thereby improving their income and resilience.

Harvesting, processing and use of pesticidal plants

Common names of pesticidal Plants	Target Pest	Plant part used	Preparation	Uses/action
Aloe	Newcastle in Chicken Insect pests	Leaf sap	• Crush leaves to extract gel, dilute in water and spray on plants; • Squeeze the sap into water for chicken to drink	Antibiotic repellent. Disrupts feeding.
Neem	Cockroaches, weevils, aphids, termites, mites, nematodes, cutworms, armyworms, sod worms, caterpillars, beetles, scales	Seeds, leaves and bark	• Extract the oil or grind the harvested leaves, seed/bark to a powder. • Dilute the oil/ powder in soapy water for spraying on crops.	• Strong anti-feedant, repellent. It affects insect growth, reproduction, causing deformities. • Contains Azadirachtin/ Nimbin
Blackjack	Aphids, fungal and bacterial pathogens	Leaves and stem	• Dry, boil, grind or burn to form ash. This is used or mixed in solution to spray on crops	Antifungal, and antibacterial
Sodom apple	Cattle ticks red spider mites, nematodes, aphids, beetles	Ripe fruits	Whole dry, ripe fruits are crushed and extracted in water at 5% w/v for 24 h and sprayed at 5L/ animal	• Surface Application. • Disrupts nervous system
Hot red pepper	Thrips, ants, aphids, caterpillars and white flies	Fruit	Dry and grind fruits. Use as a powder or mix with water and soap and apply to crops	Contains Capsaicin- irritant and deterrent
Pawpaw	Aphids, caterpillars, whiteflies, nematodes	Leaves, seeds	Pound leaves mix with water and leave to stand overnight. Sieve and Spray on crops	Contains papain- repellent, inhibits growth.
Commiphora (Myrrh) (Commiphora Holtiziana)	Ticks, skin disease, ants, termites	Bark resin	The resin extracted is applied directly mixed with milk, boiled and smeared	Acts as a repellent and has strong microbial properties.
Latifolia (Cordia latifolia)	Maize weevil, Butterfly caterpillars	Leaves	Dry plant leaves placed on grains	Strong scent acts as a repellent.
Tick clover (Desmodium spp)	Stalk borer	Whole plant as ground cover	Intercropping as a “push-pull” strategy in IPM	Repels stem borers and attracts beneficial insects that prey on the pests.
Lantana	Weevil, tuber moth, Mosquito, fly, Beetles, Aphids, whiteflies and mites	Leaves, flowers	Dry the plant leaves or whole plants and soak in water, occasionally stir and spray the liquid on affected plant parts	• Contains Landadene • Can be used both pre- and post-harvest as repellent.
Melia (Melia volkensii)	Termites Against a broad range of insects	Fruit pulp	Dry plant leaves mixed with water	Can be used both as a pre- and post-harvest repellent
White Ginger	Cutworms, aphids, leafhoppers, spider mites, cabbage worms	Rhizomes	Rhizomes extract prepared in warm water concoction and diluted for spray.	Rhizome oil has repellent properties and is toxic to some insects.
Sacred Basil (Ocimum tenuiflorum)	Mosquito, fleas	Leaves and stems	Smashing for sprays, sweeping with twigs, planted near the house, burning.	Repellent, antifungal, and antibacterial properties
Pyrethrum	Pickleworms, aphids, caterpillars, beetles, leaf hoppers, spider mites, bugs, cabbage worms.	Flower and seeds	• Dry flowers and seeds and grind them to a powder. • Mix with water for sprays.	Contains pyrethrin that acts on the insect nervous system, causing paralysis and death
Consoude (Symphytum spp)	Aphids	Leaves, roots	Grind leaves, mix with water and spray. Whole plants intercropped with crops.	Is a repellent, also causes dehydration of the insects
Mexican marigold	• Aphids, lice, fleas, ticks, ants, white flies, weevils, red spider mites, nematodes, worms, fungi • Against intestinal parasites in domestic livestock	Whole plant, leaves, stem	Planted along the plot as repellent, ground and mixed with water, dry plant placed on grains	• Added to stored beans and maize
Tithonia	• Aphids, weevils, white flies, leaf hoppers • Against plant pathogenic fungi	Leaves, seeds	Cold infusion	application

Harvesting, processing and use of pesticidal plants (Cont'd)

Common names of pesticidal Plants	Target Pest	Plant part used	Preparation	Uses/action
Tobacco	Aphids, thrips and caterpillars.	Dried leaves	Crude extract is mixed with 20 grams of fresh leaves and 100 ml water. Soak for two hours, adding 5 ml liquid soap to the above solution away from direct sun, filter and spray.	It is highly toxic if inhaled and should not be sprayed within seven days before harvest.
Tephrosia spp (Tephrosia vogeli)	• Caterpillars, beetles, • aphids, spider mite • and carpenter ants. • Ticks, mosquito larvae	Dried leaves	Extract by mixing 20 grams of fresh leaves with 100 ml water. Soak for two hours, adding 5 ml liquid soap to the above solution away from direct sun, filter and spray.	Surface application. Use immediately for optimum effectiveness. (Very toxic to fish and other animals if inhaled)
Capsicum/ spring onions	Aphids, caterpillars, ants and beetles,	Bulbs	Grind the bulb, mix it with water and spray. Whole plants intercropped with crops	Contain Capsaicin. Acts as a repellent.
Ash	Slugs, snails, aphids, ants	Ash dust	Dust the leaves with ash dust	Its irritant alkaline nature alters the insects' PH, and kills their appetite.
Coriander	Aphids, spider mites, whiteflies	Whole plant	Planted along the plot Acts as a repellent.	Repellent- contains Linalool and Geraniol
Garlic	Aphids, spider mites, whiteflies, nematodes	Bulbs	Warm water concoction used	Contains allicin and sulphur- acts as as a repellent.

Safety, toxicity, and application
- Even though pesticidal plants are less toxic than synthetic pesticides, safety measures like gloves, masks, and protective clothing should be used.
- If accidental contact occurs, rinse the area with clean water.
- Grains treated with pesticidal plants must be washed or winnowed before consumption.

Addressing invasive species
Utilising invasive species as pesticidal plants can help control their spread, but care must be taken not to propagate harmful species.

Challenges in adoption and scaling
Adoption is hindered by inconsistent effectiveness, unreliable raw material supply, lack of standardised methods, and regulatory demands for data on safety and efficacy. Issues include crude extract performance, environmental impact, and compliance with pesticide registration requirements.

Identification
Correct identification of the plant species, part, harvest timing, and extraction method is crucial for efficacy.

Mode of action
- Pesticidal plants act through toxicity, repellence, anti-feedancy, growth regulation, or interrupting egg-laying.
- Farmers are encouraged to experiment with different plants, concentrations, and mixtures to optimise results.

How to extract and apply pesticidal plants for field crops
- Plant materials should be shade-dried, ground, and stored properly.

- Extraction methods vary for aromatic plants, often requiring fresh materials.
- Soap is added during extraction to enhance compound solubility and adherence to leaves.
- Spraying should be done in the late afternoon or evening to prevent compound breakdown from sunlight.
- Frequent application is necessary due to the rapid degradation of compounds.

Optimisation of pesticidal plant products
- Ensure grains are well-dried and stored in pest-proof, ventilated conditions.
- Avoid overly concentrated or diluted extracts.
- Incorporate monitoring and repeated applications to enhance pest control effectiveness.

Using plant powders, concoctions or residues for field crops
- Powders can be sprinkled directly or sprayed on plants or soil to deter pests and control pathogens.
- For grain storage, powders can be mixed with grains or applied to storage bags for insect prevention.
- Double-bagging and treated storage sacks are effective for preserving grain quality.

The future of pesticidal plants in sustainable agriculture
Pesticidal plants hold the potential for organic, sustainable pest control, reducing reliance on synthetic pesticides. They can significantly contribute to resilient agricultural practices with market development, regulatory backing, and farmer education.

Conclusion
Pesticidal plants are sustainable, affordable alternatives to synthetic pesticides, supporting organic farming and food security. Their success depends on market support, regulation, and practical training, allowing farmers to adopt safer, locally sourced pest control methods.

FISH FARMING

How to run a successful fish farming enterprise

By Jesicah omete

Fish farming is becoming increasingly important in Kenya's agricultural sector as it provides a solution to food security, is a reliable source of protein, and provides an opportunity for income generation.

Considerations before starting fish farming

For one to be able to plan and develop an aquaculture enterprise, some of the basic requirements to be considered include;

a.) Capital—Financing is generally needed to construct aquaculture fish culture facilities, e.g., ponds, tanks, the purchase of machinery and equipment, the construction of buildings, the purchase of seed, feeds, and fertilizer, and operating and maintenance costs, including labour, power, supplies, and materials.

b.) Land availability - One should choose a suitable site for the enterprise that allows forfuture expansion.

c.) Market – A reliable and ready market is crucial; a farmer should carry out a market survey and culture a species that is commonly preferred by the consumers who will form the market.

d.) Water availability - Water is an essential consideration both in terms of quality and quantity. The sources of water for an aquaculture enterprise can be a stream, shallow well or bore-hole, dam or municipal water with varying cost implications.

e.) Infrastructure and accessibility - Good infrastructure is beneficial to any kind of aquaculture farming. For example, power and water supply and good road connections are some of the factors to consider when choosing a good location. Security is also key; your enterprise should be secured to maximize production and mitigate the risk of theft.

Common species cultured in Kenya

Although several fish species can be cultured within the country, not all are suitable for all regions. In Kenya, the most popular and predominant species cultured include the four species tabulated below, which show a comparison of the four species that one can consider for their aquaculture enterprise.

Nile tilapia

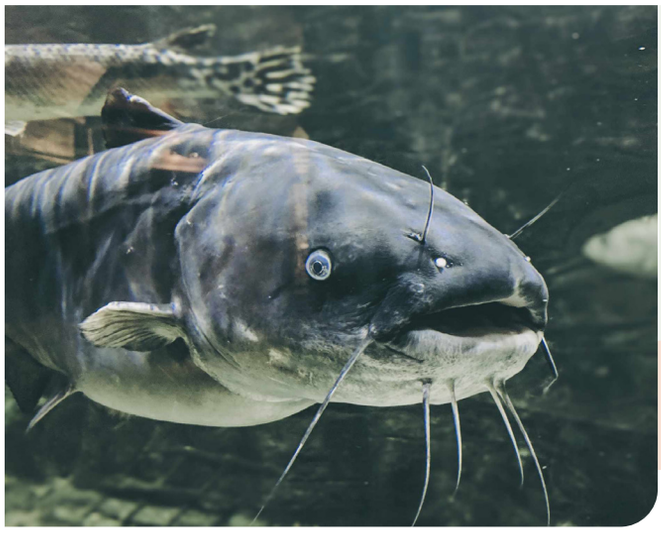
Oreochromis niloticus

ADVANTAGES

- High demand and consumer preference
- Fast growth [6- 8 months]
- Fingerlings available in authenticated farms
- Good performance in ponds, tanks, cages and aquaponics
- Good performance on low-protein diets

DISADVANTAGES

- Uncontrolled breeding ponds if not mono sex stocked
- Slow growth in cold areas



African Catfish

Clarias gariepinus

ADVANTAGES

- Very hardy and can survive in poor water conditions
- Has more fillet-to-body weight ratio
- Ideal for value addition, e.g. in fish sausages and samosas
- Fast growth and attains bigger weight than tilapia and trout
- Good for controlling the tilapia population

DISADVANTAGES

- Not very popular with consumers who buy whole fish
- Fingerlings mainly available by order

Rainbow trout

Oncorhyncus mykiss

ADVANTAGES

- Fetches high prices per unit of flesh
- Commonly preferred by large hotels and affluent consumers

DISADVANTAGES

- Acquisition of seed is a challenge
- Doesn't perform well under warm climate
- High maintenance costs in terms of feeds and water exchange
- Market mainly restricted to high-end consumers

Commom Carp

Cyprinus carpio

ADVANTAGES

- Has low crude protein requirements - cheaper feeds
- Attains bigger size

DISADVANTAGES

- Not very popular with consumers who say it is too bony
- Fingerlings not readily available
- Not recommended within the Lake Victoria Basin for ecological reasons

Good fish farming management practices
A Farmer should adopt the following practices for quality production

Water quality management - Regular monitoring and maintenance of water quality parameters, e.g. temperature, PH, and dissolved oxygen, by conducting regular water exchange to dilute harmful substances and replenish essential minerals will ensure a healthy environment for the fish.

Feeding practices - Use balanced, high-quality feed appropriate for the species. Avoid overfeeding to reduce waste and water pollution.

Stocking density—Maintain appropriate stocking densities to avoid overcrowding. This helps reduce stress, the spread of diseases, and competition for resources.

Biosecurity measures - Follow strict biosecurity protocols to prevent the introduction and spread of pathogens. This includes disinfecting equipment and maintaining controlled access to the farm.

Record keeping - Maintain a detailed record of feeds, growth, stocking dates and sources for easy traceability.

Sediment control and algae growth - Minimize sediment build-up by managing runoff and controlling erosion around the ponds. Also monitor and manage nutrient levels to prevent excessive algae growth, which can lead to oxygen depletion.

Different sizes of pellets produced commercially

What to feed fish for increased production
To achieve maximum production in fish farming, use quality commercial feeds, which are essential to providing a balanced and nutrient-rich diet for better growth.

Types of feed
Extruded feed: commonly used in aquaculture for its digestibility and ability to float to reduce waste and losses.

Pelleted feed: these are compressed pellets, either floating or sinking effective for large fish farms.

Formulated feeds: Custom-made feeds can be designed based on the nutritional needs of the fish species you are farming, ensuring that all amino and fatty acids are provided.

For juvenile fish or smaller species, use crumbles which are smaller in size than the pellets.

Quality commercial fish feed
Farmers should feed their fish with quality commercial feeds which are formulated to provide the right amount of protein, fat, vitamins and minerals required for healthy growth. They contain the following ingredients;

Crude protein, e.g., fish meal, soybeans, and other plant-based sources. Fish require 30%—50% protein content for growth, depending on the species.

Fat and carbohydrates; These provide the energy needed for sustained growth and activity. Fat content usually ranges between 5% -and 20% in fish feed, while carbohydrates are also included as a source of energy.

Vitamins and minerals Are crucial for fish metabolism and immunity. Commonly added vitamins include A, D, E and C along with minerals like calcium and phosphorus.

Alternative aquaculture feeds include
Black soldier fly BSF with crude protein of 30% - 46%.

Red worms (Eisenia fetida) with 61% crude protein,9% fat and 5% ash.

Cultured algae consisting of Blue Green Algae BGA, with spirulina platensis being the most preferred species with 60% -70% crude protein.

By using a combination of high-quality, well-formulated feeds and adopting efficient feeding strategies, fish farms can significantly increase production while maintaining the health of the fish and the sustainability of the operation.

Jesicah Omete is a fisheries officer, in the department of agriculture, Kisii County.

Staggered production: Enhancing farm produce, human nutrition and market stability

Staggering ensures a steady supply of fresh produce, in and out of season, assuring the farmer of the market, reasonable prices and waste reduction

By Elias Biwott
Staggered production or sequential cropping is a practice where crops are planted at intervals or steps to ensure a continuous supply of produce over an extended period. This ensures the alignment of output to market demand.

When crops are grown for a single large harvest, usually there is wastage, and profitability is limited as markets could be flooded with the same type of produce. Staggering, on the other hand, ensures a steady supply of fresh produce, in and out of season, assuring the farmer of the market, reasonable prices and waste reduction. Staggering is also suitable for enhancing soil fertility and disruption of pests' occurrence.

Key benefits of staggered production calendar
A planting calendar is a crucial tool for implementing staggered production. It outlines when to plant, maintain, and harvest crops throughout the year.

Creating a staggered planting calendar
Understand crop requirements: Choose varieties with different maturation times to further spread out harvest periods and identify the optimal planting and harvesting periods for each crop based on climate and soil conditions.

Divide the planting schedule: Plan planting in intervals, such as every two weeks and incorporate crop rotation to ensure continuous harvesting and to maintain soil fertility and reduce pest and disease buildup.

Monitor and adjust: Be prepared to adjust planting times and intervals based on weather forecasts and seasonal variations, keeping anticipated market demand in mind, to avoid oversupply or shortages.

Implementation strategies
- **Crop selection and timing:** plan planting schedules based on crop varieties, climate conditions, and market demand. Choosing suitable crops and understanding their growth cycles are crucial for successful staggered production. Farmers need to grow a variety of crops that have different harvesting times and include high-value crops.. This helps reduce dependency on the price of a single crop and enhance profitability, especially during off-peak seasons.

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- **Use of technology:** Apps and software that provide planting reminders, weather forecasts, and pest management alerts used in precision agriculture tools can aid in planning and managing staggered production. Data analysis helps in monitoring crop health, soil moisture, and weather conditions, enabling farmers to make informed decisions.
- **Integrated pest management (IPM):** Staggered planting can be integrated with IPM strategies to manage pest populations better. Continuous monitoring and targeted interventions help in controlling pests without resorting to excessive pesticide use.
- **Extension services:** Agricultural extension services often provide region-specific planting calendars and advice to optimise on the benefits.
- **Manual records:** Maintaining a notebook or chart with planting and harvesting dates for easy reference is helpful.

Benefits of staggered production

Staggered production helps avoid market gluts that occur when large quantities of a crop are harvested simultaneously by spreading out the harvest. Maintaining a steady supply helps stabilize prices and ensures that markets are not overwhelmed. This allows matching the supply with market demand minimizing price fluctuations and creating a more predictable and stable market environment.

Regularly planned intervals of production make supply more predictable, helping both farmers and buyers plan better. Holding back or accelerating harvests based on real-time market data stabilizes prices, optimizes revenue, and meets peak demand periods, capturing higher prices.

Adverse weather, pests, and diseases can significantly impact agricultural yields. Spreading these risks over time by diversifying planting times reduces the likelihood of complete crop failure.

Continuous harvesting allows for better planning and use of storage facilities and transportation, reducing bottlenecks and losses. Spreading out production, harvesting, processing, and marketing of agricultural products help in evenly distributing labour and inputs like fertilisers, pesticides, and water, leading to more efficient resource use.

Continuous harvesting also allows farmers to deliver fresher produce to the market steadily, focus on quality over quantity, secure long-term contracts, reduce the need for large-scale storage and the risk of post-harvest losses due to spoilage leading to better market acceptance and potentially higher prices. Continuous cultivation helps maintain continuous soil cover, efficient nutrient use, enhanced soil structure, and fertility management due to continued organic matter addition. Moreover, water usage can be more efficiently managed as irrigation needs are spread out, reducing peak demand on water resources. Farmers and supply chain actors (distributors, retailers, and consumers) can collectively collaborate through cooperatives to plan staggered production, align their production schedules with actual market requirements/needs and negotiate for better and stable prices due to consistent supply or contracts.

Staggered production is good not only for business but also for household consumption needs. It helps in:

- **Diverse food supply:** This allows for a variety of crops to be harvested continuously, ensuring nutrient diversification for households.
- **Food security:** Regular harvesting reduces the risk of food shortages at the family level.
- Allowing fresh produce in the market: This ensures that food reaches consumers in a fresher state, preserving its nutritional value..
- **Addressing micronutrient deficiencies:** This helps farmers grow a variety of high-nutrient-value crops such as leafy greens, legumes, and fruits.

Challenges and considerations

While staggered production offers numerous advantages, it also poses particular challenges:

i. Managing staggered planting schedules requires careful planning and coordination. It can be more labour-intensive and requires a good understanding of crop growth cycles and market dynamics.
ii. Continuous harvesting necessitates adequate storage, transportation, and processing facilities to handle the ongoing influx of produce. This requires investment in infrastructure.
iii. Even with staggered production, farmers must be aware of market demand fluctuations and be ready to adjust their schedules accordingly to avoid overproduction or under-supply.

Conclusion

This strategy is a sustainable agricultural practice that aligns well with modern demands for continuous production, consistent supply, quality produce, diverse and nutrient-rich food and efficient resource use. By adopting this strategy, farmers can enhance their resilience to environmental, nutritional and market challenges while contributing to food security, healthier communities, economic stability and sustainability in their farming systems.

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Minimizing chicken stress during transportation

By Esther Ndanu

Stress has health implications for chickens and can result in lower production levels and higher costs. Some of the most significant physiological symptoms of poultry stress include:

- Weight loss
- Immune suppression
- Increased susceptibility to diseases

One major way in which chickens are exposed to stress is during transportation. Transporting chickens from one location to another is often necessary but it can cause birds to become sick and—in extreme cases—die due to stress. There are four key aspects to figuring out how to transport chickens in a way that minimises stress and avoids production losses.

Create a healthy environment

Access to fresh air and water is essential. Chickens do not have sweat glands and can quickly become overheated in warm weather, especially when their environment lacks good ventilation. Choose a vehicle that allows for airflow during transportation, and make sure each poultry travel crate has breathing slots.

Chickens are more comfortable and calm when they feel air flowing. It's the equivalent of humans enjoying a cool summer breeze. However, be careful not to choose a transport vehicle entirely open to the elements. Open-air vehicles cannot shield chickens from potential rainfall, debris kicked up from the road or overpowering wind gusts. Chickens also need to be able to access fresh water every couple of hours otherwise they will become dehydrated and more stressed.

Long trips will also require that the flock is fed every four hours. Try to create an environment that allows your chickens the airflow, water, and feed they need with the least disturbance possible.

Small, dark boxes

While you want your chickens to feel a light breeze, you must limit their access to light. Use small, dark crates to reduce stress levels. Check air holes to ensure they aren't large enough to let in a lot of light. Chickens go into a sleep-like state in the dark, which keeps them relaxed. The darker you can make your crates while allowing plenty of fresh airflow, the better. Small crates that can hold two or three chickens is the best way to move your flock. The snug quarters will prevent movement during transportation, and the company of other chickens will keep them calm.

Small crates used to transport chickens

Quiet, smooth trip

Avoid travel routes with loud traffic, lots of construction, and rough roads. Smooth, quiet drives will minimise the chances of your poultry experiencing stress. Before you begin transporting chickens, reduce the noise they will encounter by placing crates on sound-absorbent surfaces, such as blankets or rubber mats. You should also consider using an insulated vehicle.

Prepare housing

Before you move your flock from one location to another, prepare the new housing facility with the following essentials:

- Fresh feed and water
- Clean bedding (straw or shavings)
- An enclosure that offers protection from predators

A good poultry house protects the birds from the elements (weather), predators, injury and theft. Poultry requires a dry, draft-free house. This can be accomplished by building a relatively draft free house with windows and/or doors which can be opened for ventilation when necessary. For better ventilation, the house should be rectangular with a maximum width of not more than 10 metres (or 33 feet) and have a wall not higher than 3 feet on the longer side. The rest of the side wall should have chicken wire.

An example an ideal chicken house

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Tree Planting In Farmlands

By Esther Mwanthi

Why is it important for farmers to plant trees in their farmlands? Trees play a central role in our restoration efforts because of the many benefits they provide.

- They capture carbon from the atmosphere thus purifying the air we breath and reduce the effects of sun rays.
- They regulate water, prevent soil erosion and provide crucial habitats for wildlife.
- They provide shade, act as windbreaks, provide timber for construction, poles and fuelwood. All these and others are good benefits provided by trees and hence give a reason why trees should form a component of the farmers' farmland.

A farmer can ensure a maximum utilization of his plot while planting trees and other crops. The mixing of trees and crops is known as agroforestry. Several ways of mixing of trees and crops are as follows;

1. A farmer can plant crops in between rows of trees. The farmer will continue harvesting the crops while the trees grow to maturity for harvest as well.
2. Boundary planting -trees can be planted along the boundary. They act as windbreaks and provide maximum benefit to the farmer.
3. Compound planting- a farmer can plant trees in his compound. They give a scenic value (beauty) and also provide shade.
4. Silvo pasture- trees can be planted in the same area where grazing is taking place in a pasture land - the trees provide shelter for livestock while providing timber, fruits, and fodder to the farmer.
5. Random planting- trees can be planted randomly within the farmland in a way they will not affect the crops growing in the farm and the farmer will continue benefiting from the trees.
6. Woodlot - a farmer can set aside a small land section within his farm, different from where he is growing crops and plant trees only.

What to consider while planting trees

The farmer should ensure to plant the right tree species in the right sites. The only trees to be planted in farmlands are only the agroforestry species (those that have no effect on crops). These tree species are nitrogen fixers in the soil they do not compete with the crops for nutrients and are deep-rooted. Examples are grevillea robusta, caliandra collothysus, sesbania sesban, Leucaena leucocephala, etc. These trees have light canopy and can allow some sunlight through. Some tree species do not allow anything to grow beneath them so these ones should not be planted in cropland. Examples are eucalyptus and casuarina, but these are good for woodlot, where the farmer has set aside a land with no crops, these trees can be planted for woodlot. The leaves of these tree species are poisonous and where they fall nothing grows. These tree species should not be planted as boundary planting.

Tree management

Many tree establishment efforts focus on the planting process and fail to consider the years of time and effort needed to care for the planted trees and manage their growth. Trees planted on farms require management and the management can be time consuming.

A farmer can grow trees in his farmland and at some point, tree crowns overgrow to shadow off the crops. In such cases, the crop yield will reduce hence there is need to manage the trees by pruning the tree branches to reduce overshadowing of the crops by the trees. There are several ways a farmer can do tree management as below.

1. **Pruning** - Prune trees at the right time of the year and use proper techniques to promote healthy growth and prevent damage. Note; over pruning can permanently damage or shorten a tree's life.
2. **Thinning-** This is the removal of trees that are diseased, deformed, dry, etc., to give way for those that are in good form.

3. **Coppicing** -Cut a tree to encourage enhanced growth. This can rejuvenate a tree and help it to last longer. Also, when the tree coppices, removal of some coppices is done to leave only the best coppices for better growth.
4. **Lopping**- This involves cutting entire branches from a tree to reduce its size. This then removes all the branches of the tree and thus minimizes the over shading effect of the branches.
5. **Pollarding**- This method involves cutting off the top part of a tree, hence reducing shading effect of the branches.

These management practices are very key for a farmer to continue enjoying the benefits of the trees and maximize on products.How a farmer can ensure tree planting is successful in farmlands.

Tree management, refers to all the activities that take place right from when the tree is planted until harvest time. A farmer has to be ready and plan well for a tree planting activity and the planning should be understood as below;

Tree planting

- Seedlings to plant must be available (borrow, buy, etc.)
- Prepare where to plant- Dig holes good enough to accommodate water for the tree establishment (11/2×11/2×11/2 ft (drylands)). Dig the right spacing.
- Plant the trees/seedlings - Plant the right species, plant the right way and tend the tree well.
- Holes to plant should be done during the dry season and if possible manure (animal) added. Then plant the trees when the rains commence.

Tree tending

The planted trees have to be tended, weeded, watered during the dry season until that tree is well established. A sign of a tree establishment is when it starts sprouting (new leaves start coming up). Do not stop watering until the next rain season.

When the tree matures and is planted in a farmland where crops are grown, then remove the tree branches in a manner as has been explained above in tree management topic to ensure the underneath is receiving enough sunlight.

Esther Mwanthi is an agroforestry expert working with Kenya Forests Service.
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Regenerative agriculture farmers in Makueni start a village market

By John Mutisya

Farmers from four wards of Makueni County (Ukia, Kee, Wote-Nziu and Kiima Kiu wards) have been practising regenerative agriculture for two years. Though the venture has been laborious, involving establishing water harvesting structures, preparing bio-fertilizers, and integrating agroforestry/livestock, farmers have worked tirelessly to reap the benefits.

Regenerative agriculture focuses more on resilient activities that promote soil health, biodiversity, animal integration and environmental conservation to create a sustainable food flow system for improved livelihoods. Farmers in this space, under close guidance of the field staff from Makueni, have now started realizing better yields and more diverse products from their farms, which now calls for a sustainable market.

For many years, farmers have suffered in the hands of brokers (middlemen) who buy their farm produce at very low prices. They also experience huge post-harvest losses due to a lack of a good market since most of the farm produce is highly perishable, and any delays to markets lead to huge losses. This is worsened by high transport costs from the farm to distant markets.

Intervention

Due to this suffering, the Enviu and Biovision Africa Trust team came up with the idea of establishing a village market. This idea of a village market was born in July 2024 with farmers in the regenerative agriculture space welcoming it and gathering their farm products in readiness for the day. Prior and proper awareness was created to the public through posters, letters, and through social media platforms. The village market was also mentioned in public forums like barazas and other community gatherings. The village market took place at Alex Sombas' farm.

It was specially arranged with prices for the products determined by market forces with buyers interacting freely with sellers. Regenerative farm products ranging from traditional root tubers/crops, pumpkins, thorn melons, indigenous cereals, fruits, and vegetables were marketed. Though it was a first of its kind, more than 200 buyers and sellers assembled and more than 75 % of the farm products were purchased. Farmers turned sellers went home with heavy pockets with customers carrying healthy and nutritious products from regenerative farms.

Benefits of village market

- Products are sold promptly
- Reduced costs since products are sold at doorsteps
- Farmers are aware of what they are buying since they know the farms where the products have been harvested.
- Availability of assorted products for the community to make their choices.
- Possibility of increased adoption motivated by the availability of the local market.
- The community has started enjoying improved nutrition from within.

Lessons learnt

- The idea, if implemented consistently, will create more awareness and widen the market.
- It will also net more interested community members who want to join regenerative agriculture farming.

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TOF Radio

Through weekly Kiswahili and local languages radio programmes, TOF Radio helps to improve awareness and knowledge of sound agroecological practices, strengthen the link between researchers and farmers to enhance food security, reduce poverty and increase household incomes among farmers in Kenya.

TOF Radio Stations

Emuria FM	Monday and Friday -10-11AM
Getembe FM	Monday 8PM
Milele FM	Tuesday 11-12AM
Mutongoi FM	Wednesday 10-11AM
Coro FM	Thursday 8.20-9PM
Ingo FM	Friday 8-9PM

TOF Radio answers your questions

What you need to know about Irish potato production

IN THIS ARTICLE we answer some of the questions we received after the broadcast of TOF radio program aired on 12th November 2024 on production of Irish potatoes in Kenya. The program airs every Tuesday from 12pm-1pm on Milele fm.

By Charles Kimani

Potatoes are a signature component of most Kenyan meals and offers a lucrative business opportunity for many farmers. They are primarily grown in the highland areas of Nakuru, Nyandarua, West Pokot, and Nyeri. In Uasin Gishu (high-altitude areas between 1,500 and 3,000 meters), potatoes are the second most important food crop after Maize.

Common varieties of Irish potatoes

There are close to 62 different varieties of Irish potatoes which are currently certified and available in the country. Some of these varieties include Unica, Sherehekea, Kenya Mpya, Dutch, Arizona, Destiny, Hangi, Lady Amarilla, Kerr's pink, Faluka, Derby, Annet, Royal, Rumba, etc. Farmers are advised to use certified seeds to avoid losses. You can find a summary of accredited seed Potato Merchants here: https://npck.org/available-seed/

Ecological conditions

Potatoes require a good supply of moisture to maximise yields and quality. Well-drained loamy to sandy loam soil is the most recommended. The pH should range between 5.0 and 7.0 but the ideal pH should be 5.5. The soil should be deep, light, loose and well drained but able to retain moisture.

Low-lying areas that are likely to be drained with surface runoff from other higher potato growing zones should be avoided. Potatoes require an average daily temperature of between 15 and 18 degrees. Temperatures above 21 degrees Celsius have adverse effects on potato growth, leading to a sharp decline in tuberisation. Above 29 degrees Celsius, there is little or no tuber formation.

Potatoes require between 400 and 800 mm of rainfall during the growth period.

Major pests affecting Irish potatoes

Like other crops, Irish potatoes are susceptible to pest attacks, which reduce the quality and quantity of produce. Major pests attacking Irish potatoes in Kenya include potato tuber moth, aphids, root knot nematodes, spider mites, millipedes, mealy bugs, and cutworms.

Pests and disease management

The following are measures farmers should take to mitigate against disease and pest infestation:

1. Use healthy seed potato tubers when planting; always plant clean or certified seeds.
2. Use varieties that have high levels of disease resistance.
3. Always cover tubers with soil during hilling to prevent tuber infections.
4. Before harvesting, destroy leaves that are infected to reduce the chances of tubers encountering the spores.
5. Harvest tubers when they are fully mature to reduce incidences of skin damage and spores' entry during harvesting and storage.
6. Before planting, select potato varieties resistant to late blight.
7. Hill or earth-up exposed tubers to prevent transmission of fungus/bacteria from above-ground plant parts to tubers.
8. Scout regularly for signs of the fungus on the underside of the leaves and stems of the plants after the plant emergence.
9. Use organic fungicides, such as red or blue copper, only as a last resort and according to the recommended application rates provided by the manufacturers.

Charles Kimani is the feedback officer at Biovision Africa Trust.
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