

## Dear Reader,

As you prepare to plant during the short rains, ensure that you do things right from the start and consider techniques that will provide maximum yields.

In this issue, we explain the use of Zai pits for increased yields, especially for areas with inadequate rainfall. We also provide guidelines for establishing various types of seedbeds and their management.

We also address the recent locust invasion that left many farmers staring at huge losses. With the expected second wave, we tell you how to use neem to prepare an extract that can protect your crops from locust damage.

In poultry rearing, diseases can be challenging for farmers. However, by applying bio-security measures farmers can reduce disease incidences and rear organic poultry successfully.

Indigenous foods such as cassava and yams are a great boost to food insecurity due to their resilient nature as well as the nutritional value. Learn about these tubers, and discover how they can earn farmers good incomes, especially when grown commercially. Also, find out how to make hay to keep your dairy animals well fed during the dry season. Finally, fermented food is full of health benefits and we tell you why you should never abandon them.

From the editor

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## Protect your crops from desert locusts organically with neem oil

**Neem oil is a natural insecticide in the control of pests such as aphids and the African armyworm**

By Silke Bollmohr

The Horn of Africa is going through the worst desert locust invasion ever and experts predict that they are here to stay, at least until the end of this year, if not longer.

Of all the migratory insects, these locusts are the most ravenous and destructive. They eat everything on their way, including sorghum, maize, wheat, barley, rice, sugarcane, coffee, fruit trees, grasslands, and rangelands.

Currently, most pesticides used to control them are applied by aerial and ground spraying. However, this has raised concern over the adverse effects they have on people, plants, and soil microorganisms.

The active ingredients used against locusts in emergencies comprise a broad-spectrum of insecticides of the organophosphate (OP), carbamate, and pyrethroid families.

Most of them are not only toxic to the pests, but also affect other insects, fish, and wildlife. They also can have chronic effects on human beings, as we reported in TOF July issue, No. 180.

Some of the chemicals are particularly harmful to children and unborn babies, affecting the development of the nervous system. Because the locusts are likely to be around for the next two years, long-term solutions that have the least toxic effects on people, non-target organisms such as birds, bees and other important pollinators, and ecological processes, must be considered.

### What can farmers do?

In the TOF magazine issue No. 59, April 2010, we wrote about the benefits of the neem tree and its potential as a natural insecticide in the control of pests such as aphids and the African armyworm.

The good news is that neem oil can be used to control locusts and protect crops and grasslands.



### How does neem oil affect locusts?

The most active chemical in neem oil, azadirachtin (with its highest concentration in seeds), is effective in increasing mortality, disturbing metamorphosis, and reducing general activity in locusts and grasshoppers (Nicol and Schmutterer 1991). Neem oil can also be applied as a repellent. When applied to crops and grassland, locusts will not feed on them. They develop a 'dislike' taste during evolution. Even under extreme climatic conditions of the Sahara, the desert locust was repelled from feeding for up to 10 days, when the main food source in the area was treated with neem oil (Wilps et al., 1992).

### Benefits of growing neem trees

- The tree improves soil fertility and water holding capacity, as it has the unusual property of calcium mining. It can, therefore, neutralise acidic soils (Uyovbisere and Elemo, 2002).
- Its extensive root system also has a rare physiological capacity to extract nutrients from highly leached sandy soils (<https://www.infonet-biovision.org/EnvironmentalHealth/Trees/Neem-tree>).
- The fact that neem keeps its leaves during drought, increases its importance as a source of biomass for mulching (Tilander and Bonzi, 1997).
- In a pastoral system, the tree provides shade, improves fodder productivity in the dry season, and provides animal medicines (Gill and Roy, 1993).



## Decked planting beds

They provide more surface area for planting, and can increase yields out of small spaces, **Story on Page 6**



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- *Neem also helps control more than 200 other pest species (Ahmed, 1995). The ability of the tree to tolerate drought and saline conditions makes it a good candidate for land restoration.*
- *Economically, seeds can be gathered for medicinal or pest control, which can generate income, if this supply chain is developed.*

### Neem insecticides disadvantages

- *Despite its broad spectrum action, neem products generally do not harm natural enemies in their adult stage because they do not feed on the plants and are, therefore, not exposed. However, larvae of natural enemies, hoverflies and parasitic wasps, might be affected.*
- *Neem products may be harmful to some water organisms. However, farmers can reduce the risk by not using neem close to water bodies, and in the morning when most natural enemies (including pollinators) are out.*
- *Farmers should prepare the product out of sunlight and apply it during dusk since the active ingredients break down very fast in UV light.*

**NB:** Neem oil does not kill locusts and other pests immediately, and effects are often not visible until 10 days later. Farmers may thus think that it is not efficient. Generally, more knowledge and understanding of its mode of action is required.

### How to make your neem insecticide

The seeds are the primary source of the insecticide. Pick them when they are greenish/yellow when they contain the highest concentration of azadirachtin. They can be used as simple aqueous extracts or as a basic raw material for formulated pesticides. The leaves can



**Neem oil can also be applied as a repellent. When applied to crops and grassland, locusts will not feed on them. They develop a 'dislike' taste during evolution**

also be used as simple aqueous (water) extracts.

1. *After picking the seeds, dry them in airy conditions (in sacks or baskets) to avoid formation of mould.*
2. *Remove the flesh from the seeds and wash away any remaining shreds.*
3. *Grind 500 grams (g) of neem seed kernels in a mill or pound in a mortar.*
4. *Mix the crushed neem seed with 10 litres of water. It is necessary to use a lot of water because the active ingredients do not dissolve easily. Stir the mixture well.*
5. *Leave to stand for at least 5 hours in a shady area.*
6. *Spray the neem water directly onto crops using a sprayer or straw brush. Neem water can be stored and will remain effective for 3 to 6 days if it is kept in the dark.*

Neem oil is one possible option and farmers should be supplied with neem oil products to protect their resources during locust invasion.

There are locally produced neem based biopesticides retailing in the market, which farmers who cannot access neem trees can buy for use in their farms. Examples include: *Neemros®* and *Neemroc®*.

More information on preparation processes of both seeds and leaves can be found at <https://www.infonet-biovision.org/Publications/Neem-Tree-HDRAorg/PlantHealth/Plant-extract-Neem>

## Using decked planting beds

**They provide more surface area for planting, and can increase yields out of small spaces, making them useful for small-scale and urban farmers**

**By James Kamau**

One of the greatest challenges facing agriculture is the lack of adequate planting space especially among the urban and peri-urban farmers. Many people wish to produce their own food but lack adequate space. However, this need not be a handicap, as they can use decked planting beds.

### What are decked beds?

Decked planting beds are layers of planting platforms arranged one on top of another. They provide more surface area for planting, and can increase yields out of small spaces, making them useful for small-scale and urban farmers. In organic gardening, the use of space, conservation of water, diversification of plant species and conservation of nutrients, are some of the most fundamental factors that a farmer needs to follow. A double or triple-decked planting bed meets all these factors.

### How to make decked beds

You can create decked beds using a range of materials depending on the space that is available. Layered plastic bottles, tires, plastic pipes, and even stones for larger gardens can be used.

To create a bed using plastic bottles and jerrycans, cut a 20litre, 10litre, 5litre and 2litre plastic jerrycan in half. Stack them one over the other and fill them up with soil with the largest container being at the bottom, then the medium container and the smallest container being at the top. Your decked bed can have different types of crops but the deep rooted plants should always go at the top. If you are growing smaller plants like cilantro(dania), onions and spinach, the old plastic bottles will work well.

However, for a bigger garden with larger plants, you can use old tyres. Start by getting a range of tyres, from a tractor tyre to a small vehicle tyre. Stack the tyre with the largest being on the



ground. Make sure to pack in your soil mix from the bottom up. Place a perforated pipe filled with ballast in the center to provide drainage. From there, the bed can be mulched and planted. Always make sure to plant a variety of species to ensure plant diversity and reduce pests and diseases.

Another example of a stacked garden is a herb spiral mostly created for growing herbs. You can build this by stacking stones in a spiral pattern as you fill in soil. The spiral goes up like a spring and the stones hold the soil in place. You then plant the deep rooted herbs like rosemary at the top circle and shallower rooted plants like sage, tarragon, and dania as you go down. This also applies to other plants if you don't want to plant herbs.

### Advantages of decked beds

They require less watering. Since plants are arranged close together and on top of each other and connected with a pipe, watering all decks is easy. In a decked garden, earthworms will easily create vermi-compost throughout all levels of the decks. Earthworms provide rich manure thus you will need to add only small amounts of mulch and organic matter to replenish your soil.

### What can you grow on the different layers?

You can plant carbon crops such as maize, which is a biannual in a cluster on the top deck. Their taproots grow deep and break up the soil. After harvest, the mulch from their stalks can add carbon to the soil. Around these, plant legumes such as beans, which add nitrogen to the soil and are also long season crops.

On the same deck, introduce a squash or variety of tuber for complementary planting and ground cover.

On the lower deck, you could plant a variety of mixed leafy greens, bulbous plants such as onions, together with various salads and herbs of your choice to give a diverse mix of crops. Planting crops like onions and chillies in between the vegetables assists in pest control as most pests dislike their pungent smell and taste.

### How to mix the soil

Mix soil with manure or compost in the ratio of 1/8th of a bucket of well composted manure to each bucket of soil. Cut dry leaves and straw into small pieces and add it to the soil mixture. Leave some stones and pebbles in the soil to reduce compaction.

You can also introduce earthworms to the soil to increase aeration and whose feces and urine provide natural manure. However, ensure that organic matter in the soil is completely decomposed before introducing earthworms as decomposing materials will kill them. You are not limited to two decks and you can make as many as you are comfortable with. With good planning, a decked bed can provide a year round supply of fresh vegetables for your family.



**You can create decked beds using a range of materials depending on the space that is available. Layered plastic bottles, tires, plastic pipes, and even stones for larger gardens can be used**

## Use Zai pits for better yields

By Purity Khandasi

Farmers have been grappling with unfavourable conditions due to climate change. Adopting climate-smart technologies that help them grow crops productively is, therefore, important. Use of Zai pits is one of the technologies that farmers cultivating land in dry areas can adopt.

Zai pits or planting pits are water-harvesting pits that are dug and filled with organic matter such as manure or compost, into which the seeds are planted. This technology helps farmers living in the arid and semi-arid areas to improve their yields as they increase water infiltration and retain moisture, keeping it close to the root of the crop.



### Establishing Zai pits

Dig a pit that is two feet wide, two feet long and two feet deep. Leave one metre between the rows. The measurements and number of seeds per pit will sometimes vary, depending on the type of crop being planted and the amount of rainfall the area receives.

Place organic matter and dry plant materials such as dry leaves and maize straws into the bottom of the Zai pit to prevent evaporation. The organic matter should, however, be light enough to decompose quickly.

The next layer should have soil and well-decomposed farmyard manure, which should fill up three quarters of the pit, leaving space on top for water accumulation and mulching.

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### Benefits of Zai pits

- They require very little input from the farmer.
- Increase crop yields and are easy to manage, making them financially viable for small-scale farmers.
- The pits reduce land degradation and soil erosion, increase soil fertility and improve water management.

They ensure that fertile soil is concentrated close to the root, boosting crop growth.

- The soil and manure in each pit enhances the water harvesting capacity of the pits, while the organic matter prevents evaporation of moisture and increases water retention in the soil.
- Use of Zai pits increases crop yields. A farmer plants nine seeds of maize per pit, on half-an-acre piece of land,

and can harvest over 12 bags of maize compared to on the surface planting, which would yield between one and four bags.

- Because the pits are depressed, seeds and organic matter are not washed away when it rains.

This technology is suitable for maize and other crops, including vegetables such as kales and spinach.

## Biosecurity measures to protect your chickens

By Nelson Barasa

As we continue to fight against the spread of Covid-19, consuming a balanced diet can increase your immunity. Chicken and eggs are a major source of the proteins needed for a balanced diet. When sourcing for eggs and chicken, ensure that they are free from pathogens and drug residues. Long-term consumption of meat and eggs contaminated with antimicrobial residues found in antibiotics given to chickens reared conventionally can cause drug resistance in humans.

This can become challenging especially in the management of diseases such as Covid-19. It is, therefore, important that farmers observe good farming practices that ensure quality products by rearing their birds organically. The high risk of disease outbreaks, which can lead farmers into the overuse of antibiotics in treating and preventing diseases, is one major challenge that discourages farmers from organic poultry keeping. However, organic farming can be rewarding and below are tips to help reduce the risk of poultry disease outbreaks in your farm.

### a. Farm location

Your poultry farm should be located away from areas that have high human traffic. Poultry houses should be located some distance from the road, the gate, and main house. This will reduce unwanted visitors who can introduce diseases to the farm.

### b. Farm visitors

Uncontrolled visitors increase the risk of diseases. Therefore, ensure that only necessary outsiders are allowed into the farm and that they wear protective gear. A visitors' record book should be available at the entry to track and control visitors coming into the farm. The farm should also be fenced off. Veterinary doctors should also be cautious to avoid transferring diseases from one farm to another.

### c. Poultry house

Spacing: Poultry houses should provide adequate space for the birds. Recommended spacing for broilers is 1 square foot per bird, for layers and kienyeji chickens is 2 square feet. To keep 100 indigenous chickens, you will need a house with a floor space of 200sq feet (20ft length by 10ft width). They should also be well-ventilated as chicken droppings produce ammonia, which can cause respiratory illnesses, especially when housing many birds. Do not mix different types of birds in one house or farm. This

is necessary for better feed and disease management, since the requirements for each vary. The same applies to vaccination. Keeping a mixture of species, for example, ducks, chickens and geese, increases the risk of spreading diseases. In addition, older birds are more resistant to diseases and can be asymptomatic carriers that transmit diseases to the younger ones. Mixed ages can also increase cannibalism.

**Hygiene:** Good hygiene should be observed. A footbath with disinfectant should be placed at the entry of the farm and poultry house. The litter (wood shavings on the floor) should be four inches thick and always be dry. Wet litter provides a breeding point for diseases such as Coccidiosis. It can also lead to foot infections affecting their mobility and growth.



Effects of wet litter

### d. Rodent control in the house

Rats are disease carriers and compete with chicken for feeds. Farmers should clear cluttered areas that make good breeding spots for rats. Clear bushes around the poultry house and place rat baits or traps in strategic areas of the farmhouse. Poorly placed baits can poison your birds.

### e. Good Nutrition

Birds need good quality balanced rations. Raw materials used to make feeds should be free from aflatoxins. Antibiotics should not be part of the feed making ingredients. Use greens such as kale leaves to supplement the diet.

- f. **Drinking water** is another source of disease that farmers sometimes ignore. Water intake determines the birds' rate of feed intake. On average, a chicken needs two litres of water for every 1kg of feeds consumed. Provide clean and quality drinking water at a temperature of between 25 and 30 degrees Celsius. Adequate, clean feeders and drinkers

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# Growing and reaping big from cassava

With its drought-resistant traits, the cassava, rich in starch, carbohydrates and fibre, can tackle food security and be a great income earner

By Emmanuel Atamba and Beritah Mutune

In Kenya, it is considered the poor man's crop by some, while stories of families and children dying after consuming cassava have made many to avoid it.

However, with its drought-resistant traits, the cassava, which is rich in starch, carbohydrates and fibre, can tackle food security and be a great income earner. The leaves contain a high level of Vitamin A and up to 17 per cent of proteins. They are used as green vegetables, while peels and other remains can be processed into animal feed.

When proper precautions are taken during preparation, the tubers are safe for consumption. Consuming raw cassava is discouraged. However, despite its great potential as a food security and income generating crop, its consumption and planting is low in Kenya, especially when compared to that of countries like Nigeria, that grow cassava extensively.

According to a report by CUTS International in October 2019, the western Kenya counties of Busia, Homa Bay, Siaya, Migori, Coastal counties of Kwale, Kilifi, Eastern Kenya and Kitui, account for almost 95 per cent of the cassava production. As early as 1961, Kenya produced about 280,000 tonnes of cassava according to FAO (FAO, 2019). This figure has gradually grown with peaks and lows over the 1980s, 1990s and early 2000s, until 2017 when cassava production reached an all-time peak production of 1,112,000 tonnes.

Busia, Migori and Homa Bay counties had the highest acreage under cassava as of 2018, with Busia farmers generating about Ksh2.5 billion from the sale of cassava in 2018. The figures also show that, growing cassava commercially is more profitable than most crops and is third only to growing tomatoes and pineapples with gross revenues of Ksh130,000 per acre (compared to Ksh180,000/acre for tomatoes



and Ksh47,500/acre for maize (Farm Concern International, 2019). There is therefore a need to move cassava from being grown mainly as a food security crop where only the surplus is sold to generate income to being grown as an income generating crop.

## Cassava varieties

Choosing the right variety is important. Kalro has categorised different varieties based on the areas where they do well, their resistance to diseases and the characteristics of the final product. There are many good cassava varieties that have been produced over the years. However, those commonly planted in Kenya are Kaleso, Karemba, and Karibuni.

## Sweet and bitter cassava

Cassava varieties are also classified into sweet and bitter. The bitterness and sweetness is evident when the tuber is eaten raw. Sweet cassava has less cyanide (poisonous content) than the bitter variety. Have a good understanding of cyanide levels before planting, harvesting and cooking cassava.

## Ecological requirements

Cassava is easy to grow and requires little care. It can supplement the loom-



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ing maize shortage in Kenya due to the locust attack and the coronavirus pandemic. It is mainly grown in western, Nyanza, the coastal lowlands and eastern regions, and does well in many different agroecological zones. It requires rainfall of between 500mm and 1,500mm and grows in temperature of between 17 and 30 degrees Celsius. With the effects of climate change and the need to diversify farming systems and diets, cassava has become an important crop.

## Land preparation

Cassava requires deep cultivation, especially where there are hardpans. Loosen soil up to a depth of 20cm and ridge it to give the roots more space to develop.

The crop also requires a lot of nitrogen. In depleted soils, apply organic manure before ploughing. Planting nitrogen fixing legumes such as beans or rattle pods (mitoo) and ploughing them in helps to enhance soil nitrogen. Encouraging black jack, wondering jew and other weeds to grow up to the flowering stage before ploughing them in is also another cost-effective way of adding nitrogen into the soil.

## Planting

Get disease-free stem cuttings from recognised farmers or organisations such as Kalro. They should be one-foot long, 10-12- months-old and have four to five nodes. Plant the cuttings either horizontally, inclined, or vertically depending on the slope of your farm, with two-thirds of it in the ground and with a spacing of 1m x 1m between the rows and plants. Cassava needs water for faster shooting. Therefore, plant at

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# Growing and reaping big from cassava

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the onset of the rains. However, when growing the tuber in dry areas or on slopes, water regularly for the first two months for better establishment. Ensure the soil remains moist. Mulching cassava, especially after planting also helps.

## Cassava diseases and pests

Closely monitor your cassava to ensure that it is not affected by disease. The most common diseases are cassava mosaic disease, bacterial blight, cassava mealy bug, root rot and anthracnose. Common pests are aphids, cassava scales, cassava mites, locusts and grasshoppers, white flies and termites.

Sometimes, when planting material is slightly infested with cassava green mites, cassava mealy bugs, and other stem-borne pests, the cuttings can be treated by immersing them in heated water (50 degrees centigrade) for 5-10 minutes just before planting. In addition, plant resistant varieties, practice crop rotation and observe field hygiene.

## Harvesting

Harvest cassava when they have maximum starch, usually between nine and 10 months after planting, depending on the variety. Harvesting too early results in lower yields while harvesting late lowers both yield and quality, as it may be too fibrous.

- *Cut the stem that carries the root tubers at about 50cm from the ground and gently pull it out to avoid bruising the tubers, which lowers their quality.*
- *Cut the roots from the stem using a sharp knife or panga. Avoid using your hands.*
- *Harvested cassava tubers start deteriorating and become discoloured within two to three days. Slow down the process by heaping them in a shaded area and watering every day. You can also dig trenches and bury them.*
- *Cassava can also be safely left in the ground for seven to 24 months after planting and harvested as needed.*

Finally, soaking them in water after peeling can keep them fresh for one to two days, but be careful, as an extended period in water will lead to fermentation.



## Farming Tips

To select good cassava varieties for planting, look for varieties with high dry matter, good mealiness, good ground storability and which are well adapted to your area.

**Coast region:** Kaleso (46106/27), Guzo, 5543/156, Karemba, Karibuni, Nzalauka, Shibe, Siri, Tajirika, KME 1, KME 2, KME 3, KME4, KME 61, Mucericri, kibandameno.

**Central and Eastern Regions:** KME 1, KME 2, KME 3, KME 4, KME 61, Mucericri, Ex-Ndovu

**Western and Nyanza Regions:** 12200, Tereka, Serere, Adhiambo lera, CKI, TMS 60142, BAO, SS4, Migyera, 192/0427, MM 96/7688, MH 95/0183, MH 96/4466, MM 96/5280, MM 96/9308, MM 96/7151, MM 96/9362, MM 96/4684, MM 96/1871, MM 96/4884. Some high-yielding varieties recently developed include TME 2004, TME-14, Nasa 13 and Nasa 14.

<https://www.infonet-biovision.org/Publications/Starting-cassava-farm>

# Biosecurity measures for protecting chicken

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should be evenly spread in the poultry house. Water pH also determines the quality of water. Water pH should be around 3.8 (acidic) to favour growth of good normal gut flora that improve the digestion of feeds. High water pH (alkaline) encourages the growth of disease causing bacteria. Organic acids in the market such as Selko PH can buffer water pH and improve its quality.

## g. Vaccination

Proper vaccination protocols should be followed to ensure adequate immunity is developed, especially against viral diseases

# How to get the most from your nursery bed

By Dennis Rapongo

How you prepare and manage your seedbed can make the difference between having a 98 per cent or two per cent germination.

To maximise your chances of success, start your plants off in the best way possible. There are three types of nursery beds that you can prepare:

## 1. Sunken nursery beds

- *Identify a good level or flat area on the farm and prepare it to a fine tilth.*
- *Mark out a one-metre wide area and any reasonable length not exceeding three metres for easy operation.*
- *Scoop out the top and sub soil to a depth of 20cm. Do not mix the two soils, put each at a different place.*
- *Get manure and mix well with the top soil. Place the mixture of the top soil and manure back in the sunken surface. This leaves you with a sunken bed of 10cm.*
- *Ensure the bed surface is well levelled and make plating furrows. Spacing shall depend on the crop. However, most crops will require a spacing of between 10cm-15cm between rows.*
- *Plant your seeds and cover well. You can construct a raised shade over it, or you can cover with grass or any other dry mulch.*

## 2. Flat beds

- *Identify a suitable place in your field.*
- *Mark out a one-metre wide area with a suitable length.*
- *Cultivate it to a fine tilth, mixing the soil well*

such as Newcastle Disease and Gumboro that can cause mass deaths of birds.

In case an outbreak occurs and farmers are forced to use antibiotics:-

- *The prescription should come from a qualified animal health practitioner upon proper diagnosis.*
- *Withdrawal period should be strictly observed on eggs and meat to prevent people from consuming products that have antibiotics. This period varies from drug to drug depending on their active ingredients.*
- *Always read the manufacturer's label on the drug before administering.*

In summary, poultry farmers can produce organic eggs and meat and proper bio-security measures are needed to prevent the entry and spread of poultry diseases. Organic produce can also earn farmers good profits as it continues to fetch premium prices due to consumers' preference for healthy products, as they become more health conscious.

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*with manure. Make plating furrows of between 10cm-15cm between rows.*

- *Plant your seeds, mulch the nursery bed or construct a raised shade over it.*

### 3. Raised beds

These are suitable for areas with high amounts of rainfall

- *Identify a good place that is gently sloping and cultivate it to a fine tilth.*

- *Using a hoe, pull the light soil to form a heap of around 15cm.*
- *Smoothen the heap to get a well-flattened bed that is one metre-wide, 10cms high with your desired length.*
- *Make planting furrows 10cm-15cm apart.*
- *Plant your seeds and mulch them. Water using a watering can to avoid soil run-off.*
- *Mostly used during rainy seasons.*

### Management of seedlings in the nursery bed

After bed preparation and planting, close monitoring and management of the seedlings is important so that the health and quality are not compromised.

After seven to 10 days, the seedlings will emerge. Remove the mulch from the beds to allow the young plants to get enough sunlight. Continue watering while monitoring any diseases and/or pests.

Manually uproot weeds to reduce competition for water and nutrients between the weeds and the young plants. Shade nets can also be used to cover the nursery and to protect it from rodents and unfavorable weather conditions.

Thin after 10 days to remove excess seedlings and for proper growth and development of the seedlings.

In case of heavy rainfall, make drainage furrows to channel away flood or excess water. This also helps to control buildup of diseases. One week to transplanting, gradually stop watering the seedlings and remove all the shade nets and the mulch to harden the seedlings and enable them to adapt to the main field.

*N/B: The area used for the establishment of the nursery should be free from floods, well drained, aerated and close to a water source.*

## Benefits of fermented food

**Fermentation is an ancient food preservation technique that is still widely used today to make wines, yoghurt, cheese, mala, kefir, fermented porridge and beer**

**By Mary Mutisya**

During fermentation, micro-organisms such as yeast and bacteria convert carbohydrates, including starch and sugar, into alcohol or acids, which act as natural preservatives while giving the food product a distinct desirable flavour.

The process promotes the growth of beneficial bacteria referred to as probiotics, which multiply inside the gut. This multiplication is influenced by the presence or absence of prebiotics (dietary fibre that feed friendly bacteria in the gut), and it is important to maintain a balance between the two.

Every fermented product is different from the other, the key determinant being the bacteria or living organism causing the fermentation. The health benefits associated with the consumption of fermented products are many. The key ones are the following:

### Improving digestive health

The probiotics produced during fermentation restore the balance of helpful bacteria in the gut, alleviating digestive problems. This is evident in the management of the irritable bowel syndrome (IBS), a rapidly rising digestive disorder. Studies have shown that the consumption of at least 125 grammes of yoghurt and related products daily improves common irritable bowel syndromes, such as stool frequency and bloating. Fermented products also reduce constipation, gas, and diarrhoea. They help to break down the nutrients in foods, easing digestion. Also, fermentation destroys anti-nutrients such as phytates and lectins commonly found in grains, legumes and nuts. This improves nutrient absorption and use in the body.

### Boosting the immune system

Fermented foods are rich in zinc, iron, and vitamin C, which strengthen the immune system and reduce one's risk of infections such as common colds. Some studies have also shown that fermented products can be helpful in weight loss and reduction of belly fat.

### Improving heart and brain functions

The *L. helveticus* bacteria found in fermented products breaks down complex proteins in foods such as milk, releasing compounds known to lower blood pressure and reducing blood pressure in those with a mildly high blood pressure reading. When consumed regularly, fermented products lower low-density lipoproteins (bad cholesterol) in blood, thereby, reducing the risk of heart diseases and high blood pressure. Also, the brain and gut communicate constantly through the nervous system, and bacteria (particularly *Lactobacillus Helveticus* and *Bifidobacterium longum*) that exist in fermented products, produce metabolites that strengthen stress resilience and tackle anxiety and depression.



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Location	Frequency
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Location	Frequency
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Narok	102.3
Nyeri	105.7
Machakos	93.8
Makueni	
Kitui	
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Location	Frequency
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Gilgil	
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Kisumu	105.3
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Kericho	90.5
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Tuko Mbele Pamoja!



## TOF Radio answers farmers' questions

### Make hay while the sun shines

By Charles Kimani

In the last issue of TOF (180), we learnt that to get maximum milk yields a farmer must not compromise on feeds. Like human beings, cows require a balanced diet, in the right portions. Most farmers depend on fodder, which is seasonal.

During dry seasons, pasture is limited and farmers may be unable to give cows the required amount of feed. It is, therefore, advisable to conserve fodder for use during the dry season to avoid reduced milk production.

Fodder can be conserved in two major ways - silage or hay. In this article, we teach you how to make hay. Hay is dried fodder. When making hay, the moisture content should be reduced from 70-90 per cent to 20-25 per cent or lower, to avoid rotting. In Kenya, the main sources of hay include, Rhode grass, Lucerne, and Vetch. Always grow your grass using certified seeds.

**Lucerne:** Lucerne is a deep-rooted, drought-resistant legume that does well in areas that receive rainfall of about 870mm, with well-drained neutral soils with a pH of 6-6.5. It is propagated using seeds and planting is done by drilling or broadcasting. Lucerne has a productive life of four to six years.

Sow seeds 10cm below the ground at a rate of 6kg of seeds/acre, with a spacing of 20cm x 25cm. The crop takes four to five months to reach haymaking maturity, depending on the weather. Using the advised planting rate will produce 375 to 550 bales per acre per year, with a cutting interval of four to eight weeks.

**Purple Vetch:** Purple Vetch is a protein supplement short-term crop with a high nutritional value. Vetch grows rapidly and can be incorporated as a pure stand or mixed with other grasses or fodder such as oats. Soils should be well drained and not acidic (pH 6-7). Planting space is 45cm between rows.

Using a seed rate of 5kg per acre in pure stand or 3kg when intercropped with other grasses and fodders.

Drilling (planting in holes) is recommended. Vetch reaches the hay production stage in four months and produces 150 to 300 bales per acre.

**Rhode grass:** This perennial grass is drought-tolerant and grows up to 90cm high. It requires loose-textured loam soils and an annual rainfall of between 650mm and 800mm. Seeds should be planted at the rate of 2kg per acre.

They can either be broadcasted and rolled or mixed with sawdust and drilled. The drilling hole should be less than two centimetres deep. The grass matures in four to six months and produces about 300 bales per acre. Harvesting is done at intervals of six to eight weeks and the grass reaches its highest production in the second year.

#### Harvesting

- Harvest fodder for hay making two to three days on the onset of dry weather, when it has attained 50 per cent flowering;
- Turn the fodder using a farm fork to ensure even drying;
- Measure the dryness by breaking the stem. If it bends too much without breaking then the moisture content is still too high.

#### Baling and storage

Baling is done manually or mechanically. For small-scale farmers, manual baling is cost effective. It is done using a baling box that measures 75cm long x 50cm wide x 40cm high, that is open on both ends.

Hay can also be stored without baling by heaping into a dome-shaped stack and covering it with a polythene sheet. Store it in a sheltered enclosure away from direct sunlight and rainfall.

<https://www.infonet-biovision.org/AnimalHealth/Hay-Making>

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