



Women sort out potato seeds from ware (commercial) potatoes at GK farm in Mau Narok. Lack of certified potato seeds has forced many farmers to recycle potatoes which has led to spread of diseases and pests across the country

Dear farmer,

The year 2019 has been a difficult one for many Kenyans. Farmers have not been spared especially due to the poor prices offered for the various agricultural commodities like those of milk and cereals. At the beginning of the year, farmers could not sell their maize after the government offered low prices for the staple. Millers took advantage of this and offered even lower prices to farmers.

One of the major problems facing maize farmers is that many small-scale farmers are unable to store their maize until prices appreciate. Some lack good storage facilities while the majority are forced to sell in order to meet various financial commitments such as fees, medical bills, buying inputs in preparation for replanting or even settlement of various debts.

Farmers who managed to store their maize until the months of May and June made good returns when the prices shot up to Ksh3,500 per 90kg bag at the farmgate. This shows that farmers who manage to store their maize can sell at good prices when maize supply diminishes. As for milk, prices fell to as low as Ksh 17 a litre!

The world over, prices for agricultural prices fluctuate on a daily basis. The only difference between farmers in Kenya and those in the developed countries is that farmers in developed countries are heavily subsidised; so they can always manage to continue farming because they are compensated by their governments when commodity prices fall to encourage them to continue farming.

For farmers in Kenya, we can only advise them to farm smart. This means the choice of the right crops to grow be it cereals, vegetables or fruits. Market surveys to find out which crops to grow including good timing to ensure the commodities reach the market when there is less competition.

With the threat of climate change, it is now becoming clear that no farmer can expect to succeed by relying solely on rain fed crop production. Right now there are various, affordable small-scale drip irrigation systems that farmers can buy to grow various crops through irrigation. This way, they can grow, sell and fetch good prices.

All these require good planning and willingness to succeed. We wish all farmers a merry christmas and happy new year.

Kenyan farmers reject foreign potato seed varieties

Peter Kamau | Kenyan potato farmers have rejected foreign imported potato seed in preference for local varieties. Interviews with many farmers across the country shows that foreign potato seed brought into the country cannot compete with local varieties, which farmers say are compatible with local weather conditions and market demand.

Demand low for new foreign varieties

The major complaint against foreign potato seed varieties is that they require a high level

of management. They also take long to break dormancy while other are prone to diseases such as early and late blight. The potatoes cannot be sold in the open air markets-a major market outlet for potatoes in Kenya since they turn green when exposed to the sun.

Foreign varieties turn green in sun

Farmers who have tried growing the varieties that are mainly promoted by Non-Governmental organisation, the Department of Agriculture and research institutions such as the Kenya Agricultural and Research Organisation(KALRO) asked the government to resume its basic seed breeding programme to enable them get local certified disease and pest-free potato seed

“We have tried three varieties here-Karuso, Jelly and Tornado varieties but farmers who grew them said they could not get market them varieties because traders who sell these potatoes along the roadsides and the open air markets complained they turn green very fast when exposed to sunlight discouraging buyers,” says a technical officer at Njabini Agricultural Training Centre (ATC).

“I was growing shangi potatoes in a rented 3-acre farm near Sasumua Dam where thieves would harvest all my potatoes at night. This year I planted

Fendargo and Tornado varieties. Nobody has stolen them because even if they did, they would have nowhere to sell them. Buyers have also rejected them an am staring at a big loss, says Lucy Maina, a potato farmers in Njabini.

Demand high for local varieties

The Executive Officer at the Kisima Foundation Mr Nteere Gitonga says most of the varieties brought by foreign companies for trials at the Kisima farm have been rejected by farmers.

“We have grown some of the foreign varieties here such as the Panamera, Voyager, Challenger and Taurus varieties, but the problem is that these varieties cannot be sold in the open air market, which is the way farmers sell their potatoes in Kenya. The potatoes turn green within a few days when exposed to sunlight making them unsuitable for consumption.

Mr. Gitonga says that during the last season in October 2019, Kisima farm sold 3000 tonnes of certified Shangi variety within 3 days owing to the high demand for the variety across the country. Other varieties that are in demand include Sherehekea and Dutch Robjn which are mainly sold to farmers in Meru and Bomet. Dutch Robjn is an improved local variety that farmers in Bomet grow under contract with factories in Nairobi for processing into crisps.

In this issue

Crop protection 3



Apple production 4

Chicken feed formulation 7

TOF on the web

www.theorganicfarmer.org
mkulimambunifu.org

[facebook.com/theorganicfarmer](https://www.facebook.com/theorganicfarmer)

twitter.com/TOFMagazine

TOF partners on the web

[biovision.ch](http://www.biovision.ch)
infonet-biovision.org
icipe.org

TOF
Radio

KBC Thursday 7.30 pm
Mbaitu FM Friday 8.30 pm

Government unable to provide potato seed to farmers

Potato seed production and multiplication centres are infested with PCN Pest and diseases such as bacterial wilt making it difficult to produce clean seeds for farmers.

Peter Kamau and Faith Bosire

Mr. Samuel Tanui is a potato grower in the Lelan ward in Elgeyo Marakwet County. He has been growing potatoes in his 5-acre farm for the last 20 years. Before, he used to harvest between 70-100 bags of potatoes from an acre. Not anymore, "today I get between 20 -25 bags an acre despite using a lot of fertilizer and farmyard manure to improve fertility in my farm," he says.

Mr Tanui is not alone; his neighbour Mr. Kenneth Kada is facing the same problem in potato production. Every season, Mr. Kada has to leave part of his potato harvest to use as seed in the next season due to lack of certified seed, a reason his potato harvest has reduced drastically as diseases and pests increase on his farm.

Farmers spread diseases and pests

"I am forced to open up new potato growing areas in my farm every year in an attempt to improve my potato yields but even this is no longer working because my potato harvest keeps on going down every year. I have now given up growing potatoes altogether and concentrate on rearing dairy cows although the price of milk is also not very encouraging at the moment," he adds.

The outcry by farmers is the same in Kaptalamwa, Kacherop and Koisugur potato growing areas of Elgeyo Marakwet County.

No source of clean seed

For the last three months, The

Organic Farmer has visited potato growing areas in Nyandarua, Laikipia, Narok, Nakuru and Elgeyo Marakwet. In all the counties more than 90 per cent of the farmers interviewed have been forced to recycle their own potatoes as seed due to lack of certified seed.

Only a few farmers in Nyandarua, Nakuru and Laikipia have managed to buy certified seed mainly from the Agricultural Development Corporation (ADC) and a few private seed producers who are unable to meet the huge demand for certified potato seed in the country.

Shangi has huge market demand

An official from ADC who declined to be named as he is not authorized to talk to press on behalf of the corporation, says that the main problem facing the potato sub-sector in the country is the preference by the majority of potato farmers to go for only one potato variety-Shangi.

He says the preference of this variety is due to the huge market demand it enjoys across the country. The variety cooks fast and can be used to make chips, crisps, good mashing quality and taste. Another quality that farmers prefer in the variety is its ability break dormancy within a short period, enabling them to plant it up to 3 times in a year. No other potato variety in the country meets these qualities.

Developed varieties cannot be multiplied

The Kenya Agricultural and Livestock Research Organisation (KALRO) has developed more than 35 potato varieties. Some of the most popular varieties from KALRO include Tigoni, Kenya Mpya, Kenya Karibu, Dutch Robjn and Sherehekea.

When the organization realised the popularity of the shangi variety among farmers,



Anne Mbugua, a seed potato producer supervises seed potato harvesting in her farm at Muchorue in Molo. Kenya has very few potato seed producers

they started cleaning it with the help of the International Potato Centre (CIP) and had it certified by the Kenya Plant Health Inspectorate Service (KEPHIS) to enable potato farmers to get clean seed. The shangi variety is now officially recognised as a potato variety that can be multiplied like any other variety in the country.

KALRO no longer producing seeds

However KALRO can no longer produce these varieties because its main basic seed production unit in Tigoni has been condemned by KEPHI. This is after it was found to have the Potato Cyst Nematode (PCN) a devastating potato pest that can remain in the soil for up to 30 years. The pest can also wipe out an entire potato crop. Importation of potatoes without following the right phytosanitary protocols (procedures) has been blamed for entry of the pest into the country.

Diseases and pests spreading

Apart from lack of certified seeds and the invasion of the PCN pest, which many potato growers do not know about, many farmers are also grappling with other problems such as bacterial wilt and viral diseases which have combined to make

potato production one of the most difficult undertakings at the moment. As a result, many farmers have abandoned potato production or reduced the area under production to cut down on losses.

Counties lack capacity to help farmers

County governments in most of the affected regions have tried many strategies such as building cold storage facilities, introducing foreign seed varieties and even training farmers on the best potato production methods, processing facilities with very little success. However farmers continue to recycle Shangi, further spreading diseases and pests such as the devastating PCN as they open up new areas for potato production.

Lack of funding

The government has identified potatoes as the second most important food crop in the county and included it one of President Kenyatta's Big Four Agenda on food security. But no funding has been allocated for the development of the crop as at now and all promises so far remain on paper with nothing to show on the ground.

In the next issue, we look at the politics of potato industry in Kenya.

The Organic Farmer is an independent magazine produced monthly for the East African farming community. It promotes organic farming and supports discussions on all aspects of sustainable development.

The articles in the *The Organic Farmer* do not necessarily reflect the views of icipe nor Biovision Foundation or Biovision Africa Trust (BvAT).



Licence: This work is licensed under a Creative Commons Attribution-ShareAlike 3.0 Unported License



Publisher: International Centre of Insect Physiology and Ecology (icipe), P.O. Box 30772, 00100 Nairobi, KENYA, +254 20 863 20 00; icipe@icipe.org; www.icipe.org

Editor Peter Kamau

Layout The Regal Press Kenya Limited

Administrator Lucy W. Macharia, +254 719 052 186

Editorial Advisory Board Dr. Sunday Ekesi (icipe), Henry Neondo (ASNS), Dr. Jane Njuguna (KEFRI), Dr. Joseph Mureithi (KALRO), Dr. Henry Kiara (ILRI), Dr. David Amudavi (BvAT), George Nyamu (KENAFF), John Njoroge (KIOF), William Makechi (farmer, Kakamega), Regina Muthama (farmer, Machakos) and Rt Snr Chief Josiah Arende (farmer, Rongo).

Sponsor Biovision, a Swiss-based foundation for the promotion of ecological development, based in Zürich, Switzerland.

www.biovision.ch



Use natural plant extracts to protect your crop against pests

Farmers need to control pests and diseases using less costly methods such as the use of plant extracts and even natural biopesticide products in the market to make their food safe for consumption in place of chemicals.

Beritah Mutune | The prolonged rains have no doubt been a blessing to many farmers who took the advantage of the rains to grow various crops. After the end of the rains the meteorological department says a severe drought will follow. This will increase pests that destroy crops, causing great damage to crops. It is important to know how to protect your crops and spending less time and money fighting pests with insecticides and other toxic products.

Early pest detection helps the farmer to assess the situation and plan the next step to eradicate it. Monitoring involves detection of the pest early, crops affected and type of pest damage.

Some of the most common pests include the following:

Aphids, whiteflies, thrips, bean flies, fall armyworm, stem borers, fruit fly, leaf miners amongst others. Farmers can control these pests through prevention, non-toxic home-made remedies, use of other industrial substances, use of pheromone baited traps, use of natural enemies which are friends of the farmers, and other natural control measures.

Prevention: Farmers need to



know that the easiest way to prevent insects' damage in your farm is by creating unfavorable conditions for them to thrive. A healthy farm is the best defence. This can be done by: -



Rogue weak plants: Weak plants may already be infected. If not, they will attract predators. Pull the plant and dispose of them away from the farm area.

Build healthy, organic soil: Using natural composting methods, mulching, and adding compost manure to the soil is the best way to develop strong and healthy plants.

Minimize pest habitat: Clear your farm area of debris and weeds, which are breeding places for insects.

Use clean mulch: Use clean mulch to prevent diseases.

Interplant and rotate crops: Insect pests are often plant specific. When plantings are mixed, pests are less likely to spread

throughout a crop. Rotating crops each year is a common method to avoid re-infestation of pests.

Keep foliage dry: It is highly recommended to water your plants early in the day so that they will be dry for most of the day. Wet foliage encourages insect and fungal damage to your plants.

Disinfect working tools: If a farmer has been working with infested plants, he is advised to clean the tools before moving on to other farm areas. This will reduce the speed of invading insects.

Use of pest resistant plant varieties: Some plants and plant varieties are more prone to pest issues than others. Preventing pests in your farm is sometimes as simple as choosing pest-resistant plant varieties.

Use safe home-made remedies: Home-made remedies are inexpensive, and the farmer is sure of what they are applying to the crops in the farm. Many homemade remedies have been used with good results to control harmful insects. They usually involve harmful (but non-toxic) ingredients such as garlic, neem, cinnamon, chillies, etc. which are diluted in water and blended ready to be sprayed on the plants.

Industrial products: Some of these products farmers can use include: Use of bar soap, cooking oil, sugar which are blended and diluted with water to be sprayed to plants.



How to make 20 litres of Fermented Plant Extracts (FPE) to control pests

Ingredients

1 litre of molasses

1 litre EM1

4kg of different plants with biopesticide properties

eg stinging nettle, sodom's apple, neem, African marigold

Tithonia, comfrey, garlic and even chilli

A 20-litre jerrycan (molasses and EM1 is available in many agrovet shops).

Preparation

-Mix the molasses and EM1 with 5 litres of water.

-Chop up the vegetation into small pieces the way you chop vegetables and add into the

jerrycan.

-Fill the jerry can to the brim with water and seal with a lid to keep it airtight for 14 days.

Use

After 14 days, filter the solution, dilute it at a ratio of 1 litre FPE to 100 litre of water (1:100) and use a spray. If you use a knapsack sprayer, ensure to pass the extract through a piece of clean cloth (sieve) to stop the plant particles from blocking the nozzles of the sprayer. Add foam from bar soap to act as a sticker or use ordinary stickers bought from shops. Spray at least three times every week since natural pesticides do not work in the same way as pesticides.



A farmers group in Gatuto Kirinyaga County go through the steps of preparing plant extracts for use in controlling pests

Diversify and improve your income by growing apples

Apples are a popular fruit in Kenya. However few farmers grow this nutritious fruit due to lack of knowledge on how to grow it. This is why almost apples consumed in the country are imported from South Africa.

Audrey Opondo | “Apple fruits are becoming popular in Kenya’s urban areas, they are highly nutritious. However, Kenya is forced to import almost 90 per cent of apples consumed in the country because very few farmers know how to grow this nutritious fruit. Any farmer who can grow this fruit can make very good income as part of diversification of their income.

Apples are rich in vitamin C, beta-carotene, B-complex vitamins, dietary fibre and minerals such as potassium, phosphorus and calcium; thus, the saying, ‘an apple a day keeps the doctor away.’ Apples also help in reducing weight because of their fibre. They can be eaten fresh or cooked depending on the variety.

Varieties

There are many varieties, including winter banana, Rome beauty, Sharp Early, Brae burn, Fuji, Gala, Blenheim Orange, Anna and Jonathan.

Fuji, Gala and Brae burn have been proven to do well in Kenya. They are high yielders and produce quality fruits in terms of size, color and taste. The following are their characteristics:

Fuji

- Medium-sized apple.
- Slightly sweeter than other varieties.
- Predominantly red/dull-pink in colour over a green/yellow base.



Mr. James Kangethe, an apple farmer, in Murungaru Nyandarua County shows off an apple tree in his orchard. We shall feature Kangethe’s experience in apple production in one of the next issues

- Texture is firm, crispy and juicy with extremely dense flesh best for fresh consumption due to its high sugar content.

Gala

- Most widely grown variety in the world.
- Grown in both temperate and tropical regions.
- Has a sweet taste, and is crispy with a firm texture.
- Resistant to bruising, softening and other defects.
- Can be stored for up to six months.

Fruit picking can start after two years after planting.

Braeburn

- Medium to large in size.
- Growers prefer it due to its ability to keep fresh when chilled.
- Fruit is firm with a red/orange vertical streaky

appearance on a yellow/green background.

- Has a sweet flavor.
- Heavy yielder.

Requirements for growing apples

Rainfall

Annual rainfall of 1000mm per annum is best for production. Inadequate rainfall can be supplemented with irrigation.

Temperatures

Apples require low temperature of below 15°C for dormancy breaking and above 22°C during fruit maturity.

Altitude

Apples are grown in high altitude areas at 2000-3000 above sea level.

Soils

Apples do well in properly aerated well-drained soils with a pH between 5.5 (sandy soils) and 6.5 (heavy clay).

Planting guidelines

- The best time to plant apples is when they are dormant that is July and August.
- Plant the seedlings in holes of 60x60x60cm.
- Spacing should be between 3x3m to 4x4m depending on the variety.
- It is beneficial to plant at least two varieties since most of them are cross-pollinated.
- A newly planted farm can be intercropped with low growing crops.
- -Do not shade any part of tree especially the lower parts.
- -Having bee hives is

beneficial since bees are important pollinators.

Pruning

For the tree to have a good structure and form, pruning must be done in the first 2-3 years after planting.

Select 3-4 strong branches around the central leader and tip them off during dormancy to stimulate secondary branching.

Dormancy breaking in apples

Dormancy in apples occurs in the month of July and August. To break dormancy, the farmer needs to defoliate the apple tree 4 weeks after harvesting to break the lateral buds and make them blossom (grow).

Fruit Thinning

The fruits should be evenly spaced, about 2-3 trees per spur to avoid malformation due to crowding. This is brought about by a heavy fruit set.

Harvesting

The fruits are harvested 4-6 months after fruit set depending on the variety.

Handle the fruits carefully and retain a small stalk attachment.

Storage

A cool, dry and rat-proof place for up to 4-8 months would be most ideal.

A refrigerated store can store the fruits for much longer.

Yields

If the trees are well managed a farmer can expect about 250-300 fruits per tree.



Reduce chemicals in food production to improve health

It is difficult to tell if the food we buy is safe for human consumption due to the overuse of chemicals in food production. Farmers should use natural methods of food production to improve their health and that of consumers.

Mary Mutisya | Have you ever posed and asked yourself how what you eat has been produced? Well, this is a discussion that is currently gaining momentum and more so in this era of increasingly high numbers of non-communicable diseases such as cancer, diabetes, arthritis and diabetes.

As it is now, the situation seems to be getting out of hand and people have over and over again gone back to the drawing board and tried to figure out what we could be doing wrong.

Among the issues that have been pointed out, the use of chemicals in the food industry from farm to fork has been highlighted as one of the key problems as there exists a very strong link between soil health, plant health, animal health, environmental health and food consumption.

Encourage safe food production

From research, it is suggested that about 70% of our lifetime risk of non-communicable diseases is within our power to change, and more so our diet. Currently, many people try to eat healthy but how healthy is our healthy eating? Well, this is a much deeper issue than it may seem as it is more of a shared responsibility rather than an individual's efforts. It involves everyone, right from the farmer at the village level to the final consumer in towns where the food is sold.

Limit use of chemicals

As the human population continues to grow with no increase in arable land for food production, efforts are being made to come up with ways to boost food production and ensure adequate food supply. Among these is the use of chemicals such as fertilizers, pesticides, antibiotics and hormones.

Although, all these can in one way or the other increase crop production dramatically while at the same time ensuring a higher quantity of produce, they are also toxic, and some can cause problems if they are consumed by

humans in large amounts.

Exposure to chemicals high

The level of harm from exposure to pesticides is dose related, meaning that the more one consumes foods containing the chemicals, the greater the potential risk of poisoning. A major challenge which is facing the food industry is coming up with a way to balance a reliable, high-quality food supply with the need to protect the consumer from unnecessary exposure to chemicals.

It's difficult to tell safe chemicals

Maximum Residue Limits (MRLs) for safe human consumption are often encouraged to reduce high levels of chemicals in the crops. However, past experience has shown that, sometimes, a pesticide that is thought to be safe for human consumption has undesirable effects, which may not be indicated on the labels. These can harm people, animals, water sources, soils and even the environment.

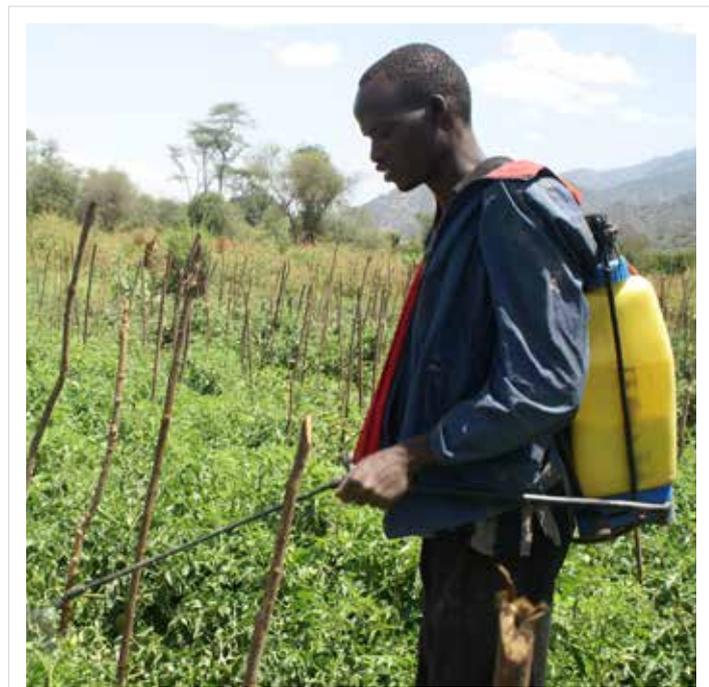
Effects of pesticides on human health

Allergy: Allergies are abnormal reactions of the body towards any harmful product or and the most common first health reactions human express when they come in contact with somethings that their bodies express in defense. Chemicals are treated as strange substances by the body and if the immune system resists to be contaminated by them, it can cause allergic reaction.

These reactions vary from itching, rashes, hot red spot and many more to eye allergy and in worse cases effects on internal organs whereby the chemical can trigger asthma, shortness of breath, or running nose. Although allergies are usually treatable, there still is the possibility that they can harm someone's life.

Digestive problem: Not all chemicals are soluble in water. Some pesticide stays in plants and when they enter the human body, especially the digestive system, they may upset the stomach and cause digestive problems. The victims end up feeling nauseated, experiencing pain in the bowel, diarrhoea, and many more.

For this reason, therefore people need to perfectly clean any vegetables or fruits that come from non-organic sources. Even though most people do not show immediate symptoms, slow accumulation does take place a fact which makes the chemicals worse.



Chemicals used to protect crops against pests and diseases always leave harmful residues that harm human, animals, plants and the environment

Respiratory problems: This is very common more so among factory workers and farmers who spray their farms and get exposed to the chemical on a daily basis. Heavy chemicals leave residues in their lungs and they may start developing respiratory problems.

These problems include experiencing difficulty in breathing, infected trachea, sore throat and in worse cases chronic lung problems. Factory workers and farmers who spray their produce with chemicals should therefore wear masks and protective clothing.

Internal organ damage: Internal organs are the most vital parts of the human body, which sustain human life. Thus, if chemicals endangers one of them, some dysfunctional or malfunctional organs occur. For example, the kidney, liver, and lungs are the most affected internal organs caused by harmful environmental chemicals. When the chemicals accumulate within one's body, they worsen the symptoms and organ defects can lead to complication and in worse cases lead to death.

Cancer: Cancer is one the deadliest diseases caused by use of chemicals. Several bio pollutants as well as insoluble chemicals such as cadmium, asbestos, mercury, and many pesticides are on the list of cancer-causing agents (carcinogens). These chemicals work by blocking the growth of new cells as well as causing the growth of malignant (abnormal) cells within the human body. The

cell mutations can cause lung, breast, throat and many other cancers that affect vital organs within human body.

Way Forward

Although the human population and the need to increase food production to cater for the extra people is being felt, the world does not have to completely rely on chemicals for food production since there are safe methods and products that can be used for this purpose.

Farmers should go organic

Although some of the impacts of the heavy use of chemicals are not immediately felt, they could be long-term which could affect the quality of our health in the long term. Adoption of the organic or natural methods of pest and disease control in farming is the best option. Right now, there are markets that are growing and selling of organically-grown foods and this should be the way to go.

Also, at home level people should try and clean their fruits and vegetables well at least to remove the excess chemicals that could be on the surface especially for all food bought without knowledge of how it was produced. The government on its part should try to encourage and support healthy methods of farming because if properly done, our environment and health will improve if we do not rely on deadly chemicals for food production.

Use crop residue to prepare fodder for dry season

A lot of fodder is wasted after harvest when farmers release their animals into the fields after harvest. Crop residue can be collected and converted into silage while fodder grasses can be made into hay for feeding during the dry season.

Purity Khandasi | The common saying “make hay while the sun shines” is not a new to many of us, neither is it a new saying for farmers. Every farmer knows the importance of preparing fodder when they have adequate material such as grasses or any good quality crop residue.

Due to the changing climate, it is no longer possible for farmers to predict when they will have rains next. It is important that farmers plan their fodder requirements at the beginning of the year so that their animals will always have something to eat even when the rains delay or fail.

Prepare when still fresh

Farmers can conserve adequate fodder especially after harvest when it is still fresh either in form silage, or hay. To these, farmers can add gristed maize, sorghum or barley mixed with grasses at the time of feeding.

Livestock in most parts of the country are either emaciated or even die due to lack of adequate fodder and even water during the dry season. But through proper planning it is easy to overcome these challenges. Early preparation and storage of hay or silage is the one method they can use to ensure the animals have enough to eat. During the wet season a lot of fodder is wasted in many farms because farmers do not store fodder correctly and at the right time.

Difference between hay and silage

Hay is grass that has been cut and dried to be used as animal fodder.

Hay making is the process of turning green, perishable forage into a product that can be safely stored and easily transported without danger of spoilage, while keeping nutrient loss to a minimum.

How to dry hay

This involves reducing its moisture content by drying the forage in the sun. The process of drying the green crop without significant change in aroma, flavour and nutritional quality

of forage is called “curing”. This involves reducing the moisture content of green forages, so that they can be stored without spoilage or further nutrient loss (usually to a moisture content of about 10 per cent).

Hay is used during dry season when there is not much pasture for livestock.

The process of making hay

Now that we are heading into the dry season, with the weather already changing in some parts of the country, it is the perfect time to make hay. Not all crops can be used in hay making, crops with thin stems are used while making hay. Crops such as oats, desmodium, lucerne, maize, sorghum, Napier grass and Rhodes grass are good for hay.

Conserve nutrients

Hay is made at a time of the year when the weather is dry and warm.

Making hay involves a process of cutting and drying the hay. Haymaking turns green, perishable, forage into a product that can be safely stored and easily transported without danger of spoilage, while keeping losses of dry matter and nutrients to a minimum.

When to harvest

The perfect time for cutting hay from crops is when they are into flowering when the plant is full of nutrients. The stems have less nutrients than the leaves so, it is advisable for farmers to have more of the leafy parts of a crop than the stems.

How to prepare hay

After hay has been cut and dried it is usually gathered in bales and bundles.

After preparation, one should spread the hay under a shade for two to three days depending on the weather and let it wilt.

Tools used in hay making are like machete, hoe, and sisal twines. The hay is cut in equal measurements and laid out in rows to dry. Select a ground that is well-drained and dry and should be near to a grass field. Hay should not be over dried as it may start to ferment and become a fire hazard.

Feed nutrients

Animal feed should contain various groups of nutrients and the composition depends on the type of animal that is being fed; proteins help to build the animal's body and its maintenance, carbohydrates provide energy while minerals help in biological

regulation and growth, vitamins regulate biological processes and provide nutrients.

Animal fodder should contain all these nutrients.

Storage

When hay is prepared and ready, it can be stored for many years. Hay should be stored in a dry environment as it is dry and moist environment may destroy it.

Hay can be baled and stored under cover or can also be stored by creating hay stacks. These may be created in a field near the source, or close to where the hay will be required later in the year. Stacks may be covered by plastic sheets to keep out rain and prevent from exposure to excessive sun. The surface layer of a stack may also be “thatched”, in the same manner as a thatched roof to a house. It can be stored in pallet boxes as hay stacks.

Conservation by use of polythene bags

Use of polythene bags in

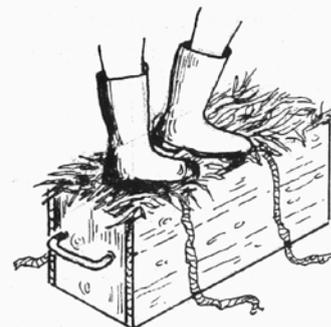
conservation is the most suitable method for small-scale farmers. Place forage mixed with molasses into polythene bags and compact as much as possible. Please note that every time you open the silage bag, expel the air from the bag and then tie it tightly to avoid spoilage.

Importance

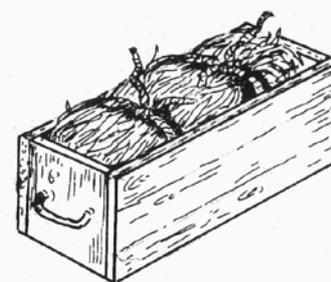
The goal of haymaking is to produce a stable, high-quality animal feed with minimum expenditure. Hay making is one of the ways that farmers can use in having pasture for their livestock when the dry season approaches.

A farmer can also make lots of stacks of hay not only for their livestock but also for sale to other farmers, which makes it a profitable venture.

Bailing hay at home



Packing hay



Removing hay

Source: KALRO

Making your own chicken feeds to reduce costs

A farmer wrote to us worried that the cost of buying ready-made feeds for his chickens was becoming too high. He wanted to know if making his own feeds will reduce the cost. He also wanted to know how to make these feeds. It is true indeed that making one's own feeds reduces the overall cost for feeds especially if the farmer is able to obtain the raw ingredients at a cheap price. If a farmer decides to make their own feeds, they should be very careful when buying the raw ingredients. These ingredients should be of good quality.

If the farmer uses ingredients of poor quality or those that are contaminated, they will negatively affect the health of his chickens leading to huge losses. After acquiring the raw ingredients and mixing them, the farmer is advised to first isolate a few chickens and feed them using his new feeds on a trial basis then observe the health and growth of the chicken to make sure that the ratios are correct before feeding it to the whole flock. When mixing the raw ingredients, bear in mind that chickens have different nutritional requirements at different stages of development, for instance, layers require more calcium in the diet for eggshell formation. It is advisable to make feeds that will last for one month and no more. This ensures that the chickens feed on fresh feeds throughout the month. Feeds that last beyond one month may start to deteriorate lowering the quality of the feeds this can negatively affect your chickens. It is wrong to use rotten maize (*maozo*) as it may contain aflatoxins which are harmful to chickens. To make



feed stay longer, farmers can use stabilisers.

The most common raw ingredients include whole maize, maize germ, wheat bran, wheat pollard, cotton seed cake, soya beans, sunflower or fishmeal (*omena*). Farmers should also add various additives to cater for vitamins, minerals and micronutrients. We have tried to compile feed formulations for every chicken growth stage. The simple formula can be used for hybrid layers.

Chick mash (1 to 4 weeks)

A chick feeds on a minimum of 60g on a single day. Growing chicks require feeds with Digestive Crude Protein (DCP) of between 18 to 20%. The following formula can be used to make 70kg worth of chick mash.

Ingredients

31.5kg of whole maize
9.1kg of wheat bran
7.0kg of wheat pollard
16.8kg of sunflower (or 16.8kg of

linseed)
1.5kg of fishmeal (only if organic)
1.75kg of lime
30g of salt
20g of premix *Amino acids*
70g of tryptophan
3.0g of lysine
10g of methionine
70g of Threonine
50g of enzymes
60g of coccidiostat
50g of toxin binder

Growers' mash (4 to 8 weeks)

Chickens at this stage require feeds with 16 to 18% protein content for growth and preparation for laying eggs. The following formula can be used to make 70kg feeds.

Ingredients

10kg of whole maize
17kg of maize germ
13kg of wheat pollard

10kg wheat bran
6kg of cotton seed cake
5kg of sunflower cake
3.4kg of soya meal
2.07kg of lime
3kg of fishmeal (only if organic)
14g of salt
1g of coccidiostat
18g of Pre-mix
1g of zinc bacitracin
7g of mycotoxin binder

Layers' mash (8 weeks and above)

Feeds for layers chicken should contain a 16 to 18% of Digestible Crude Protein and enough Calcium derived from lime for the formation of eggshells. An egg-laying chicken feeds on 130-140g on a single day.

Ingredients for making 70kg bag of layers' mash.

34kg of whole maize
12kg of soya
8kg of fishmeal (only if organic)
10kg of maize bran, rice germ or wheat bran
6kg of lime
175g premix
70g lysine
35g methionine
70g threonine
35g tryptophan
50g toxin binder.

Answer by Elkanah Isaboke

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

My birds have scaly legs and scratch themselves constantly

My chickens have grown white scaly skin in the legs and scratch themselves. Can you advise what problem could be and what I can do to prevent it?

Scaly legs in chickens is a problem of hygiene in the chicken shed which encourages mites to infest the shed and find their way into the birds body where they cause constant irritation as they suck blood and cause the development scales in the legs as they burrow under the skin to parasitise the birds. A chicken shed should always be kept clean by sweeping every morning to remove the droppings and feed leftovers to create a conducive and clean

environment for the birds to stay.

For farmers who want to use natural methods can apply ash from the kitchen after sweeping will control. The soils where the birds take their birds should also be sprinkled with ash, diatomite or swept with leaves of African marigold. All new birds should also be isolated as they may carry mites.

After sweeping the shed, you can sprinkle the floor and walls with water which chokes and kills the mites. To treat the affected birds, apply Ectomine® powder in the affected areas daily until the mites are eliminated.



TOF **Radio** answers your questions

TOFRadio is broadcast on KBC on Thursday at 7:30pm and Mbaitu FM on Friday at 8.30pm. Tune in and listen to farmer experiences and expert advice on agribusiness and eco-friendly farming methods. On this page, we respond to some of the issues raised by farmers in their correspondence to the radio program. Send your questions and comments via SMS 0715 422 460, email: admin@theorganicfarmer.org

You can make nutritious porridge with baobab juice

Musdalafa Lyaga | *Miriam Kuvuna Mwaka from Kilifi county asks TOF Radio; "Here in Kilifi we have plenty of Baobab trees growing in the wild and the fruits are in abundance. How best can we utilize these fruits?"*

All over Africa, rural families enjoy a meal of maize flour porridge because it is tasty and easy to prepare. Taking porridge every morning has many health benefits including boosting energy and improving digestion.

In many African countries, porridge is also used to wean infants from mother's breast milk. Even though porridge already has good nutritional properties like carbohydrates which provide slow-releasing energy, it can be enriched by adding more ingredients.

Baobab juice enriches porridge

Porridge contains mainly starch which is not enough for the nutritional needs of the farmer families. Women from arid, semi-arid and coastal areas can use baobab juice to enrich their porridge with minerals and vitamins.

Baobab is super food

The fruit pulp of the baobab tree, which grows naturally throughout the drier parts of Sub-Saharan Africa, is of high nutritional value. According to Emily Chai Chivatsi, who has been trained on enriching various foods like porridge, sauces, bread, mandazi (buns) and making juice using baobab, the fruits contains very high levels of minerals such as calcium, iron and magnesium as well as vitamin C in comparison



A pregnant woman in Kilifi county enjoying enriched porridge

to other foods. Furthermore, it has high fibre content and is beneficial for human health and reduces the risk of diseases.

Due to these properties, baobab fruits are often called a super food.

If used as a food ingredient, baobab juice can greatly improve nutrition and help combat micronutrient deficiencies.

Select good fruits

Says Ms. Chivatsi, "Baobab juice is the basic ingredient for enriching the porridge, so you have to be careful and select good quality fruits for making baobab juice. I choose baobab fruit that are mature and free from dirt. Poor quality fruits can affect both the taste and nutritional value of the porridge."

How to make Baobab porridge

Making porridge enriched with baobab juice at home is easy, observes Ms. Chivatsi. She says that most of the ingredients you need are right in your kitchen.

Ingredients

To make 4 cups of enriched porridge you will need 70g of maize flour, 1 cup of baobab juice, 1 cup of milk and 4 table spoonfuls of sugar. Before you start making baobab enriched porridge, make sure that everything is as clean as possible, so that the porridge will be safe for your family:

1. First, clean the kitchen utensils. Then wash your hands with soap and clean water.
2. Start by putting a clean pot on the fire and measure four cups of water.
3. Put the 4 cups of maize flour in the cold water and stir to dissolve the flour. Keep stirring to avoid lumps.
4. Add a little bit of water if the mixture is too thick. Continue stirring for 7-10 minutes.
5. Add milk and sugar stirring till dissolved. After a few minutes take the pot off the fire, wait for it to cool. As your porridge cools, you can start preparing baobab juice.
6. It is important to first wash your hands with clean water and soap before touching the fruits.
7. Pour water into a cup half-filled with baobab fruits and squeeze gently.
8. Now you can sieve the mixture, which is ready for addition to your porridge. Only add the baobab juice once the porridge has cooled. The vitamin C contained in baobab can easily be destroyed through heat, so only add it as the last step, once the porridge has sufficiently cooled.
9. Let the porridge stand for a few more minutes before serving.

Nutritious and tasty enriched porridge is easy to prepare at home and, will be enjoyed by your whole family, and they will love it and be happy and more productive both at the farm and in school.

For additional reading:

<https://www.infonet-biovision.org/EnvironmentalHealth/Trees/Baobab>

Radio Taifa frequencies for our TOFRadio programmes

TOWN	FM FREQUENCIES	MW (MEDIUM WAVE FREQUENCIES)
Nairobi	92.9 MHz	
Mombasa	100.8 MHz	
Kisumu	104.5 MHz	
Kakamega	104.5 MHz	
Bungoma	104.5 MHz	
Eldoret	88.6 MHz	
Nakuru	104.1 MHz	
Meru	90.4 MHz	
Nyeri	87.6 MHz	
Kisii	103.3 MHz	
Malindi	90.1 MHz	
Kapenguria	93.3 MHz	
Kitale 9	3.3 MHz	
Voi/Kibwezi	96.9 MHz	
Namanga	89.9 MHz	
Lodwar	88.6 MHz	
Lokichoggio	89.3 MHz	
Garsen	93.1 MHz	
Kajiado	92.9 MHz	
Kitui	92.9 MHz	
Lamu	96.3 MHz	
Maralal		1107 KHZ
Wajir		1152 KHZ
Marsabit		675 KHZ
Garissa		567 KHZ