The Organic Farmer

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biovision

The magazine for sustainable agriculture in East Africa

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Photo: Agatha Ngotho

Ranajit Bandyopadhyay, a plant pathologist and Aflasafe Initiative team leader at the International Institute of Tropical Agriculture (IITA) displays the aflasafe product at the laboratory in Kenya Agricultural and Livestock Research Organization (KALRO) - Katumani, Machakos County.

KALRO launches aflatoxin control product

Agatha Ngotho - We have good news for maize farmers in Kenya! An innovative, safe, and effective product for controlling aflatoxin contamination has been launched.

The product was officially launched at the Kenya Agricultural and Livestock Research Organization (KALRO) Headquarters in Nairobi last month. The *Aflasafe KE01* product will be available to farmers from next year's planting season at a cost of KSh 1,200 to KSh 1,500 for a 10 kg bag.

Photo: TOF

A heap of maize after harvest

Dr. Eliud Kireger, Director General KALRO, said the technology has proven effective in reducing aflatoxin contamination in maize crop by 70 – 80 percent. He added that this will also pave the way for *Aflasafe KE01* production and distribution. He observed that aflatoxins are a major challenge to maize production in the country.

Aflatoxins common in Kenya

Aflasafe KE01 is only applied once in every season and farmers will only need to scatter the product in their farms to control the effect of aflatoxin in the soil. Dr Ranajit Bandyopadhyay, a plant pathologist and Aflasafe Initiative at the International Institute of Tropical Agriculture (IITA), said the problem is acute in the country as the strains of aflatoxin found in Kenya are highly toxic.

Other countries affected by the problem are Nigeria, Senegal and Malawi. Machakos County in Kenya is an aflatoxin hot spot where 124 people died in 2004 due to alleged use of maize contaminated with aflatoxin. The government had distributed 155,000 bags of maize, in the region that were alleged to be contaminated with aflatoxin. In July this year, 16 people died in Tanzania after eating food contaminated with Aflatoxins. Aflatoxin is a carcinogenic toxin that has serious negative consequences on health, trade, and food security, and is mainly produced by a fungus scientifically known as *Aspergillus flavus*.

Manufacturing plant

KALRO and IITA have partnered with USDA–ARS and other international and national partners to adapt the technology to Kenya using locally sourced strains of the fungus. IITA and KALRO are also constructing a manufacturing plant at KALRO Katumani in a 2-acre land at a cost of about Sh120 million.

The 5-year project funded jointly by the United States Agency for International Development (USAID) and the Bill & Melinda Gates Foundation covers 11 countries where Aflasafe KE 01 will be a registered product. The countries include Burkina Faso, Ghana, Kenya, Malawi, Mozambique, Nigeria, Senegal, Tanzania, The Gambia, Uganda, Zambia.

In this issue

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Dear farmer,

At the beginning of last month we attended the Nairobi International Trade Fair where farmers, manufacturers, Agricultural institutions show cased various products they have designed for agro-processing. But the most interesting was the range of information material including brochures, fliers, books, magazines and periodicals in the display for livestock and crop production. Going through the material, one got impressed at the variety of farming information material now available in the market for farmers. When we started *The Organic Farmer* magazine ten years ago, one could easily count the number of agricultural publications in the country.

Indeed, as one farmer observed during the trade fair, there is now an overload of information material for farmers. This is good for the development of agriculture in the country. The quality of information in some of these publications may not be very accurate or relevant in content because some of the information is lifted straight out of the internet, photocopied and bound into books, brochures and leaflets but it points out to one fact: Farmers are in dire need of information, but very few quality publications get to the rural areas where it is needed most. Publications such as *The Organic Farmer* are not adequate to meet the needs of thousands of farmers hungry for information.

But all is not lost; following years of neglect of the agriculture by the government the sector is now witnessing rise in agricultural entrepreneurs who have come in to take advantage of the opportunities available in the market to promote and encourage farmers to produce a range of new high value crops that are in great demand.

This is a very encouraging development. All along, we have always believed that agriculture in the country can only thrive with more active participation of the private sector. The next frontier in the agricultural sector will be the emergence of a vibrant agro-processing industry. This will in turn encourage more farmers to produce crops that the industries will require as raw material for processing. Visit any supermarket in Nairobi or any other town and you will be surprised at the range of agricultural products on the shelves mainly from South Africa, Egypt, China and even the United States of America (USA). Most of these products can be produced and processed right here in Kenya in a tropical climate where we can produce crops all year round.

Use briquettes to save energy and protect forests

Briquettes are made from waste material such as agricultural waste, charcoal dust, wood chips, macadamia and coconut shells, sugar waste and other plant material. They are environmental friendly and can save our trees.

Venter Mwongera | Modern innovative technology to convert discarded charcoal, among other crop wastes, into an alternative energy solution is not only a timely solution to most of households energy needs but also a move towards contributing to the country's target of reaching its 10% forest cover by 2030.

Briquettes are a better replacement for traditional charcoal and firewood. They are easy to make, have no smoke, no odour, easily affordable, environmental friendly. The charred material burns longer and more steadily than firewood and is not an air pollutant.

Briquettes are not harmful to human health, have no soot, can be lit and used within a house. Besides, it does not taint other household items since it has no sparks while burning. Briquettes are easily reusable, they retain heat longer than the traditional charcoal and provide a better solution to waste disposal.

Materials for making briquettes

A briquette is a product of bio residuals of agricultural waste, a block of compressed coal dust, charcoal dust, sawdust, wood chips or biomass, fruit pits, macadamia nut shells, coconut shells, sugarcane bagasse among other plant waste.

Binding materials for briquettes

Making of briquettes requires an additional material with plasticity and almost all raw materials for production of briquettes need a binding material to hold them into shape. Binders such as starch, molasses and soil are among the best binders for this purpose. Soil binder is yet to be approved by Kenya National Bureau of Standards (Kebs).

Starch has been found to be the best binder. It can be obtained from cassava flour and gum Arabic.

Raw materials for binders

"Just use starch or flour to make a porridge-like solution. You can then use the sticky porridge to bind the charcoal dust or fines together, if the raw material for briquettes making is charcoal husks," says Ms. Nelly Oduor, Deputy National Director Forest Products Research Programme.

According to Ms Oduor briquette makers should always use a binder for quality briquettes.


Photo: Venter Mwongera

Briquettes from Jungle Nuts Kenya made from macadamia shells

Ms. Oduor asserts that briquettes can help to resolve the challenges of energy for cooking especially for small-scale farmers besides conserving the environment.

How to make briquettes

"The ratio of a product which could be macadamia shells, coconut shells or rice husk and a binder should be 10:1 for production of quality briquette," Ms. Oduor adds.

A 45 kilogramme bag of charcoal dust needs 2–3 kilogrammes of starch, which will cost you Ksh 200–Ksh 300. A kilogram of high quality gum Arabic costs Ksh 200 in Kenya.Therefore, to process 40kg bag of charcoal dust you will need to spend Ksh 400 - 600 for the gum Arabic binder.

Mashed newsprint/waste paper pulp is also a good binder. Other bidders such as molasses, cement, clay and tar can be used but the resulting briquettes are not of good quality.

Jeniffer Muhonjo, a 42-year-old mother of five and resident of Kibera, Nairobi, makes briquettes for her domestic use and for commercial purposes. "As a single mother and with five children to feed, clothe and educate, I had to think of many ways of diversifying my income. I prepare and package briquettes in different weights for different prices. I make Ksh 15,000 from this business every month,"she says.

Jungle Nut Kenya also manufactures briquettes. "At Jungle Nuts Kenya, we manufacture briquettes from waste shells of macadamia. We package the briquettes in different packages at different prices. For instance a pack of 2kg and 5kg is sold at Ksh 150 and Ksh 250 respectively. I am happy to be a part of a company that is recycling waste products to provide safe energy for domestic use as we save our trees through charcoal burners." says Ms. Elizabeth Kinuthia, sales lady from the company.

Forests in Kenya have been depleted by charcoal burning activities, felling of trees and exposure of the environment to greenhouse gases.

Making briquettes from macadamia shells and charcoal dust

a) Recipes for making macadamia briquettes

i) 10 kg macadamia shells
ii) 5 kg saw dust
iii) 1 kg cassava starch
iv) 0.5 kg limestone

b) Recipes for making charcoal briquettes

i) 10 kg sugarcane bagasse
ii) 5 kg saw dust
iii) 1 kg mashed newspapers/ pulp

- Assemble all the ingredients required for making the briquettes and according to the quantity you would like to prepare.
- If the product is macadamia shells, crush them into powder using a mortar and a pestle or the grinding stone.
- Mix the ground powder with water and stir to mix properly.
- Add newspaper pulp as a binding agent and stir until it forms dough.
- Carbonise (burn like charcoal) the dough to reduce smoke emission and to add heating value.
- Shape the resulting dough by hand, or mould in wooden or metal presses the fist-sized pellets into desired sizes and shapes.
- Leave the briquettes under the sun to dry.


Photo: IN

Macadamia shells make quality briquettes

The best recipe for making charcoal briquettes is the one that works for you. Test different recipes again and again, and when you get the one that work for you, do not let it go.

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.

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Drip irrigation uses less water reducing wastage

Drip irrigation is a climate-smart and efficient method of crop production where a small amount of water can be used to grow high value crops such tomatoes, vegetables and fruits.

Racheal Wangari | With the onset of the dry season, water scarcity is experienced in many small-scale farms that depend on rain to grow various crops. This therefore leads to reduction in fresh vegetables for home consumption as well as source of income for farmers. Vegetables such as tomatoes, kales, cabbage, spinach, carrots and others are mostly maintained in the kitchen gardens.

One solution to this problem is the use of drip irrigation system, which is an efficient and convenient way to water the garden. The method supplies water directly to the plant roots where it is needed most hence reducing on water losses through evaporation. Less water is needed to farm and it allows one to farm all year round.

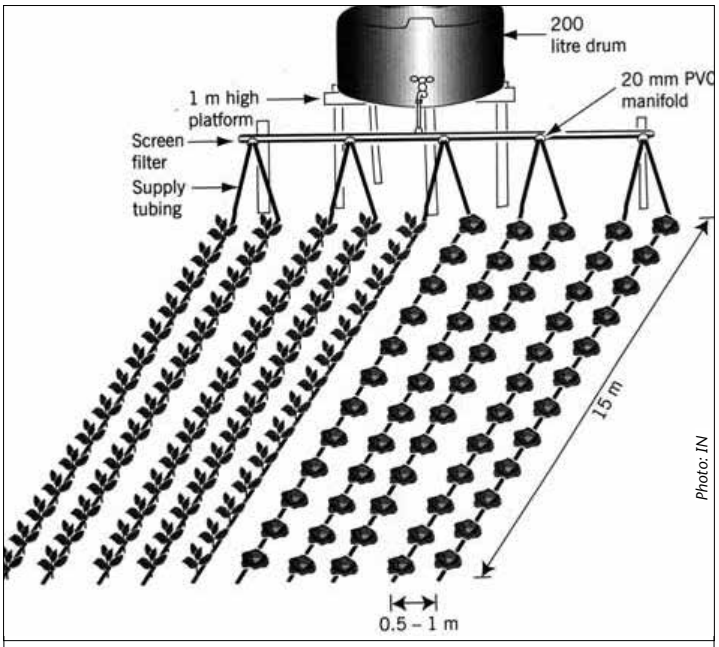
When carrying out drip irrigation, there are factors which need to be considered such as:

- **Soil type**: Drip irrigation is suitable for most soils. When working with clay soils, water should be applied slowly to avoid flooding and runoff unlike in sandy soils where higher discharge rates will be needed to ensure adequate wetting of the soil.
- **Slope of the land**: A flat slope is necessary when carrying out drip irrigation. Crops should be planted along the contour line and the water supply pipes should be laid along the contours to minimize changes in water discharge due to changes in land elevation. Contours can be determined using an A-frame or emitter valves can be used in sloping farms to ensure that water is distributed uniformly to all plants.
- **Crops grown**: Drip irrigation is suitable for crops that can be planted in rows such as vegetables and trees. Water outlets can be provided for each plant. Crop water requirement and developmental stage are also necessary in determination of the type of drip irrigation to be used.
- **Water available**: The drip irrigation water should be free of any sediment to avoid blockage of outlets which usually have a small diametre for water discharge.

Drip irrigation also reduces the cost of labour since once the system is installed, no labour will be required for watering of the crops. All these measures translate into higher incomes for the farmer. The system has other advantages which include:

- Water efficiency as there is reduced water loss through evaporation, percolation (infiltration of water below the root zone) and runoff since water is applied at the plant roots.
- There is reduced weed growth as water is only availed to the plant roots hence little water is available between the rows that could encourage weed growth.
- The slow rate of water application helps in water penetration in problematic soils.
- The moisture availability to the plant at low soil tension results into faster growth, higher yields and better crop quality.
- It is easy to install a drip irrigation system especially when locally available materials are used.

Sukumawiki vegetables under drip irrigation



A 200 litre drum can provide water for 500 plants as shown above

- Plants can be planted in both sides of the pipe hence giving higher yields.
- Soluble plants nutrients can be dissolved in the irrigation water and fed to plants directly.
- There is reduction in diseases associated with excess moisture in some plants especially when the leaves are wetted.

The system requires regular maintenance to ensure that it runs effectively without breaking down since replacing is quite costly. Some simple maintenance practices include:

- Always be careful when carrying out activities in the farm to avoid damages to the drip pipes and outlets.
- Mulches should be used to minimize evaporation losses and also suppress the development of weeds. The mulches should not be placed very close to the roots to give room for the crops to extend their roots as well as avoid pests. Dry mulches should be used.
- Check for any leakage in the system to avoid water loss and uneven irrigation.
- Inspect the system for any damage that might be caused by pests such as moles and termites when in search of water.
- Always use clean water that is free of sediments to avoid clogging.
- Clean the filters regularly to avoid blockage.
- Flush the system at least every month to remove any clogging.
- When the system is not in use, disseminate and clean it well then store safely.

Cost and installation of drip irrigation system.

Drip irrigation system for an eighth of an acre goes for KSh 12,000 as indicated by Shade Net Ltd. The components of the kit are as indicated in the table below;

When farmers come together to purchase the drip system as a group, they have a higher chance of winning a favorable discount. The system should be installed properly in the farm to avoid any leakage and also to ensure longevity of the drip system and this will lead to increased incomes in the farm. Small-scale farmers can make a modification of drip irrigation system to suit their needs in the farm by use of a bucket or drum system that can be assembled and maintained at the farm.

Filter unit	1 Piece
Bend 25mm	2 Pieces
End caps 25mm	2 Pieces
Tee 25mm	3 Pieces
Gate valve 25mm	4 Pieces
25mm HDPE pipe	25 Meters
Start connectors with rubber	12 Pieces
16mm drip pipe (any spacing)	500 Meters

Farmers interested in buying irrigation material can contact Shade Net Ltd on 020 211 8204/5 or 0733 371 983, Thika

Metal silos protect grain from pest damage

With this technology, there is no need for farmers to powder their grain with chemicals to keep away pests. The silos can store the grain free from pests for more than a year after harvest. Therefore, farmers do not have to sell their stocks at throw away prices for fear of losing their grain from pest damage.

Karitu Njagi | For most farmers, sowing and harvesting grain from the farm is a test they have learnt to cope with. The biggest upset comes during storage, as Philip Ngolania found out.

Mr. Ngolania is from Machakos County in Eastern Kenya, where maize farming is one of the most promising ways to survive the pressures of climate change.

But even after fighting erratic weather in the farm, farmers have to deal with pests like the common weevil and the Larger Grain Borer (LGB) or *Prostephanus truncates*.

Mr. Ngolania says the LGB is so tough that traditional granaries, even those freshly lined with cow dung cannot stop it once it infests the stored grains. Some farmers have tried to store grain in plastic containers, but even these are no match for the pest that has been nicknamed 'Osama,'

"It can crush all the grain in a granary into powder within three months," says Ngolania.

A sketch of a metal silo

Philip Ngolania and his wife demonstrate how the metal silo works at their home in Machakos County

Silos can last for more than 10 years

For him, this problem persisted until 2011, when the International Maize and Wheat Improvement Center (CIMMYT) introduced the airtight metal grain silos to him.

He bought a metal silo at Ksh 13,000. Since then, he has not had a problem with maize storage. The silos can store up to five bags of maize.

He is not likely to struggle until the silos are over 10 years old. That is their lifespan, argues Dr. Tsedeke Abate, Leader, Stress Tolerant Maize for Africa (STMA)-CIMMYT.

According to him, the airtight metal silos are designed in such a way that they do not allow oxygen circulation inside the container. Hence, stray pests suffocate and die.

The lining is made of galvanized metal sheet, is 0.5 millimeters thick and has soldered seams, he adds.

With this technology, there is no need for farmers to powder their grain with chemicals to keep away pests. "The silos can store the grain free from pests for more than a year after harvest." asserts Dr. Abate. "Farmers do not have to sell their cereal stocks at throw away prices for fear of losing their grain due to pest damage." he advises.

However, Dr. Abate emphasizes that farmers must ensure that the grain is completely dry before it is stored to prevent other challenges like developing moulds and aflatoxins.

Larger Grain Borer (LGB) or Prostephanus truncates

Many sizes

"Besides, the silos should be opened at least once every month for farmers who need grain for home consumption to ensure the technology lives up to its efficacy," he adds.

CIMMYT introduced the technology in 2008, where the largest silos can hold up to 30 bags of grain.

While the technology has been adopted successfully in North America (El Salvador and Guatemala), Kenya and Malawi are the lead countries in Africa in terms of metal silos uptake.

There are some farmers who may argue that the technology is too expensive for them.

"Many tinsmiths and *jua kali* artisans, are learning to make the air tight silos from galvanized metal sheets of the same standard," informs Dr. Philip Kiriro, the President, East Africa Farmers Federation.

According to him, small holder farmers can be able to access silos with a minimum storage capacity of 20 kilogrammes, at a cost of Ksh. 3,000.

How to load grains into a metal silo

When loading grains into a metal silo, the grain outlet lid should first be tied with a rubber band. Open the grain inlet lid, load the dried and treated seeds and tie the inlet lid with a rubber band. The metal silo should be left airtight for 30 days in order to complete the life cycle of any weevils that may have gone in with the grains.

Where a metal silo should be placed

An appropriate place on a platform in the house should be selected to place the silo where it is not exposed to direct sunlight and rainfall. Water spillage into the metal silo should be avoided at all times. It should be at least one meter or three feet below the roof and it should not touch the house walls. When removing the grains, untie the rubber band on the outlet lid and place a container below the outlet to collect the seeds. Replace the lid and tie with a rubber band after offloading.

Store preparation: A storage facility should allow air circulation at the lower end and even more space in the upper section which will keep the pests away since the pests like a warm environment which would be discouraged by the ventilation. If the grains were stored the previous year, clean the store thoroughly to remove any previous harvest which could be harbouring pests. The cracks in the wood making the store should be thoroughly cleaned since they harbor weevils to remove them.

Remove all weevil infested maize

Sorting: Sorting prevents the spread of pests and moulds to the rest of the grains as the grains are as clean as possible. Shelling the maize will reduce pest damage since most pests prefer maize while still in the cob.

Drying: Shelled maize should be dried under the sun for at least four days to prevent mould which can lead to aflatoxin poisoning. Drying the maize also kills some pests which are already in the maize.

Racheal Wangari

Stevia: Sweet leaf that is good for your health

Stevia is 40 to 200 times sweeter than sugar. It has zero calories and has been found to control diabetes, high blood pressure, reducing weight promoting general well-being.

Dr. Peter Mokaya | "Let food be thy medicine and thy medicine be thy food," when Hippocrates, who is reputed to be the father of modern medicine uttered these words, I think he had on mind medicinal plants such as stevia which have immense health beneficits for consumers.

Stevia is a herbal plant that belongs to the Asteraceae family; is related to ragweed and marigolds. Stevia rebaudiana is the most prized variety of stevia. The stevia plant has been used for over 1500 years by the Guaraní people of Brazil and Paraguay, who refer to it as ka'a he'ê, which means "sweet herb".

Stevia extract is about 40 to 200 times sweeter than ordinary sugar depending on the variety and level of processing. When using stevia, one only needs a tiny fraction to sweeten your morning cup of tea. Extracts made from the leaves of the stevia plant are the healthiest sweeteners in the market. Stevia is a healthy alternative for sweetening beverages. Other commonly used and over processed sweeteners have been associated with many lifestyle diseases such as obesity (overweight), diabetes, high blood pressure and even cancer. If grown organically, stevia is a powerhouse of health benefits with unique ability of adding sweetness to beverages "sugar taste' without adding the bad "sugars" in humans' body!

Varieties of stevia in the market

Green leaf stevia is the least processed of the stevia types. It is the best healthy and natural sweetener to use only if grown organically. The leaves are basically dried and ground into powder form. No processing is done on this type of sweetener and it is locally grown with natural sweetness of about 30-40 times sweeter than sugar.

Partially processed stevia: Some brands that make stevia extracts have the sweeter and less bitter part of the stevia leaf called rebaudioside. This part of the leaf doesn't have the health benefits found in stevioside. The stevioside component of the stevia plant is bitter but with immense health benefits both recommended for a healthy conscious person.

Photo: TOF

Samwel Bengat, working on his stevia farm in Kabianga, Kericho County

What are the health benefits of consuming stevia?

There are medicinal properties in the plant itself that give it healing and disease-fighting effects. These nutritional and health benefits include:

Anti-cancer management abilities

In a scholarly article *Nutrition and Cancer* (Samad Akbarzadeh et al, 2012) highlighted a groundbreaking study that, for the first time ever, connected stevia consumption to breast cancer reduction. It was observed that stevioside, enhances cancer apoptosis (cell death) and decreases certain stress pathways in the body that contribute to cancer growth. The journal *Food Chemistry* (*Stevioside Induced ROS-Mediated Apoptosis Through Mitochondrial Pathway in Human Breast Cancer Cell Line MCF-7, Published online: 12 Oct 2012*) published a study in Croatia showing that when stevia is added to natural mixtures for killing colon cancer such as blackberry leaf; antioxidant levels go up, which is a cancer fighting factor.

Photo: TOF

Kimani, a farmer in Molo holds stevia stems

Diabetics management

Using stevia for white sugar can be extremely helpful to diabetics who need to avoid conventional sugar. Avoid artificial sweeteners. Human and animal studies have demonstrated that artificial sweeteners can raise blood sugar levels more than common sugar.

An article published in *Journal of Dietary Supplements, (Volume 12, 2015 - Issue 1)* evaluated how stevia affects diabetic rats. It was found that rats treated with 250 and 500 milligrams of stevia every day lowered their blood sugar levels and balanced insulin resistance, triglycerides and alkaline phosphatase (which is raised in cancer patients). Health experts advise that continuous use of stevia before a meal reduces post meal blood glucose and insulin levels.

Helps in weight reduction

High sugar intake has been linked to weight gain and adverse effects on blood sugar. This can have serious negative impacts on one's health. Stevia is a plant-based, zero calorie sweetener. By controlling sugar and calorie intake in a healthy way, this can help to prevent obesity as well as many health problems linked to obesity like diabetes and metabolic syndrome.

Improves good cholesterol levels

Research findings show that stevia extracts decrease elevated serum cholesterol levels, triglycerides and LDL ("bad cholesterol") while increasing HDL ("good" cholesterol).

Lowers high blood pressure

Certain glycosides in stevia extract have been found to dilate blood vessels and increase sodium excretion.These are two things which are very helpful to keep blood pressure at a healthy level.

For better results, avoid highly processed stevia. It's really not stevia, any more, by time these pharmaceutical variety goes through a 42 step process to make this processed sweetener. Highly processed stevia has the rebaudioside extracted which is beneficial to humans. They also add chemical solvent acetonitrile which is toxic to the liver and is a carcinogen. Processed stevia also has an additional element of GMO corn derivative called erythritol which is toxic to human bodies.

What is the way forward?

Consume organic stevia for maximum health benefits. Organic stevia is readily available grown by organic farmers. Still, you may grow stevia on your farm or kitchen garden and use the leaves, freshly harvested from your garden. That way you will maintain your health and that of your family.

For more information on this and related health and nutritional questions and clarifications, feel free to contact the author of the article through the address given below:

Dr. Peter Mokaya, Director and CEO, Organic Consumers Alliance (OCA), Website: www.organicconsumers.co.ke Email: Peter.Mokaya@organicconsumers.co.ke or Mokaypm@gmail.com

Working with partners has paid off for Biovision centre

Since it was set up, Katoloni Biovision Resource Centre, has worked together with several organizations in Machakos, Makueni and Kitui counties to help train farmers adopt sustainable agriculture technologies, water, energy and other development projects.

Regina Muthama (inset)-The Co ordinator Chairperson of Katoloni Mission C.B.O, also handles collaborations and networking with partners

The Organic Farmer | The Katoloni Biovision Resource Centre (KBRC) brings together a Biovision field staff team of 6 information agents. The staff share responsibilities on various fields in an amicable way to ensure effective execution of their duties.

Collaborations and networking

Ms. Regina Muthama, the Coordinator for Katoloni CBO, has assisted in establishment of collaborations with several partners including, Kenya Organization for Environmental Education, (KOEE), KALRO-Katumani, Machakos Water Resource Management Authority (MWRMA), Caritas Development Services (CDS), micro-finance institutions among other like minded partners. These partnerships have been enhanced by Biovision Africa Trust (BvAT), through strengthening of the programmes towards the realization of sustainable organic agriculture initiatives.

Source of information

For instance, KALRO-Katumani has housed the Katoloni Biovision Resource Centre, (KBRC), and has provided good educational environment for the farmers. KALRO-Katumani works with KBRC, to empower farmers in Katoloni region, Machakos, Makueni and Kitui Counties. KBRC also shares their information products with the centre. Above all, farmers visiting KALRO Katumani Centre are also directed to KBRC for more information on sustainable agriculture.

KOEE has provided capacity-building trainings for three of KBRC staff, teachers and church leaders on issues concerning environmental conservation. KOEE award the participants with diplomas after successful completion of a module on sustainable development.

KOEE has also funded schools and C.B.Os with water storage tanks for use in vegetable and livestock farming activities. They have also empowered groups with skills and materials for making energy saving *jikos*. It is through enhanced working relationship and dependable collaboration with various partners that groups like Kukena and Muuo wa Makaveti Women Groups benefited from this partnership.

Energy saving *jikos*

Easy Life Company, another partner, promotes modern energy saving *jikos* within Katoloni Farmer Groups. The energy saving stoves have reduced usage of firewood by 45 % according to the company's records. They have saved energy and improved environmental conservation through improved energy saving *jikos*. Since September 2016, one of Katoloni Women Group members, also a volunteer information officer, Ms. Christabel Mbuvi; has sold more than 200 energy saving Jikos, from Ngelani location, Machakos County.

Dairy goats

The Caritas Development Services (CDS) has supported 8 groups with dairy goats for milk production while Katumani Agricultural Technology Development Centre (KATDC), supported 7 groups with egg hatching incubators. "These are just a few benefits realised from collaborations and partnerships. These partners have really enabled us achieve our Biovision set objectives effectively," says Regina.

Plant Clinic

By Berita Mutune

Aphids

Aphids are small, soft-bodied and sap-sucking insects. They may be green, yellow, brown, red, or black depending on the species and the plants they feed on. They have tube-like structures which clearly distinguish them from other insects. Aphids occur in colonies, mostly on the undersides of leaves. Aphids produce large quantities of a sugary liquid waste called "honeydew". Some aphids are vectors of plant viruses.

Crops affected: Legumes, tomato, Cucurbits, carrot, citrus, pepper, spinach and plums.

Symptoms

Heavily-infested leaves wilt or turn yellow because of excessive removal sap. Saliva injected by these aphids may cause leaves to wrinkle, curl or to become severely distorted. Once the distortion occurs, the leaves will remain cup-shaped and twisted until they fall off. Moreover, aphid feeding on flower buds and fruit can cause malformation in flowers and fruit.

Aphid infestation on leaves

A fungus called sooty mold grows on honeydew deposits that accumulate on leaves and branches, turning them black. The appearance of sooty mold on plants blocks sunlight inhibiting photosynthesis. The honey dew deposits can attract ants that will feed on it. Presence of ants climbing up is the first indication of aphid infestation in a plant.

Plants that become infected with an aphid-borne virus may be severely stunted and may die.

Prevention and control

Early detection of the pest is the key to reducing aphid populations.

- Prune heavily infested leaves or other plant parts.
- Use a strong spray of water to dislodge the aphids off the plant.
- Use of natural enemies e.g parasitic wasps.
- Ants protect aphids from their natural enemies, so keep ants away by applying a band of sticky material around the trunk to prevent ants from climbing up.
- Use of predator insects such as lady bird beetle which feed on them.
- Do not over water or over fertilize as aphids like plants with high nitrogen levels and soft new growth. It is advisable to use organic fertilizers which release nutrients slowly.
- Growing resistant varieties may help in reducing infection with some viruses that attack plants.
- Planting garlic or onions near infested plants, as the smell drives aphids away.
- Use of insecticidal soaps.
- Use of horticultural spray oil such as neem oil (Nimbecidine®) that kills insect eggs.

Black sooty mold

Feed your dairy cow well to get a healthy calf

What can I feed a dairy cow that is pregnant (incalf)?

Animal nutritionists say that when you are feeding a pregnant dairy cow, you are feeding two animals (the cow and the developing calf in its uterus). What this simply means is that when a cow is incalf (pregnant) it needs adequate and balanced feed that is enough to meet her body maintenance and also that of the calf inside her. A calf's development (growth and performance) before and after birth depends on how its mother is fed during pregnancy. The feeding of the dam (mother cow) during pregnancy is therefore critical and determines the health and productivity of the calf later in life.

A cow's nutrient requirements are based on three factors and these are maintenance, milk production and reproduction (foetus – unborn calf growth), but as the unborn calf grows, the nutrient requirement of the mother increases. While the energy and protein requirements of incalf heifer (young cow) are generally higher than those that have calved down more than once, additional feed supplementation, especially feed with a higher level of proteins plays an important role in proper growth of the unborn calves and a young growing in calf and lactating heifer. For an incalf dairy cow, the daily energy and protein requirements should include the nutrients for the unborn calf. The rule of thumb is that such a cow should be offered extra nutrients similar to cow producing 10 kg of milk. The extra nutrients would carter for the requirements of the unborn calf.


Photo: IN

Protein and energy needs

But the question is; how much energy and protein does a pregnant dairy cow require? Many animal nutritionists find this a very difficult question to answer because different breeds of animals have different nutritional needs based on their different weight and digestion efficiency. At the same time, different types of feeds have different nutrient levels. The best method that farmers are advised to use is simply to ensure that their pregnant dairy cows are provided with enough feed that is balanced. To ensure that the requirement of the cow is met, farmers should consult animal nutritionist to design feed rations that meet the nutritional needs of the animal.

Feed that has adequate energy for maintenance (e.g. energy sources include grass hay, Napier grass, crop residue etc) which are supplemented with equally balanced sources of proteins (e.g. calliandra, *Sesbania Sesban*, lucerne, leucaena, purple vetch, lablab, desmodium, clotalaria etc). In addition to the feed, ensure the animal has clean and adequate water at all times day and night- a dairy cow weighing 400kg requires at least 40 lt of water per day for maintenance and extra 4 lts of water per lt of milk produced. Therefore a cow producing 20 lts of milk would require 120 lts of water per day. Ensure that the water taken by your cows is not very cold. Cows prefer lukewarm than cold water.

Supplementation of these feeds with minimal concentrates (dairy meal) on a daily basis is important in order to provide the dairy cow with extra nutrients and minerals it requires for its maintenance and that of the unborn calf. A close observation of the incalf dairy cow is very important on the part of the farmer to ensure that the animal is in good health.

Under ideal conditions, a dairy cow should be able to calf down at least once in a year. Since a year has 365 days, the cow should be dried (stop milking) 60 days before it calfs down. For the farmer to know when to stop milking the cow, they can subtract 60 days from 365, which comes to the 305th day from the date the cow conceived.

To make it easier for the farmer to understand, we give you different feed requirements for dairy cows at various stages of lactation (*see tables on the left*).

Answer by William Ayako, willyayako@yahoo.com

General requirements of dairy cows for maintenance

Body weight in kilogrammes (kg)	**Energy requirements per day** MJ/day	**Crude Protein** CP/day
300	38.6	0.288
350	38.88	0.324
400	42.9	0.358
450	46.9	0.39
500	50.8	0.423
550	54.8	0.454

Requirement for a dairy cow producing milk

Milk butter fat (%)	**Energy requirements** MJ/ kg milk	**Crude Protein** kg/kg milk
3.4	4.9	0.081
3.6	5.0	0.082
4.0	5.3	0.085

Example of feed ration for an incalf dairy cow weighing 400 kg

Feed type	**Fresh weight (Kg)**	**Percentage of dry matter (% DM)**	**Dry matter in feed (Kg)**	**Energy MJ per kg of dry matter**	**Crude protein per kg of dry matter**	**Energy in mega Joules (MJ)**	**Crude protein in (kg)**
Napier grass	30	20	6	7.4	70	44.40	0.420
Lucerne	6	80	4.8	10.8	160	51.84	0.768
Total available	36		10.8			96.24	1.188
Requirement						92.90	1.144
Surplus						3.34	0.044

Ration for a dairy cow for milk production weighing 400 kg

Feed type amount in (kg)	**Fresh weight (Kg)**	**Percentage of dry matter (%DM)**	**Dry matter in feed (Kg)**	**Energy MJ per kg of dry matter(MJ)**	**Crude protein per kg of Dry matter (g)**	**Energy in Mega Joules (MJ)**	**Crude protein per kg (kg)**
Napier grass	30	20	6	7.4	70	44.40	0.420
Lucerne	6	80	4.8	10.8	160	51.84	0.768
Dairy meal	6	90	5.4	12	160	64.80	0.864
Total	**42**					**161.04**	**2.052**
Requirement						142.90	1.964
Surplus						18.14	0.088

The requirement of dry incalf cow has been calculated based on milk production at 10kg milk per day.

TOF Radio answers your questions

TOFRadio is broadcast on KBC on Thursday at 8:45pm 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 916 136.

Value addition: Organic farmer earns more

Joyce Wambui Mahui | Value addition is increasingly becoming a determining factor for farmers to succeed in the market. Immediately after harvest, the same type of farm produce tend to flood the markets since most farmers harvest at the same time resulting in a glut and very low prices. Many farmers continue to incur heavy losses, which can be avoided if they learnt how to increase the shelf life of their produce and sell when the supply is low and prices high.

For retired civil servant Charles Mundia of Kiamwangi village located in Gatundu north, Kiambu County, trending market prices no longer affect his income from farming.

Says Mr. Mundia, "When I retired 10 years ago to start farming, I was very frustrated. I experienced many challenges ranging from deciding what profitable crops to plant during a particular season, diversifying my crops to spread the risks as a form of mitigation against weather and market losses due to low pricing, managing the crops, minimizing on post harvest losses; but my worst nightmare was the market. The prices seem to fall every time I took my produce to the market but I had no choice but to sell since they would get spoilt very fast."

Biovision trained him

After being introduced to do organic farming and value addition by Biovision Africa Trust (BvAT) Outreach officer Ms. Njeri Kinuthia, farming started bearing fruit for Mr. Mundia.

"Njeri taught me how to make compost manure and advised me on various agribusiness ventures I can engage in that will differentiate me from other farmers, thus enabling me to make more profits and improving my living standards," he says.

Set up hotel for organic food

Mr. Mundia is now a proud owner of the only hotel in the region which serves organic food. Mr Mundia prepares meals for his customers out of produce from his organic farm and the hotel is now a popular eatery for the local residents. Thanks to the increasing demand for organic foods.

Photo: TOF

Mundia shows different types of flour that he processes for use in his hotel

Mr. Mundia grows bananas, sweet potatoes, cassava among other high value crops to meet the high demand for kienyeji indigenous food.

With yields increasing from improved organic farming practices, the farmer is also eyeing the nearby Nairobi market which is experiencing a rapidly expanding population of health-conscious consumers.

Processing and blending flour

By making flour from bananas, sweet potatoes, cassava and other products he grows himself, the farmer is not only able to increase the shelf life but also diversify the range of his farm produce to tap both the nearby market and that in other towns. Mr Mundia has been milling banana, cassava, mulberry and sweet potatoes from his farm.

"The flour is very nutritious and after seeing how much people were enjoying *ugali* and porridge made from the flour. Together with my wife we have introduced other diversified products like *mandazi*, *chapati* and cakes made from the organic flour."

For now, the farmer spends much of his time training other farmers on organic farming practices and value addition by inviting them to his farm to see for themselves how he has benefitted from adding value to the organic produce.

Photo: TOF

Customers take poridge in Mr Mundias' hotel

Encourage organic farming

He believes that if more farmers take up organic farming practices, then, Kenyan consumers will not only eat healthy food but also will have a variety of foods to pick from. He also adds that there is need for policy makers to enact policies that encourage farmers to practise organic farming and guarantee food security in the country while protecting the environment.

Need for change in diet

Mr. Mundia observes that one of the challenges facing organic farming is the craze for fast foods especially among the youthful urban population. The organic farmer feels that there is need for consumer education on organic foods to take advantage of the emerging trends of "healthy living" and appreciating indigenous foods.

The Outreach team advises farmers on organic farming techniques and environment conservation practices through a Biovision Farmer Communication Programme funded by Biovision-Foundation, Zurich.

farmers forum

0717 551 129 / 0738 390 715

Chickens on sale: 2½ months old KARI chickens. Price negotiable. Contact 0710 247 281, Nairobi.

Organic produce for sale: We are offering organic vegetables, fruit and spices for sale. We have *sukumawiki*, spinach amaranth, chia seeds, rocket black, Chammomile, Fenugreek, basil, mint, asparagus, parsley, beetroot, lemongrass, Taragon, tree tomato and Pepino fruit and seedlings. Contact Wanjiru's Park Farm and Resource Centre, Limuru Tel. 0723 158 680.

Silage tubes for sale: We sell silage tubes, improved KARI chickens, day old chicks. Farmers in Western and North Rift, call Star Rays Educational Centre, Nangili 0721 245 443.

WhatsApp

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