The Organic Farmer

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The magazine for sustainable agriculture in East Africa No. 161 October, 2018 Ksh 20/- (Usd 0.20)

Photo: TOF

From L to R: The University of Nairobi College of Architecture and Engineering Principal, Prof. Peter Ngau; PELUM Kenya Country Coordinator, Zachary Makanya; College of Agriculture and Veterinary Sciences Principal, Prof. Stephen Kiama and College of Humanities and Social Sciences Principal Prof. Enos Njeru (right) view organic vegetables and fruits during the Kenya Organic Food Festival and Exhibition which was held at the Wangari Maathai Institute of Peace and Environmental Studies last month.

Harvest your maize early to cut losses

Peter Kamau | The Meterological Department has warned farmers of the likelihood of increased rainfall towards the end of the year, that is between November and December. Excessive rainfall towards the end of the year has always been associated with a lot of damage to maize that is ready for harvest at this time.

Harvest in October

A lot of maize grown in March and April especially in the major maize growing areas of Uasin Gishu, Trans Nzoia, West Pokot, Elgeyo Marakwet and parts of Western Kenya is mainly late maturing varieties. These varieties mature between September and October. It is important for farmers in this maize belt to start harvesting their maize in October to ensure that damage through rotting is reduced to minimum.

It is a common practice among farmers to wait for schools to close to benefit from free labour from their children in harvesting the crop. But this practice leads to a lot of losses.

In the event of excessive rains, most of the maize is lost through rotting, aflatoxin contamination and discolouration (it attains a yellow colour making it unmarketable).

Government reduces drying costs

All late maturing maize varieties planted in March and April are usually ready for harvest in late September and the entire month of October. Indeed farmers should cut and stake the maize immediately the silk (pinkish-brown fibre at the tip of maize cob) turns black. Shortly after, the maize should be properly dried and stored in a well-ventilated store. For large-scale farmers, the Ministry of Agriculture, Livestock, Fisheries and Irrigation has reduced drying charges at the National Cereals and Produce Board driers this year to enable farmers to dry their maize to reduce losses.

Photo: TOF

Maize heap at Endebess, Kitale

Lack of storage facilities

Maize storage is big problem to farmers in Kenya and the rest of Sub-Saharan Africa. Indeed, many farmers are forced to sell their maize to middlemen at throwaway prices immediately after harvest as they do not have stores to keep their maize. This is one reason why farmers get very poor prices for their maize. With the bumper harvest expected this season, it is only farmers who manage to store their maize and sell when prices are favourable that will get good returns.

In this issue

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Dear farmer,

Failing to plan is planning to fail. This saying is very true when it comes to farming. An important aspect of any successful farming enterprise is planning. Proper planning enables the farmer to decide on the type of crop to grow, how and when to grow it in order to deliver it to the market when prices are good. Farmers should also know what it will cost to produce the particular crop.

As we approach the end of the year, any enterprising farmer should be able to know which crops are likely to be in short supply in the market in the coming months and plan to grow them. For example, in the month of November and October every year, most farmers put up vegetable and fruit nurseries mainly sukumawiki, cabbages and tomatoes targeting to sell the produce during the dry season, which starts in January and ends in April or May the following year. Most farmers make very good returns from these products.

The only problem is that every farmer grows the same crops that other farmers are growing. This is risky because when all these products reach the market at the same time, they cause a glut and a drop in prices leading to losses. It is advisable that farmers do a market survey and identify produce that not many other farmers are growing. This way they can avoid incurring losses that come with "copy-cat" farming.

In the last few years; for example, most consumers are discovering the value of indigenous vegetables. Indeed, the demand for these vegetables is so high that producers are unable to supply enough of these vegetables to the market. Farmers can take advantage of this to grow them and make very good returns.

With the problems that come with climate change it is very important that farmers adopt technologies that optimise available water resources. Practices such as mulching, use of organic fertilizers such as compost, including minimum tillage to reduce water loss and enable production of various crops with minimum water should be encouraged.

During the dry season it is common to see farmers pumping water from rivers to flood their farms to irrigate tomatoes and vegetables. Over exploitation of water for irrigation denies other farmers downstream this precious commodity that they need for both domestic and other uses.

It is time farmers adopted climate-smart technologies such as drip irrigation for crop production during the dry season. Water harvesting should also be made mandatory for all farmers to ensure we reduce wastage and harvest all the water available during the wet season for use in the dry season.

AFERIA enables farmers cope with climate change

More than 1000 farmer families in Kenya and Tanzania have been trained on water harvesting, Integrated Pest Management (IPM) planting trees, irrigation, nutrition and sustainable agriculture.

Venter Mwongera | Water is a rare commodity upon which people, plants, animals and the environment depend on for sustenance. Its availability and scarcity affects all social-economic activities including farming and patterns of food production. In the past, unsustainable farming methods adopted by human beings have continued to deplete water resources which have also been adversely affected by climate change.

Rainfall patterns are no longer easy to predict for farmers to plan their farming activities appropriately, extreme weather changes have become the norm; soil fertility has decreased due to poor farming practices over prolonged periods of time.

Chemical fertilizer use affects soils

Continuous use of chemical fertilizers for farming, spraying of chemicals to control pests and diseases on crops, continuous tilling of land, which leads to loss of soil nutrients and soil erosion when the winds blow it away, leaving poor soil that is infertile.

To cope with the effects of climate change and to ensure continuous food supply throughout the year; adoption of prudent methods of using water could be a relief to many small-scale farmers. The use of natural enemies to control pests on crops as opposed to use of chemical pesticides for crop protection can be practised.

Recycling crop residue

Feeding livestock with crop residues which is then recycled back to enrich the soil can help farmers reap high yields from their animals. Animal products can also be processed to diversify incomes. Farmers can plant and nurture trees to regulate the temperature and conserve the environment as one way of mitigating climate change.

Farmers embrace sustainable farming

Productive strategies ought to be embraced by farmers to support them to grow more high-value crops to improve livelihoods, decrease malnutrition amongst children and pregnant mothers, conserve the environment and reduce the impacts of the climate change.

As part of this strategy, the Adaptation for Ecosystem Resilience in Africa (AFERIA) project has trained more than 1,000 farmer households in Taita Taveta Hills in Kenya and Moshi in Tanzania on water harvesting, Integrated Pest Management (IPM) strategies such as use of the natural enemies to protect crops and diversify the range of crops they grow for improved nutrition and livelihoods. The project has also promoted the planting of trees to mitigate the negative effects of climate change through care of the environment.

Using natural enemies to control pests

Mr Bobson Mwakisha is a resident of Kishenyi village, Weruga location in Taita Taveta County. He is one of the beneficiaries of AFERIA project. "I received training on water harvesting and management and use of natural enemies, which were released on my farm to protect my crops against pests. I used to plant maize, but the harvest was very poor because of the stemborer pests which destroyed almost the entire crop. Since the natural enemies were released on my farm by the AFERIA project officials, my harvest of maize increased," confessed Mr Mwakisha.

Mr Mwakisha at one of his gardens where he grows vegetables under irrigation

Program has changed me

A former Kenya Defence Force Officer, Mr Mwakisha had a passion for farming on his three acres. "The soils were fertile more than 40 years ago. My parents used to farm on this farm and the harvest was bumper. Today, the fertility of the soils has decreased. I spent a lot of money buying chemical fertilizer. Still, the harvest was not good. Through the AFERIA project, I was taught organic farming," he says.

Mr Mwakisha is passionate about farming; although he has more than one acre of land, he would only plough an acre each season.

Farmers get drip irrigation kits

Mr Mwakisha is among more than 2,000 beneficiaries of drip irrigation kits whose life has been changed for the better. His farm remains ever green with horticultural crops throughout the year due to irrigation.

"Each month, I make more than Ksh 30,000 after selling horticultural crops that I grow using the drip irrigation kit. The knowledge and the equipment were given to me by AFERIA. I'm now a happy farmer. My dreams have come true," a happy Mwakisha confesses.

Improved livelihoods

According to Mr Mwakisha, AFERIA project has rekindled hope in many small-scale farmers whose livelihood was threatened by climate change. "With a drip irrigation kit, a tank, the knowledge I have acquired, I can grow more food on a small parcel of land; many farmers have benefitted from improved nutrition, additional income and the ecosystem can be restored," says Mr Mwakisha. "Through the increased sales of vegetable and bumper harvests from maize, I own a motorcycle and I have renovated my house," he adds.

The project has shown that "Through knowledge and facilitation to own a drip-kit, smallscale farmers' life could be changed for better through better adaptation of climate change technologies," says Dr Tino Johansson, the AFERIA Project Coordinator.

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).

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Sponsor Biovision, a Swiss-based foundation for the promotion of ecological development, based in Zürich, Switzerland.
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It is possible to store your maize safely

Ann Wanjiku Gitau | Most farmers are faced with challenge of marketing their maize after harvest mostly as a result of late payments by NCPB which forces them to sell to brokers at cheaper prices to sustain their livelihood. Late harvesting provides a conducive environment for pest infestation. Timely harvesting of maize should be done before the husks start opening up, which exposes the grains to pests and rainwater that causes rotting.


Photo:TOF

Late harvesting causes rotting and aflatoxin contamination

Advantages of early harvesting

- Enables farmer to efficiently plan for next season's farming operations.
- Reduces losses due to pests such as maize weevils and Larger Grain Borer (LGB).
- Minimises chance for use of chemical dusts which have over time become ineffective due to pest resistance.

Tips on how to minimize maize spoilage

- Sweep clean the storage facility floor to remove any grains scattered on the floor.
- Clean in and around the store and spoilt grains should be buried or burned.
- Ensure holes and leaks in storage bags or bins are patched to prevent grain loss.
- Clean storage facility to prevent pests.
- Sample grains before storage to get clear picture of grain condition.
- Sort shelled grains to reduce amount of foreign matter.
- Most insects prefer maize still in cob for easier movement hence shelling the maize minimizes infestation and helps in monitoring pest damage.
- Do not mix newly harvested grains with old stock which may contain insects.
- Ensure the store has adequate ventilations to facilitate free flow of air.
- The store should be raised with rat guards in place to keep away rats.


Photo:TOF

Diatomite: Effective but harmless

Storage methods

Most farmers have a great challenge when it comes to storage especially due to lack of stores forcing most of them to sell immediately after harvest when prices are low. Most farmers have over time used traditional methods for preservation of grains as well as adopting advanced technologies that are cost effective, reliable and easy to use to minimize losses. There are several methods that farmers can use to preserve their grain for long to fetch better prices.

Ash: It has mostly been used for preservation of legumes such as beans which are then stored in air tight containers to minimize infestation by pests like weevils.

Pyrethrum powder: Flowers are picked and dried in the shade which are later crushed and mixed with grains. It can protect grains for up-to 4 to 6 months. The grains need to be well washed and dried before consumption.

Diatomite: The grade Kensil F is most appropriate and acts by piercing and killing insects with its sharp edges. It's very effective and doesn't affect quality of grains. The diatomite should be washed off before grains are consumed.

For additional reading http://www.infonet-biovision.org/PlantHealth/Pests/Storage-pests

The metal silo

It is a more advanced technology with capacity ranging between 2-20 bags. It's an airtight cylindrical metal structure where grains are loaded and is most effective when left closed for at least 1 month for completion of weevil's life cycle which may be hidden within the grains. Since some farmers consider 10 kg silo expensive at KES 10,050, local *juakali* industries also fabricate the silos at a cheaper price.

A metal silo

How to load grains in metal silos

- Grain outlet is sealed with rubber band before loading grains.
- Dried grain is loaded in the silo using the inlet then sealed with rubber band.
- Place the sealed silo away from direct sunlight or rainwater
- During offloading of grains, untie rubber band at the outlet and use a container to acquire required amount.
- After offloading, carefully replace the lid and tie with rubber band to ensure it is airtight.
- Silos are durable and can last for up-to 10 years and can store maize for upto 3 years.

How to test your maize for moisture content

To test if your maize is dry for storage, all you need is an empty glass bottle and dry salt:

1. Put a handful of grains and a half handful of salt in a dry bottle or glass.
2. Shake the contents in the bottle for 2 to 3 minutes. Allow it to settle.
3. If the salt sticks on the walls of the bottle, then the grains are not well-dried or have not attained the lowest required moisture content.
4. Dry the grains again and repeat the test.
5. If there is no salt sticking on the walls of the bottle, then the grains are dry and ready for storage.


Photo:TOF

Moisture content testing

IPM protects mangoes, increases farmers income

The Integrated Pest Management (IPM) method has reduced the use of harmful chemicals, enabling farmers to sell their mangoes at good prices in the local and export markets.

Beritah Mutune | Horticulture is one of the most important food and income generating opportunities for small-scale farmers in Kenya. However, the Horticulture industry is currently faced by a number of constraints including insect pests that directly attack crops and consequently reduce their yields. Apart from pests, there are diseases which may attack crops indirectly. Some pests are considered quarantine pests hence result in the rejection of horticultural produce in export markets. The majority of mango producers are small-scale farmers; and have not knowledge on effective pest and disease control measures. They rely on chemical pesticides. The pests eventually become resistant to chemicals. Chemical pesticides also kill the natural enemies and parasitoids which can biologically control the pests.

Fruit flies cause great losses

Mango fruit flies cause an estimated annual loss of more than 2 billions US dollars in Africa. Over the years, ICIPE and a number of global partners have developed Integrated Pest Management (IPM) packages for exotic and native fruit flies. These include baiting and male annihilation techniques; biological control with biopesticides, natural enemies and parasitoids and cultural control through field sanitation amongst others.

How to identify fruit flies

Adults are 3mm to 4mm long, may have red eyes, though some are dark eyed, and have a tan thorax. The abdomen is black on top, gray underneath. Fruit flies can appear to be brown or tan in colour. Fruit flies are attracted to sugary, organic materials. As their name suggests, they commonly infest fruits. They lay their eggs in rotten fruit and other soft, sweet, organic materials.

Fruit fly (Bactrocera invadens)

This strategy generates a significant environmental and health benefits by helping in reducing the use and misuse of chemical pesticides. The non-selective and frequent use of chemical pesticides has serious side-effects to the health of the growers, consumers and the environment. The use of fruit fly IPM package is aimed at reducing mango yield losses.

The IPM method has helped increase mango yields, consequently reducing the huge expenditure incurred by farmers in purchase of chemical pesticides. It also enhances the quality of mangoes produced, which fetch a much higher price and consequently greater profits both locally and in the export market. There are also the benefits of using different combinations of the IPM methods. These control measures ultimately provide the highest impact once the technology is adopted. The technologies can be up-scaled and through extension services can reach a larger number of small-scale farmers in affected areas.

Impact of the fruit fly IPM technology on mango growers

In Kenya, and within the framework of a Biovision Foundation funded fruit fly IPM project, icipe in 2016 conducted 11 fruit fly IPM demonstration sessions in Kitui, Meru and Tharaka Nithi Counties for NARS (National Agricultural Research Systems), CESPS (Community Service Providers) and growers, which brought together 45 NARS/CESPs participants (80% men and 20% women) as well as 1322 growers (59.4% men and 40.6% women).

The training of trainers' workshops, establishment of IPM learning sites, technology demonstration of the IPM technologies to growers and other stakeholders through organised field days has really helped mango growers to fight the menace of the devastating fruit fly pests. Overall, the IPM technology increases the market competitiveness of the mango fruit, and increasing the earnings of small-scale farmers, enhancing food security and improving livelihoods.

Achievements so far

- Establishment of learning sites that are learning hubs for growers.
- Creating awareness among the communities about the fruit flies and the available eco-friendly IPM technologies.
- Sensitization of communities on conservation of natural enemies through reduction of chemical insecticides spraying.
- Training of NARS and CESPs on various aspects of fruit flies management.
- Establishment and training of production member committee on good agri-practices (GAP), market access and marketing.
- Training of fruit growers on fruit flies monitoring and management.
- Releases and establishment of efficient parasitoid species for the invasive fruit flies.
- Distribution of fruit fly IPM starter packs (male lures, food baits, traps and augmentoria) to the growers.
- Releases of parasitoids in the project sites mentioned above.

Currently dissemination is ongoing in Meru (Nduruma and Kiagu), Tharaka Nithi (Karocho and Nkondi) and also in Kitui (Mulango, Kyangwithya, Migwani and Nguutani) counties in Kenya.

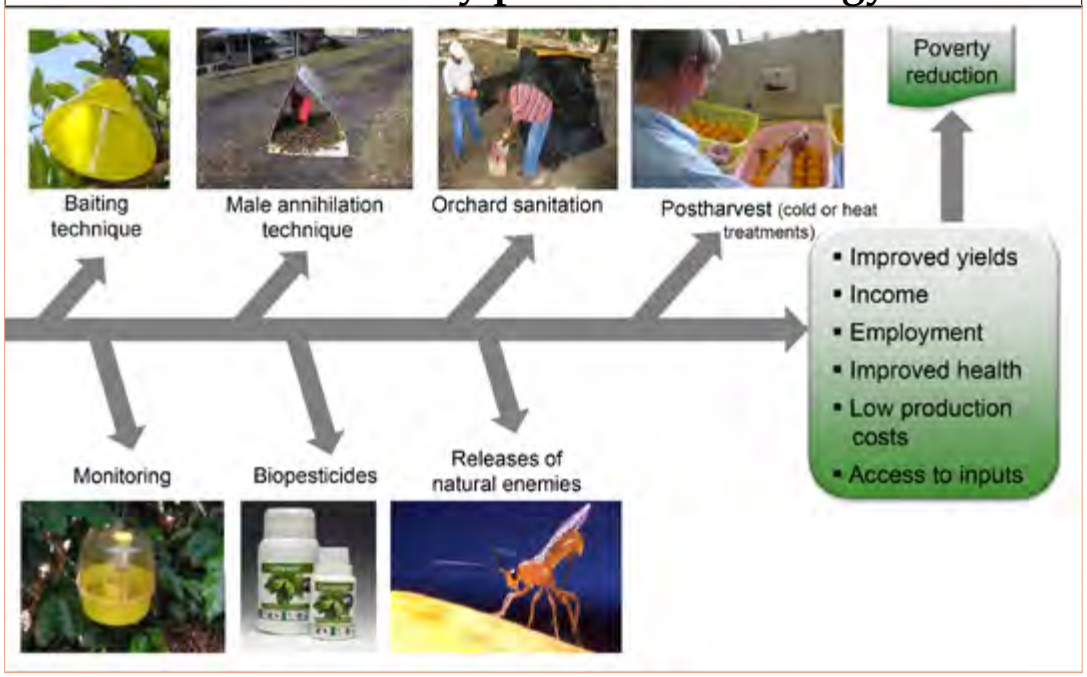
Project partners involved include: Ministry of Agriculture, Livestock, Fisheries and Irrigation, TechnoServe and private sector partners (Real IPM; Farmtrack; Kenya Biologics)

Donors include: Biovision Foundation, Switzerland.

Contact persons in the fruit flies IPM project: Fathiya Khamis, email: fkhamis@icipe.org; Chrysantus Tanga, email: ctanga@icipe.org and Samira Mohamed, email: sfaris@icipe.org

For additional reading http://www.infonet-biovision.org/PlantHealth/Pests/Fruit-flies

ICIPE fruit fly pest control strategy



Be careful with what you eat to prevent chronic diseases

A balanced diet devoid of sugar, saturated fat, salt, regular physical activity and consumption fruits, vegetables and vitamins can prevent lifestyle diseases such as obesity, diabetes, blood pressure, cancer, arthritis and many other health complications.

Photo:TOF

Food pyramid: Consumers can benefit from eating food shown in the food pyramid

Mary Mutisya | Currently, the burden of chronic diseases is huge. Many people ask what chronic diseases are, their causes, and what role diet and nutrition play in causing, preventing and managing them. Chronic diseases have been defined medically as human health conditions or diseases that develop overtime and are persistent, long-lasting, and whose cure has not yet been identified. Some of the most common chronic diseases are obesity, diabetes, cardiovascular diseases, cancer, osteoporosis and arthritis. No specific cause has been linked to chronic diseases, though the main risk factors associated with these diseases are age and gender. Diet, lifestyle and metabolic related issues have also been pointed out to play a key role in causing these diseases.

So far, no cure or single approach to the problem has been identified but rather, a combination of various practices are being recommended key among them being:

Good diet and nutrition

Research has shown that proper diet and nutrition is vital in the prevention and management of chronic diseases. Some of the most important solutions in terms of diet that need to be advocated for are:

Cereals consumption: Including cereals and whole grain in the daily diet should be encouraged. Cereals contain a lot of fibre which is important in adding into the weight of food, making digestion easy and efficient. They are also loaded with a lot of vitamins and minerals and for this reason they have a double benefit to their consumers as fibre from cereal products not only lowers the risk of type 2 diabetes but also other cardiovascular (heart) diseases.

Sugar consumption: Sugar and sugar-based beverages (soda and artificial juices) should be minimized: It is important for people to know that sugar and more specifically refined from sugarcane or sugar beets and high-fructose corn syrup have no nutritional value and only leads to additional calories that the body does not need. This has negative implications on health and predisposes consumers to chronic diseases. Low sugar intake is thus desirable and should be encouraged.

Low sodium intake: Sodium is mainly found in table salt in the form of sodium chloride. High amounts of sodium have an effect on blood pressure which is a major risk factor for stroke and coronary diseases. The suggested intake by the World Health Organization (WHO) is at most 1 teaspoon of salt per day and this should be keenly observed in an effort to keep the body healthy.

Avoid saturated fats: People should aim at replacing saturated and trans-fats which are mainly obtained from animal sources such as meat with unsaturated fats obtained from plant (vegetable) sources and include sources of omega 3 fatty acids such as fish in their diets.

Consumption of fruits, vegetables and folic acid: There is strong scientific evidence which links the consumption of fruits and vegetables in reducing the risks of heart diseases and stroke. Fresh fruits and vegetables should thus be included in meals and taken as often as possible.

Limit excessive calorie intake: Limiting the consumption of energy from any source is fundamental in the prevention and management of chronic diseases. Calories consumed from beverages are less well-regulated than those that are taken from solid foods. It is therefore important for people to limit the consumption of beverages and more specifically those that are sweetened.

Maintaining a healthy weight

For any normal individual, the body mass body index (BMI) which is calculated by dividing the weight (kg) of a person by their height (m^2) should be between 18.5 and 25. Any BMI that is below 18.5 is considered underweight while that between 25 and 30 is overweight and above 30 is said to be obese. Obesity is rapidly increasing worldwide and this is elevating the risks of many chronic diseases. Obese people are twice or thrice more likely to develop chronic diseases more particularly diabetes and hypertension.

Another key aspect regarding a healthy weight is the waist circumference which although not known to many is a silent killer and is critical in exposing people to chronic diseases. In healthy men and women, a waist circumference of approximately 100cm and 88cm is considered to be optimal. For this reason, therefore, those already affected by chronic diseases and those not yet affected should all focus on maintaining the appropriate body weight as well as waist circumference by eating healthy and exercising frequently (for farmers, being physically active in the farm provides enough exercise).


Photo: IN

Fish is healthy food

Maintaining daily physical activity

Increased urbanization, motorization and mechanization has markedly reduced people's opportunities of using the excess energy the body may not require. When it comes to preventing and managing chronic diseases, regular physical activity is key as it not only helps people in maintaining a healthy weight but it also helps reduce the risk of type 2 diabetes, stroke, colon and breast cancer, osteoporotic fractures, depression and erectile dysfunction.

Avoiding the use of tobacco

Most chronic diseases and more specifically cancers have been associated with the smoking of tobacco. Avoiding smoking by preventing initiation or by cessation for those who already smoke is the single most important way to prevent cardiovascular diseases and cancer. Avoiding the use of smokeless tobacco also helps prevent oral cancer.

For additional reading http://www.infonet-biovision.org/healthy_food

Farmer cuts cost of production with home-made feed

Through trial and error Mr David Kiruhi has managed to formulate his own home-made feed for his dairy cows, goats, sheep and even indigenous chickens.

Beritah Mutune | David Kiruhi is a dairy farmer in Ruai village in Ngobit ward in Laikipia County. He rears dairy cows, sheep, goats and chickens. But he cannot remember the last time he went to an agrovet shop to buy dairy meal for his animals. Instead he uses various crops he grows in his farm and some wild plants to prepare a home-made Total Mixed Ration (TMR) to feed his animals. He says the feed, which he learnt to make after many trials until he came up with the right combination, has helped increase milk production and maintained fast growth in all his animals including chickens.

"The feed has saved me a lot of costs, which I would have incurred in buying feed concentrates and also helped many of my neighbours who have learnt to make it for their animals, in the process cutting the cost of production," he says.

The following is the procedure Mr. Kiruhi uses to make 100 kg bag of home-made Total Mixed Ration (TMR):

Ingredients

66kg of maize stalks and maize on the cob (unshelled maize)

12kg whole sunflower

12kg of dried lucerne

1kg of stinging nettle roots and leaves (dried)

1kg of wild aloe vera

8kg of fermented and well-dried maize flour

Photo: TOF

David mixes his TMR ration

Preparation

The maize stalks which include the unshelled maize on the cob is dried well and milled together with the sunflower and lucerne (dried in a solar drier or limited sunlight to conserve the nutrients). The maize flour is put in plastic bucket and a little water added to make it moist, it is then closed tight to make it ferment for 7 days. The fermented flour is then put out in the sun until it is completely dry. The dried stinging nettle roots and the leaves and wild aloe vera are also milled separately. All ingredients are later mixed thoroughly to make sure they are evenly distributed (farmers with a drum mixer can use it for mixing). Each dairy cow is given 7 kg per day, goats and sheep about 1kg. For indigenous chickens ration about ½kg of sunflower and ½kg lucerne powder is mixed and added and each is given 130g per day.

He says the addition of wild aloe vera in his ration has helped control worms in his animals and improved their overall health and cutting down veterinary drug costs because they rarely fall sick.

Mr. Kiruhi says the feed has helped increase milk production for his dairy cows from an average of 7 litres to 10 litres per day. "This is a big improvement for me because during the dry season, milk production used to drop to as low as 5 litres but now my dairy cows have maintained the same level of milk production during the dry season as they do during the wet season when there is a lot of fodder and pasture," he says.

Farmers can contact Mr David Kiruhi on 0722 357 502.

For additional reading *http://www.infonet-biovision.org/AnimalHealth/Fodder-production*

Know the right way to feed calves

Kindly let me know the raw materials for dairy cow home-made meal starting from a calf, heifers and a mature cow just as you did for chickens.

Dear Farmer,

Making feeds at home is one of the most important decisions a farmer can make. This is for the simple reason that feeds can take up to 80 per cent of livestock production costs. However the farmer should acquire the necessary skills to ensure the feeds they make are of high quality and meet the nutritional requirements of the animals. Below we provide you with nutritional requirement of each stage of growth in a dairy cow:

Calves

The main reason for proper feeding of a calf is to ensure that it grows well to become a productive dairy cow. Good feeding helps the calf to grow fast and attain the right weight at each stage of its development. A healthy growing calf should attain at least 400g in weight per day. At 12 weeks of age (weaning), a well-fed calf should have attained at least 80kg in weight. The most important reason for feeding a calf properly is to help in the development of its rumen (first stomach). A calf has four feeding phases as shown below:

Colostrum phase (1-3 days): When a calf is born, it has low immunity (it is prone all manner of disease-causing germs and bacteria in the environment); so it is prone to infections. At this stage, the calf should only be fed with colostrum-the first milk from its mother after calving down. Colostrum contains antibodies that protect the calf from any form of infection. Calves should be fed this milk immediately after birth because in the first 3 days, the state of the colostrum makes it easily digestible, enabling a lot of antibodies to get into the calf's body for protection against any form of infection, therefore giving the calf a strong and healthy start in its life. Calves can be given 2 litres of colostrum in the first 4 hours, another 2 litres in the next 12 hours and another 2 litres in the next 24 hours.

Pre-ruminant phase (4 to 30 days): From the 4th to 30th day, the rumen of the calf is still developing, which means that the calf cannot digest carbohydrates or some forms of protein except simple proteins found in milk. Calves can only be fed on milk or milk replacers that contain simple proteins. Milk replacers should be of the highest quality. Farmers should check the nutritional value of the milk replacer or buy from reputable companies. Milk replacers should be at least 20 per cent protein, not less than 12 per cent fat and less than 1 per cent fibre.

Photo: TOF

In organic farming practices a cow should be allowed to remain with its calf for a week after calving

Transition phase (2 to 3 weeks before weaning): Since the rumen is still developing at this stage, calves can be given small quantities of dry feed e.g concentrates. Sweet potato vines are quite nutritious and can be fed to calves to help in rumen development.

Post weaning phase (after 12 weeks). At this time the calf's rumen is fully developed and functional, which means that it can now be put on pasture and fodder to maintain a high growth rate. The calf should also have access to clean water at all times (*ad libitum*).

Tips on calf feeding

Sanitation: Ensure buckets, feeding bottles or nipple bottles for calf feeding are thoroughly cleaned before and after use. Isolate sick calves eg those that have diarrhoea from healthy calves and feed them last if using the same feeding bottle.

Ensure each calf is housed separately from other calves. The calf pen should be clean, dry and well-bedded. The protected pen should be well-ventilated and kept free of draft (calves should be from wind).

Feed requirements of a calf

The daily concentrate requirement for a calf is very little. So there is no need for the small-scale farmer to make the concentrate at home. We would recommend that farmers buy high quality feed from reputable companies. A calf requires concentrates with 18-20% crude protein. In the first week, a calf can be given just handful of concentrate per day.

During the second week, it should be given ½ kg of concentrate. By the third to fourth week, the ration can be increased to 750g per day.By the 4th to 8th week, the ration can be increased to 1kg per day. From the 9th to 15th week, 1.5kg per day. Apart from the concentrate calves should be provide with a lot of fodder, mainly sweet potato vines and high quality hay to aid in the development of rumen (first stomach).

Answers by Elkanah Isaboke

In the next issue we look at feed requirements of heifers

For additional reading http://www.infonet-biovision.org/AnimalHealth/Cattle#simple-table-of-contents-4

Photo: TOF

A well-fed Fresian-Fleckvieh calf

TOF Radio answers your questions

TOFRadio is broadcast on KBC on Tuesday and 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

Push-Pull farmer improves food security and income

Musdalafa Lyaga | In Vihiga County, grain is at the heart of agricultural production for both family consumption and sale to boost the household income. Even though women provide the bulk of agricultural labour, they lack some or all of the resources that are needed to grow enough food to ensure household food security from seeds, tools, and farm inputs to knowledge on how to deal with cereal production constraints such as insect pests, invasive weeds, and degraded soils.

Getting enough for the family to eat is a constant worry for many households. The need for adaptive agricultural practices that can cope with the challenges facing farmers is of great significance. There is also a need to ensure that these practices are extended to the farmers.

Since early 1997, Prof. Zeyaur Khan, ICIPE's team leader and his colleagues have been disseminating the Push–Pull technology to farmers, aiming to transfer both the technology and the knowledge of how it works. Farmers are encouraged to experiment further, gain ownership of the technology and pass it on to others.

By training a network of farmer-to-farmer trainers, helping establish farmers' groups, and facilitating farmer field schools and field days, the team has established a mechanism for rapid adoption, which is the key to wide-spread impact.

In this last part of the Push-Pull series, **Musdalafa Lyaga** of TOF radio talks to **Ms Deborah Sande** a Push-Pull Farmer in Ebukanga Sub location, Vihiga County who has immensely benefitted from Push-Pull Technology:

Ms Deborah Sande spreads out her maize to dry

Q: What kind of challenges has your household been facing?

A: I am a widow and the head of my household. We underwent very many challenges. Most of them revolve around food and money. At times we faced problems such as accessing health care which is very expensive, paying school fees, and we could not even afford to clothe ourselves.

Q: Have you been able to overcome these challenges?

A: Oh, yes, I have been practising Push-Pull on the land my husband left me. Over the years, I have had the joy of seeing my yields increase. Now I am able to provide enough for my 5 children and even sell the surplus. With the money from the sales, I am able to meet other household financial needs like paying school fees, paying medical bills and I have even bought two dairy cows from the maize sales. I get additional income after selling milk.

Q: Tell us how you came to know about Push-Pull?

A: I first saw Push-Pull methods being practised by my neighbour, Ms. Agnes Ambubi. We all used to experience similar challenges like pests and degraded soil but then she started farming differently and we started seeing an increase in her yields.

This is what triggered my curiosity in this new farming technology. When I later listened to a farmer radio program on Push-Pull technology, I knew it is something that I could try. This energised me to start attending demonstration classes at Ms Ambubi's farm, conducted by the International Centre of Insect Physiology and Ecology (ICIPE) extension workers.

Q: What did you learn about Push-Pull farming

A:I learnt how to set up a Push-Pull plot which entails knowledge on when and how to plant the different Maize companion crops like desmodium and Napier grass, how to manage a Push-Pull plot weeding practices and harvesting from the Push-Pull plot.

Q: How have you benefitted from this method of farming?

A: Before, I barely harvested anything from my farm. I used to harvest only a half a sack of 90kg bag in my farm. Here we have plots, each roughly a quarter of an acre. When I started practising Push-Pull, my first harvest was 2 bags. This has since increased to 7 bags in the last harvest. With the surplus money that I have been receiving, I am now able to rent more land from my neighbours most of who are in Nairobi.

Q. How much maize do you harvest from both your farm and on the hired land?

A: As we speak, I have more than 20 bags of maize in the store which I intend to sell. I have also bought dairy cows which I feed Napier and desmodium from my Push-Pull plots. The cows are giving me a combined 20 litres of milk, which I also sell. I have managed to educate my son up to college level through Push-Pull and he is now a teacher. You can also see how smartly dressed I am. As a farmer teacher, I have developed status in the community where the voices of women are not heard and worse still, widows are looked down upon. I am really happy with Push-Pull for the prosperity I am now enjoying in my life.

For additional reading ***http://www.push-pull.net/***

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	93.3 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