The Organic Farmer

The newspaper for sustainable agriculture in Kenya BIOVISION Nr. 14 June, 2006

Healthy cows give more milk

Integrating animal husbandry into crop producing farms is one of the principles of organic farming. Animal husbandry plays an important role in the recycling of nutrients. In organic farming, animal husbandry is different from both *extensive* animal husbandry, which is often environmentally damaging (for instance overgrazing of common lands), and from *intensive* animal husbandry, which keeps animals under ethically unacceptable conditions. According to the standards of organic farming, zero grazing is only allowed if livestock have sufficient free movement and opportunity to express normal patterns of behaviour, sufficient accesss to clean drinking water, and clean sheds of sifficient size and with adequate light and fresh air. Landless animal husbandry is not permited in organic farming.

Page 6: Which cow breed is best?

Plants tell you what they need

Attentive farmers can detect mineral deficiencies, if they watch carefully the leaves of their plants

The Organic Farmer

Plants require three factors for growth and reproduction: light, water and nutrients (minerals). They obtain the nutrients they need through root uptake from the soil in which they grow. Since nutrients are essential for healthy plant growth and an optimal yield, it is important to maintain a high fertility of the soil, which includes a balanced nutrient supply. If a plant lacks a nutrient, it shows clear signs on its leaves and stems. The most needed nutrients are nitrogen, phosphorus, potassium and magnesium, but also boron and iron are of valuable benefit to the plant.

Organic agriculture's approach to fertilization is to feed the soil and let the soil feed the plant. The soil is provided with minerals through decomposition of plant residues and animal remains, weathering of soil minerals, through manures, composts, biosolids (sewage sludge), other organic amendments. Other food processing byproducts and ground rock products including lime, rock phosphate and greensand can be added.

Our article about mineral deficiencies on pages 4 and 5 gives advise on how to fight the lack of minerals in maize, beans and cabbage.

in this issue

Dear farmers,

When I was young, there was one thing I learned from my late grandfather. Each afternoon, he would walk around the family shamba and carefully examine every plant to see if there was any problem. If he noticed any sign of disease or pests, he would take action immediately to prevent it from spreading and damaging the rest of the crop.

Of course he had one big advantage. He knew most of the insect pests and diseases that affect various crops in our home region. In other words, he was well equipped with the appropriate knowledge that every farmer needs in managing their shamba. Many farmers may not possess the same level of knowledge, but there are various measures they can take to ensure their crops are safe from pests and diseases.

Careful observation of the crops in the farm on a regular basis is a very important exercise in modern farming. There are many benefits farmers can get from this simple activity. One of these is that diseases and pests are detected early and remedial measures can be immediately taken to prevent them.

The practice in Kenya, and indeed in many African countries, is that farmers do not pay much attention to crops once they have been planted and weeded. They focus their attention elsewhere or sit back and wait for the crop to mature and be harvested. When they finally identify an insect pest or disease, it is often too late to save the crop; a large portion of the crop is therefore lost, and with it, their investment in its production. The use of pesticides and chemicals is an added cost to the farmer.

Just in the same way we take care of our children, livestock and our other valuable possessions, plants need special care for proper growth. If a farmer notices an insect pest or disease they cannot identify, it is always wise to seek expert advice from the agricultural extension officer near their area or even a research institution. These experts publish a lot of good information. Nobody is too old to learn new things. Farming is a profession, it is a business. If we do not see it this way, African farmers will never increase their yields and income. They will remain poor.

MY OPINION

Traditionally, homestead waste used to be dumped in one place. Over a period of time, the accumulated garbage turned into good compost. Families could then move this heap, scatter it and dig it up. Crops planted in this area did well. However such a dumping site today cannot become good compost because the garbage is mixed up with nylon bags, plastic containers and related toxic material. Families can carefully sort out such wastes and make good compost that can be used as organic fertilizer. Let us improve the environment by making use of kitchen waste to grow food.

Charles Kimani, farmer, Wangige

The Organic Farmer

The Organic Farmer is an independent newspaper for the Kenyan farming community. It promotes organic farming and supports discussions on all aspects of sustainable development. *The Organic Farmer* is published monthly by ICIPE and distributed free to farmers. The reports of *The Organic Farmer* do not necessarily reflect the views of ICIPE.

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Publisher
International Centre of Insect Physiology and Ecology (ICIPE)
P.O.Box 30772, 00100 Nairobi
KENYA
Tel. +254 20 863 2000
e-mail: icipe@icipe.org
homepage: http://www.icipe.org
Editors
Peter Kamau, Peter Baumgartner
Secretariat
Lucy W. Macharia
Advisory Board
Dr. Bernhard Löhr, ICIPE
Dr. Nguya Maniania, ICIPE
Dr. Fritz Schulthess, ICIPE
Charles Kimani, Farmer, Wangige
Address
The Organic Farmer
P.O.Box 14352, 00800 Nairobi
KENYA
Tel. +254 020 445 03 98
e-mail : info@organickenya.com
Layout
In-A-Vision Systems(k)

Suitable language for farmers

Although farmers prefer Kiswahili to English, most readers understand English.

The Organic Farmer

Language is an important tool of communication, so when we started *The Organic Farmer*, one of our main concerns was which language to use to ensure the newspaper is understood by the majority of the Kenya's farming community. When we chose to use English, a number of readers wrote to us requesting that we consider using Kiswahili in order to improve information access to more of the farmers.

Many prefer Kiswahili

When we sent out the questionnaires at the beginning of the year, one of the questions we asked farmers was what language they thought was appropriate to use in future. As it turned out, more than 80% of the farmers were in favour of Kiswahili, 10% their vernacular languages, while 10% preferred English. We know the issue of language is such an important one because it determines the extent to which our readers understand what we write and are able to apply it in their day-to-day farming activities.

Kiswahili has changed

However, we also know the limitations of the use of Kiswahili, especially in defining the names of pests, diseases, botanical (scientific) names and other terms we use in our newspaper. No doubt, many farmers would find it difficult to understand these terms unless they were translated into a language they all understand.

Kiswahili as a language has changed a lot over time; this is likely to make it extremely difficult for farmers to understand the modern terms and phrases used in the language. Indeed, one only needs to listen to local radio and TV broadcast stations or read newspapers to appreciate what we are talking about.

Research undertaken on this subject shows that most of the readers in Kenya can comfortably read and understand the English language. We know that many of our farmers were not able to acquire any formal education. Therefore they may not be in a position to read and understand material written in English. This is why quite a number of them want the newspaper written in their local languages to enable them understand it better.

However, we are happy to note that an equally large number of our farmers have attained at least primary and post-primary levels of education and therefore are at ease with the English language. This group of readers is already active in the agricultural sector. They can therefore play an important role in disseminating information to those who cannot read and write. They can also help those who may be in difficulty with some of the technical terms used in the newspaper.

We use simple language

For our part, we have tried to do as much as we can to ensure that the language used in the newspaper is made as simple as possible. We always strive to explain any difficult terms for the sake of those who may be challenged by the language we use.

Even as we take these measures, we are also aware that there is a section of farmers who cannot read and understand English at all. For this section of readers, the newspaper plans to strike a balance in the use of the two languages in order to serve everyone better.

Translating selected articles

To this end, the paper intends to translate into Kiswahili some of the articles that we have already carried in our previous issues and which we feel need to reach a wide cross-section of the farming community. The articles, in brochure format, will be selected on the basis of their importance to farmers. These will include important diseases or pests affecting farmers and ways of controlling them. In this way the newspapers will become an important medium of information to all farmers in the country.

Wasp has reduced diamondback moth

The successful reduction of the moth demonstrates the benefits of using biological pest control.

The Organic Farmer

A healthy cabbage crop one year after the release of the wasp (below). Photo ICIPE

"The wasp that saves the cabbage"- this was the title of the story we wrote last year on a wasp that kills the diamondback moth (DBM). Now scientists at the International Centre of Insect Physiology and Ecology (ICIPE) have released results of their research on the use of the wasp for the eradication of the pest. They are amazing, as we will see in the following story.

A dangerous pest

Cabbage is one of the most important vegetables grown in Kenya. The average annual production is 256,000 tonnes. In the local farming system, cabbage is usually part of a mixed cropping pattern, and is mostly grown as a cash crop for the local market

The most devastating pest to affect the cabbage crop is the diamondback moth. Its control by chemical means had become difficult and uneconomical. ICIPE had been seeking an effective, economical and environmentally acceptable control method for the pest. They finally found a small wasp by the name of *Diadegma semiclausum*, which is a natural predator of the diamondback moth.

The way the wasp acts is so lethal to the moth; first it lays its eggs in the larvae of the diamondback moth. After a few days, the larvae of the wasp come out of the eggs and start feeding on the larvae of the moth, killing it. This process is called parasitism. The larva is the harmful stage of the pest, which eats holes in the leaves of cabbage and other kinds of brassicas (for instance sukumawiki, or kale).

Good results

The wasp is very common in Asia but ICIPE have now shown that it is also well adapted to conditions in Africa. The two sites selected for the research (Weruga in Taita Hills and Tharuni, Limuru in Central Province) are about 500 km apart and are known for vegetable production all year round. They are the main suppliers of kale and cabbages to Mombase and Nairobi, respectively

The scientists released the wasps in July 2002 in Weruga and in September of the same year in Tharuni. According to the research findings, the population of diamondback moths in Weruga has been reduced by more than 50 percent within one year, despite the low number of wasps released (100 females, 100 males). In Tharuni, the diamondback moths were reduced by 18 percent within one year. One of the remarkable findings of the research is that half of the moths died on the ground. They abandoned the cabbage and died after the attack by the wasp.

Environmental factors seem to play a big role in the speed of the establishment of the wasp. Weruga is a relatively cool place with good rains. Tharuni is much drier and was very dusty and windy during the two dry seasons when the trials were carried out. Insects do not like wind and dust, which might explain why it is taking longer to have the same impact in Tharuni as in the wetter Weruga site.

Economical benefits

A very remarkable factor of these ICIPE findings is the economical impact. In an additional study, the scientists calculated the potential impact of biological control of the diamondback moth in cabbage production in Kenya. On average, the crop losses due to the moth are close to 31 percent. The yield loss was estimated at 6.8 tonnes per hectare or KSh 32,616. That means that the losses for the cabbage producers throughout the country are around KSh 570 million! If these losses can be avoided with the help of the wasp, then farmers will see for themselves and easily understand the benefits of biological pest control.

Biological control agents

There are many pests threatening crop production that can spread very fast because they are not controlled by any enemy. One of the most common methods used by farmers is the use of chemicals. This is exactly the point the scientists of the ICIPE are starting from. They intensively search for natural enemies or biological control agents which are able to reduce the pests and which pose no danger to the environment. One of the best-known examples of biological control programmes was the fight against the cassava mealybug in the 1980s.

There are natural native (local) enemies of the diamondback moth in Africa. Unfortunately they have failed to control this pest. However, the wasp *Diadegma semiclausum* is well known in Asia. The earliest introduction of this wasp as a control agent against the moth was made in New Zealand. In Taiwan and in the Philippines the wasps reduced the moths by 70 percent and 64 percent, respectively. The ICIPE scientists tried to find out if the wasp could also act as a biological control agent under African conditions. It can, as the results have shown in the separate story above.

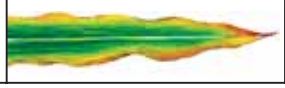
One might fear that new problems are bound to occur, for instance when the introduced predator insects themselves become a problem. This may not necessarily be the case. If the number of diamondback moths goes up, the number of wasps increases also. This is because they can find a lot of larvae in which to lay their eggs. If there are only few moths, the number of wasps does not increase because they cannot find enough larvae of diamondback moths for egg laying.

Mineral deficiencies and organic solutions

When managed organically, most soils will provide all the nutrients plants require. Diversity in material used in compost, crop rotation and the use of green manures on a continual basis will raise the fertility of the soil. Organic material is made up of many elements, including minerals. By recycling these materials back into our soils, we automatically include the addition of minerals. Prevention is the key when it comes to mineral deficiencies. Mineral deficiencies are quite hard to confirm from symptoms alone. They are often confused with diseases, especially viruses. Weather also temporarily affects the plant uptake of minerals. Too much rain causes leaching of minerals away from the root zone as well as causeing root damage as the roots cannot breathe. Drought works in reverse, where plants are unable to access soluble minerals due to lack of water. It is important therefore to take these factors into consideration when diagnosing our plants.

Plants use macronutrients for the following reasons

Nitrogen (N) fuels growth of leaves and shoots.
Phosphorus(P) is essential in growth of roots.
Potassium(K) is vital to flowering and fruiting and hardens growth, increasing resistance to pests, disease and frost.
Calcium(Ca) is needed for cell division, plant growth and balancing nutrient uptake. Vital to the microbes in the soil.

	Maize	Symptoms	Cause	Prevention
Nitorgen deficiency		The leaves turn yellow starting from the tips. Plant development is reduced.	Shortage of available nitrogen in soil can occur on any soil but is more common on light soils, low in organic matter and where rainfall is heavy. Cold weather can cause a temporary shortage. Wood shavings and similar woody material added to the soil may cause 'nitrogen robbery' where soil microorganisms are using up all the available nitrogen to help them break down the woody material first.	Build up organic matter levels in soil. Grow green manures to reduce leaching of nitrogen from soil. Grow nitrogen-fixing green manures. Apply composted green waste and animal manures. Mulch plants. Apply nitrogenrich organic liquid fertilizers
Phosphorus deficiency		Poor growth. Leaves turn bluish purple starting from the tips. This deficiency can be mistaken with drought, root damage, or nitrogen deficiency.	Soil may be naturally deficient, particularly acid soils, poor chalk soils and in areas of high rainfall. Cold weather can cause a temporary deficiency.	Apply Minjingu rock phosphate.
Potassium deficiency		Leaves turn yellow from the edges. Growth is affected.	Most common on light sandy soils or those with low clay or high chalk content.	Improve soil structure. Use plant-based potash e.g. comfrey leaves or comfrey liquid. Apply well rotted compost or manure, add wood ash to compost heap (do not add directly to soil as it is very soluble

	Beans	Symptoms	Cause	Prevention
Nitorgen deficiency		Lower leaves turn yellow starting from the tips. Plants are stunted. Flowering or fruiting may be reduced or delayed.	Shortage of available nitrogen in soil can occur on any soil but is more common on light soils low in organic matter and where rainfall is heavy. Cold weather can cause a temporary shortage. Wood shavings and similar woody material added to the soil may cause 'nitrogen robbery' where soil microorganisms are using up all the available nitrogen to help them break down the woody material first.	Build up organic matter levels in soil. Grow green manures to reduce leaching of nitrogen from soil. Grow nitrogen-fixing green manures. Apply composted green waste and animal manures. Mulch plants. Apply nitrogenrich organic liquid fertilizers
Phosphorus deficiency		Poor growth. Young leaves are small and dark green. Plants have short internodes and reduced branching.	Soil may be naturally deficient particularly acid soils, poor chalk soils and in areas of high rainfall. Cold weather can cause a temporary deficiency	Apply Minjingu rock phosphate.
Potassium deficiency		Leaves turn yellow from the edges. Growth is affected.	Most common on light sandy soils or those with low clay or high chalk content.	Improve soil structure. Use plant-based potash e.g. comfrey leaves or comfrey liqui d. Apply well rotted compost or manure, add wood ash to compost heap (do not add directly to soil as it is very soluble

	Vegetables	Symptoms	Cause	Prevention
Nitorgen deficiency		Poor growth. Leaves are pale green, in brassicas leaves may have tints of yellow, red or purple. Lower leaves are effected first. Flowering and fruiting may be reduced or delayed.	Shortage of available nitrogen in soil can occur on any soil but is more common on light soils, low in organic matter and where rainfall is heavy. Cold weather can cause a temporary shortage. Wood shavings and similar woody material added to the soil may cause 'nitrogen robbery' where soil microorganisms are using up all the available nitrogen to help them break down the woody material first.	Build up organic matter levels in soil. Grow green manures to reduce leaching of nitrogen form soil. Grow nitrogen fixing green manures. Apply composted green waste and animal manures. Mulch plants. Apply nitrogenrich organic liquid fertilizers
Phosphorus deficiency		Poor growth Leaves turn bluish - green with purple tints, but not yellow. This deficiency is not easy to diagnose and can be mistaken with drought, root damage, or nitrogen deficiency	Soil may be naturally deficient particularly acid soils, poor chalk soils and in areas of high rainfall. Cold weather can cause a temporary deficiency	Apply Minjingu rock phosphate.
Magnssium deficiency		Symptoms first develop on older leaves, then spread to younger leaves. Leaves turn yellow, although sometimes red, purple, or brown, between the veins and around the margins, whilst the veins remain green.	Acid soils. Magnesium is easily washed out of light soils by heavy rain. Over use of high-potash feritlizers can make magnesium unavailable to plants	For immediate effect, foliar feed with Epsom salts (available at most chemists) diluted at 200g per 10 litres of water after flowering. Reduce use of potash fertilizer. If pH is too high use dolomitic limestone to reduce acididty

Choosing the right cattle breed

Ronald Nyabuya from Kitale is interested in livestock keeping. "We want to know how to rear modern breeds of Friesian, Guernsey or even Jersey. What are their advantages and disadvantages compared to traditional cattle?"

Unfortunately, it would be unwise to make a decision based on the financial advantages alone, especially when considering organic production. I buying a cow, one must look at the overall picture including organic requirements, environmental conditions, disease resistance, markets for products, operational costs and animal management requirements.

Rearing cattle the organic way

Organic standards restrict the routine use of preventative medicines, the use of synthetic herbicides, minimum amount of purchased feed, minimum proportion of forage in ruminant diets and prohibit the use of certain high protein feeds. This is to ensure the animals live at optimum health under natural conditions (see page 1). Healthy animals cost less to care for and provide by products that are healthy.

In Kenya we have many diseases affecting our cattle. Foot and mouth, Anthrax, East coast fever, Tsetse Fly (Nagana), brucellosis, as well as many other tick-borne diseases. Different climatic conditions also affect the health and productivity of our livestock. Some local breeds of cattle are more resistant to diseases than others. The advantage here is that mortality and veterinary costs are low. Purchase and sale price of indigenous breeds is lower and so too is milk production compared with exotic breeds.

Exotic breeds costs more

Exotic breeds require a lot of care and their maintenance costs are high in comparison as they are not adapted to local conditions. They succumb to local diseases quite easily. To reach their potential yields of beef and milk, their feed needs are greater than native breeds too. They also cost more to purchase as well as the costs of their semen through artificail insemination services.

Su Kahumbu answers your questions

Write to
The Organic Farmer
P.O. Box 14352
00800 Nairobi Kenya
Tel: 020 445 03 98, 0721 541 590
e-mail: info@organickenya.com

However, exotic breeds are genetically predisposed to produce optimum yields of either beef or milk, which are far greater than our local breeds and also fetch a better sale price when sold for breeding stock or milk production. Ideally, a local farmer would need a breed that will produce like an exotic one but which will be as resilient and cheap to maintain as a local breed. Middle of the road crosses of any exotic with native breed will produce an animal with some immunity and tolerance of local climatic conditions. This would be a preferable option for a local farmer. It will, however, produce less milk than the exotic breeds. From these crosses, one can then crossbreed them further.

The offspring of poor yielding cows very rarely produce good yielders. Another option is that crossbred bulls can be raised for beef. Exotic bulls are too expensive to raise and grow very slowly, as they are not genetically designed for beef production, if they are descendants of a diary cow. It would be wise to seek advice from the Department of Livestock extension services in your area, armed with the knowledge of requirements for organic production. Ask for information on maintenance and feed requirements, dipping schedule, and the breed you choose to keep. It is very important to know the cost implications before starting, and also to identify the potential markets for your cattle, milk or beef – and even manure!

Rearing cattle

Rearing healthy cattle requires good grazing land, or access to healthy forage, and access to clean fresh water. You would also require a secure area for calves and a milking shed for the dairy animals. Keep in mind that if your cow is healthy, your maintenance costs will be lower. A veterinarian close to your area is useful, especially if you are a beginner. Some cattle illnesses strike very quickly resulting in mortality if not noticed early. Vigilance will tell you if an animal is ill, signs of which may be a raised temperature or reluctance to feed, drink or even stand. It is wise to have a thermometer close at hand. Learn how to use this as most animals may not show signs of a raised temperature, which could indicate the need for medical attention.

Holstein-Friesian
Black and white, common in many Kenyan dairy herds; major dairy breed in the US and most Western countries; largest volume producers of milk of any breed.

Jersey
Golden brown in colour with a white ring around their nose; their milk has the highest level of milk solids (proteins and minerals) and vitamins, as well as butterfat, of any breed of cattle. It is easier to manage than Guernsey.

Guernsey
Closest to the Jersey in the butterfat content of milk; larger and heavier boned than the Jersey.

Ayrshire
Dual purpose breed, both good milk production capacity and quality in terms of butterfat content and milk solids. It is easier to manage than Holstein-Friesian and good for small scale farmers.

Letters to the editor

I have formed group

This is to inform you that I have already formed a group of 25 members who have a lot of interest in organic farming. Please do supply us with the newspaper as a group through my address. I promise to be distributing it to them immediately I get it.

Paul Muema Kimanzi, P.O Box 263, Kitui Tel. 0721 691 798

Cattle breeds

continued from page 6

Zebu
Small local cattle mainly raised for beef. It has less milk than Zahiwal; also has a humped back. It is the hardiest of all native cattle breeds.

Zahiwal
Large local cattle mainly raised for beef but also used for dairy. Milk production is average. It has a hump like a Boran.

Boran
A local breed, the same size as Zahiwal. It is mainly raised for beef although is also used for milk, and will yield more than Zebu.

Breed	Origin	Climate	Use	Size	Costs
Holstein Freisian	exotic	cool	dairy	large	high
Jersey	exotic	cool	dairy	small	high
Guernsey	exotic	cool	dairy	medium	high
Ayrshire	exotic	cool	dairy/beef	medium	high
Zebu	exotic	hot arid	dairy/beef	small	low
Zahiwal	exotic	hot	dairy/beef	large	medium
Boran	exotic	hot	dairy/beef	large	medium

We need market

We are a group of 1800 members who grow French beans in Kamukuywa location Kimilili Division Bungoma District. But the problem is that we lack market for the produce. Please assist us get the market for our farmers who are exploited by middlemen who the buy the produce at around Ksh 20 per kilo. I belong to Nama Self -Help Group with around 20 members. I attended the organic workshop at ICIPE 2004 and it really helped me in organic farming. I request you to assist us get buyers of our produce. We need buyers who can supply us with seeds and buy our crop at reasonable prize. We have been exploited by a company from Nairobi called who pay Ksh20/= a kilogramme. We also want buyers who can offer good prices for our goats and sheep. Your paper is okay and contains useful information. We do not want to miss a copy. Just publish every month.

Ambrose Majani, P.O Box 70
Kamukuywa
enyongesa2000@yahoo.com

We are selling seeds

I thank you for keeping us in touch with you and other fellow farmers through the TOF newspaper. Also by publishing our article on growing purple vetch. We are now selling the beneficial seeds to farmers around our country. Some come from Karatina, Elburgon and as far as Kitale. We use the few issues to have a discussion agenda in our meetings and we have started mobilizing and making awareness on organic to other farmers outside our group. It is our suggestion if you organize field days on organic farming we may reach more farmers also if possible arrange for inter group visits. We use both conventional and organic farming methods due to the available market in our area. If you please know of any donor who can assist us financially or through farming materials give us the contact or make us in touch with any of such organization. Wish and hope to meet you.

Benson Maina, Ikinyukia Self Group
P.O Box 125, S. Kinangop

Dear Farmers,

As part of our efforts to serve the organic farming community effectively, we would like to create a database of organic farmers in the country. We are interested in:

-Your names,
-Addresses, Location,
-Farm acreage,
-Are you an organic farmer?

To make it easy for you, we have a special telephone number: given above. All the farmers can provide these information through short messaging service (SMS). ***Come on Farmers, Tuma jibu. Asante.***

SMS ONLY

I need back issues

A friend of mine last month gave me a copy of your newspaper and it was wonderful. Let me thank you very much for your effort to teach an ordinary man simple and health ways of farming. Mine request to you is, please put me on your distribution list and please send me already issued newspapers and also as you distribute to others remember me. Thanking you in advance.

Joseph K Njeru, P.O. BOX 927, EMBU,
jkinyua@Mungania.ktdateas.com

Consider me

I am an agricultural extension worker and have lots of interest in organic farming. Could you please be sending me a copy of your monthly publication of the organic farmer magazines. I will be grateful to be receiving a copy of the same.

Grace W Mburu, P.O Box 6, Kiria- Ini, Muranga

Send copies

I intend to start practicing organic farming, please send me past and future copies of *The Organic Farmer.*

Githinji Muthima, Yes farmers group
P.O Box 162, Subukia.

Tend your fodder trees

Fodder trees need protection. If attacked by pests and diseases, their growth is also affected.

Eric Lumosi Asiligwa

"Prevention is better than cure". This is a common saying of people all around the world. After the planting and establishment of fodder trees (see TOF Nr.8, May 2006) protection against pests and diseases is needed so as to realise higher yields. Among the best tree management practices, coppicing (cutting back) of the fodder trees works wonders in increasing yields.

Coppicing

Coppicing is done to force new growth of multiple shoots and branches that provide more forage. This is done when the trees are growing vigorously. Cut down the trees to about 6 inches (15 cm) from the ground. Make a clean cut at an angle that allows water to drain off the stump to prevent rot.

Coppice for the first time when trees reach a height of about 6 feet (2 metres), usually 9 to 12 months after planting. The aim of coppicing at this stage is to encourage abundant branching for fodder production. Coppicing can also be done when trees grow old and forage production falls, possibly after 7 years.

Pests and Diseases

Pests can destroy fodder trees. Diseases can also keep the trees from thriving and lower their optimum production. They attack the fodder trees and lead to reduction of foliage and even to plant death. Fortunately only a few pests and diseases are known to cause serious damage to trees. Some trees, e.g. gliricidia and leucaena, are resistant to attack by pests such as termites. Pests and diseases of mature trees include scales, black ants, termites, crickets and hoppers.

Scales are white, powdery insects that attack plant stems, especially calliandra. Scale attacks occur during the dry season. Control scales with washing detergents dissolved in water. Sprinkle the detergent solution onto the affected plants using leafy branches or a knapsack sprayer.

Black ants damage the tree by debarking the stems. To control the ants, dig out and destroy their nests. Smear wet dung or used motor vehicle oil at the base of the tree or sprinkle some fresh ash to repel the ants.

Termites are destructive and cause serious damage by debarking the tree and may lead to its death. Control them using the methods for controlling black ants. Some farmers use fresh urine from cows diluted with water to repel the termites once they are noticed to affect trees.

Crickets and hoppers are harmful to young and succulent seedlings at the nursery stage and immediately after transplanting. To control them use the pest repellents used in vegetable farming.

Armilleria mellea is a fungus that attacks the roots of plants, causing root rot and eventual death. It's common in areas where forests have recently been cleared. To control this problem, uproot the affected trees and burn them. Avoid planting trees areas that have been affected by *Armillaria mellea*.

Caution: Avoid using chemicals to control pests and diseases on forage materials that are about to be fed to livestock. Such chemicals may affect the health of the animals and could eventually be transmitted to human beings through milk and meat.

With this article we close our series on agroforestry. If you would like to read more, consult the book "More forage, more milk", Technical Handbook Nr. 33, published in 2005 by World Agroforestry Centre. The book is available at the World Agroforestry Centre bookshop, P.O.Box 30677, 00100 Nairobi.

Market place

Seedlings: Benjamin Lugano has several varieties of conventionally certified fruit seedlings of Fuerte and Hass varieties of avocado, apple, tommy and harden varieties of mango fruits. He also has in stock pawpaw and tree tomato seedlings. Farmers interested can contact him on the address given below:
Lugano Horticultural Enterprises
P.O. Box 323, 30200 Kitale.
Tel.0733- 99 05 74, 0733-39 19 07

Borer control: Mr. John Sprite from Kitale has advice for fellow farmers who want to control stalk borer in their maize crop. He advices farmers to use tephrosia dust. The soft part of tephrosia stem and leaves is used. The stem and leaves are crushed, dried and then grounded. The dust


Stem borer on maize leaf

is put in the maize funnel. Application is repeated after every three weeks. He says farmers have the alternative of using liquid tephrosia extract. About 1 kg of leaves and stem are crushed. They are then put in plastic container to ferment. Later, they are mixed with 5 litres of water for a day. Sieve and apply in maize funnel drops. He says the extract can eliminate the borer completely especially when applied early.

Cutworm control: Joannes Samikwo of Endebess Kitale has an interesting way of controlling cutworms to prevent them from destroying his medicinal plants. He places a Kerosene lantern in a tray of water near the plants. The cutworm moths are attracted to the light and drown in the water. This method has kept his plants safe from this destructive pest.

Controlling aphids and thrips: Caroline Kawira of Gacoka Organic Farmers group from Embu have been using a number of plant extracts to control aphids, thrips and caterpillars and nematodes. To kill aphids and caterpillars, she advices farmers to use rhubarb. The leaves are soaked in hot water at the ratio of 1:3 for 20-30 minutes and then sprayed on crops.