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...
Wasp has reduced diamondback moth

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

The Organic Farmer

"The wasp that saves the cabbage" - this was the title of the story we wrote last year on a wasp called 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 pleasing, 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. The scientists had found a small wasp by the name of Diaegona semiclausum, which is a natural predator of the diamondback moth.

The way the wasps act 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 them. 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 Taifa Hills and Tharuni, Limuru in Central Province) are about 500 km apart and are known for very productive all year round. They are the main suppliers of kale and cabbage to Mombasa 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 per cent. In Tharuni, the low number of wasps released (100 females, 100 males). In Tharuni, the diamondback moths were reduced by 10 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.

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 is the use of chemicals. This is exactly the point the scientists of the ICIPE are starting from. They are looking for natural enemies or biological control agents which are able to reduce the pests and which are good for 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 are not able to control this pest. However, the wasp Diamondback moth, however, is well known in Asia. The earliest introduction of this wasp as a control agent against the diamondback moth was made in New Zealand. In Taiwan and in the Philippines the wasps reduced the moths by 70 per cent and 64 percent, respectively. The ICIPE scientists tried to find out if the wasp could also act as a biological control agent against 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 have a lot of larvae in which to lay their eggs. If there are only few moths, the number of wasps decreases. If the wasps cannot find enough larvae of diamondback moths for egg laying, their number will decrease.

Suitable language for farmers

Although farmers prefer Kiswahili to English, most farmers understand English. The wasp is very common in Asia but ICIPE has now shown that it is also well adapted to conditions in Africa. The two sites selected for the research (Weruga in Taifa Hills and Tharuni, Limuru in Central Province) are about 500 km apart and are known for very productive all year round. They are the main suppliers of kale and cabbage to Mombasa and Nairobi, respectively.

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## Mineral deficiencies and organic solutions

When managed sustainably, most soils will provide all the nutrients plants require. Diversity in material used to build up the organic matter and recycling of crop residues and animal manures will raise the fertility of the soil. Organic material is made up of many elements, including minerals. These elements are essential for the growth of plants. Mineral deficiencies are quite hard to confirm when diagnosing our plants.

### Prevention

**Potassium deficiency**
- Apply well rotted compost or manure, do not add directly to soil as it is very soluble.
- Apply Minjingu rock phosphate.

**Magnesium deficiency**
- Build up organic matter levels in soil. Grow nitrogen-fixing green manures to reduce leaching of nitrogen. Apply composted green waste and manures. Apply well rotted compost or manure, do not add directly to soil. Apply Epsom salts (available at most chemists) dissolved in water. For immediate effect, foliar feed with Epsom salts.

**Calcium deficiency**
- Calcium (Ca) is needed for cell division, plant growth hardens growth, increasing resistance to pests, disease, and weather. Calcium also assists the plant in the absorption of other minerals like phosphorus and potassium.

**Phosphorus deficiency**
- Phosphorus (P) is essential in growth of roots. Apply phosphorus rock phosphate. Apply well rotted compost or manure, add wood ash to compost heap, do not add directly to soil.

**Nitrogen deficiency**
- Nitrogen (N) fuels growth of leaves and shoots. Several symptoms include: poor growth, leaves turn yellow, lower leaves turn yellow, then spread to developing leaves, yellowing usually first appears on older leaves, then spread to new leaves. Edges of leaves develop a bluish tint, then become yellow or brown. Foliage is stunted. Flowering or fruiting may be reduced or delayed.

### Symptoms

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Cause</th>
<th>Symptoms</th>
</tr>
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### Organic solutions

- Build up organic matter levels in soil. Grow nitrogen-fixing green manures to reduce leaching of nitrogen. Apply composted green waste and manures. Apply well rotted compost or manure, do not add directly to soil.
- Apply phosphorus rock phosphate. Apply well rotted compost or manure, add wood ash to compost heap, do not add directly to soil.
- Calcium is needed for cell division, plant growth hardens growth, increasing resistance to pests, disease, and weather. Calcium also assists the plant in the absorption of other minerals like phosphorus and potassium.
- Nitrogen fuels growth of leaves and shoots. Several symptoms include: poor growth, leaves turn yellow, lower leaves turn yellow, then spread to developing leaves. Edges of leaves develop a bluish tint, then become yellow or brown. Foliage is stunted. Flowering or fruiting may be reduced or delayed.
- Phosphorus is essential in growth of roots. Apply phosphorus rock phosphate. Apply well rotted compost or manure, add wood ash to compost heap, do not add directly to soil.

### Cause

- Shortage of available nitrogen in soil can occur on any soil but is more common on light soils, low in organic matter, high in potassium, low starting from the tips. This deficiency can be caused by: drought or nitrogen deficiency.
- Most common on light sandy soils or those with low available nitrogen. Model may be naturally deficient. Particularly acid soils. Potassium is vital to flowering and fruiting and on a continual basis will raise the fertility of the soil. Potassium rock phosphate. Apply well rotted compost or manure, add wood ash to compost heap, do not add directly to soil.
- Adequate soil structure. Use plant-based materials first. Flowering and fruiting may be reduced or delayed. Potassium rock phosphate.

### Prevention

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Choosing the right cattle breed

Ronald Nyabuya from Kitale is interested in livestock keeping. "We want to know how to rear modern breeds of cattle or crossbreeds of local breeds with exotic breeds?"

Unfortunately, it would be wise to make a decision based on the financial advantages alone, especially when considering organic production. I buy 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 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 that animals live at optimum health under natural conditions (see page 1). Healthy animals cost less to care for and by providing products that are healthy, hence healthy animals cost less money.

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 and they are locally adapted. It is here that we risk our mortality and veterinary costs are low. Purchase and sale of exotic 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 artificial insemination services.

Su Kabumbo 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

Choosing the right cattle breed

Ronald Nyabuya from Kitale is interested in modern breeds of 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?"

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 the 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 is advisable to 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 beef, any 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.

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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 required papers 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

We need market

We are a group of 1800 members who grow French beans in Kamukuywa location Kimilili Division Bungoma District. We are interested in exotic breeds which 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.

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Tend your fodder trees

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

Eric Lumberland 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 callandra. 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.

Armillaria 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 in 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 have completed our series on agroforestry. If you would like to read more, consult the book "More forage, more milk", Technical Handbook Nr. 33, published in 2003 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, tomato and hardy 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 advises farmers to use teprosia dust. The soft part of teprosia stem and leaves is used. It is put in the maize funnel. Application is repeated after every three weeks. He says farmers have the alternative of using liquid teprosia 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. Steve 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 advises farmers to use rubarb. The leaves are soaked in hot water at the ratio of 1:3 for 20-30 minutes and then sprayed on crops.