

The Organic Farmer

The magazine for sustainable agriculture in Kenya



Nr. 52 September 2009



Farmers should always ensure there is adequate fodder for the dry season.

Fodder shortage hits dairy farmers

The price of milk has already gone up due to low production caused by shortage of fodder.

The Organic Farmer

With the failure of the long rains in most parts of the country, one category of farmers who are hard hit by the prevailing dry conditions are livestock keepers. Dairy farmers have experienced a sharp decline in milk production due to lack of pasture while pastoralists in Northern parts of the country have already lost thousands of livestock due to lack of pasture and water.

With modern weather forecasts, dry conditions are predictable and farmers should devise ways of coping with such conditions. Although most of the weather forecasts by experts do not come to pass, drought cycles have become so common that farmers need to plan ahead to ensure they have adequate fodder at all times. Most dairy farmers are spending a lot of money to

buy hay and any type of fodder available. Milk prices have gone up due to low production caused by fodder shortage.

But the current dry spell should be a lesson to most farmers that they need to plan for their fodder needs on time. In previous issues of *The Organic Farmer* we have showed how farmers can prepare hay and even silage for use during the lean times. Despite the advice, we would like to ask one question: How many farmers prepare hay or silage for their livestock?

More milk with green manure legumes

Green manure legumes improve not only the quality of soils, but are also valuable protein supplements for animal feed rations. According to studies carried out by KARI, lactation performance with Jersey and Friesian cows in coastal part of Kenya (Mucuna, Clitoria, and lablab) and North-Western Kenya (mucuna and lablab) was improved greatly on supplementation with green manure legumes. In coastal Kenya, the green manure legume effects on milk production were equivalent to those realized with gliricidia, the recommended legume supplement in dairy rations. In semi-arid Eastern Kenya, siratro, glycine, lablab and mucuna were shown to be as effective in inducing weight gain in goats as Leucaena leaf meal. See page 3



Dear farmers,

The government is once again crying for assistance from Western countries, and it has once again announced a countrywide relief operation to save more than 10 million Kenyans who face starvation in various parts of the country. To put it mildly, nothing has really changed in our country. The food crisis is yet another indicator that the country has been unable or lacks the political will to put into action concrete measures that can provide adequate food to its people.

Understandably, the erratic weather and the after effects of last year's post-election violence had an influence on food shortage. But the real problem is purely lack of planning – a result of corruption and inefficiency. Good examples of this failure are the many policy papers prepared for donors to raise funds for revival of agriculture, which are never implemented. The money raised through these blueprints often disappears.

All of us remember what happened at the beginning of the year when food meant for the country's strategic food reserve at the NCPB was sold to individuals who later sold it at exorbitant prices to millers and even managed to export it to Southern Sudan, where a bag of maize was selling at Ksh 6000. Subsidised fertilizer meant for poor farmers was bought from the board and sold to traders at high profits by corrupt officials. Consequently, our farmers are a neglected lot; up to now many who delivered their produce to NCPB last year are yet to be paid.

Ironically, whenever we have a bumper harvest, the government has let down farmers by not buying the surplus produce forcing them to sell it to middlemen at throw away prices, only to import the same commodity the following year when the rains fail.

Our farmers have the capacity and the will to produce enough food for the country if they had access to cheap credit and a reliable marketing system. Better infrastructure would make it easier to transport food from one part of the country to the other. Strategic institutions such as the NCPB should be restructured to ensure they are properly managed. There should be resources to buy enough food to last the country for two or three years. Any government can achieve these goals – if it is really concerned with the welfare and the plight of its people.

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Rabies is a killer disease that can affect people and animals. Vaccination can prevent it.	

It is good to know your animals' weight

Weight data of animals can help the farmer to plan for feeding, drug dosage and marketing.

The Organic Farmer

Many farmers will admit that they have never bothered to know the weight of each of their animals. Establishing the weight of your dairy cows, bulls, sheep and goats, rabbits or even chickens is very important.

A farmer can use the information on animal weight to make a number of vital decisions that affect the health of their livestock – and the projected income!

Useful information

Feed weight: Feeding a cow without knowing its weight will result in either underfeeding or even overfeeding; an animal can only be properly fed if the feed corresponds to its weight; so farmers especially the ones who rear beef cattle should know how much their animals weigh.

This helps to ensure that the animals are disposed off immediately they attain the desired weight; it is uneconomical to continue feeding animals when they have already attained the marketable weight.

Drug dosage: Treatment is another area that needs weight monitoring;

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Large animals

Live weight of large ruminants can be estimated by measuring the chest with a tape measure or a calibrated string. Approximate weight can be calculated using the table below; cm (Centimetre) stands for heart girth and kg (kilogramme) for the weight.

cm	kg	cm	kg	cm	kg
65	35	115	134	165	360
70	40	120	150	170	392
75	45	125	170	175	429
80	50	130	190	180	467
85	59	135	210	185	508
90	69	140	230	190	552
95	75	145	252	195	598
100	89	150	272	200	648
105	103	155	295	205	698
110	118	160	325	210	748

any dosage administered to an animal should take into account its weight.

Marketing: If a farmer is willing to sell an animal it is wise to know the animals' weight; otherwise, there is always the danger of being exploited by crafty buyers. This happens every day at the market place. Middlemen will always take advantage of the farmers' ignorance. They pay less for the animal and rake in hefty profits selling the animals to the butchers and slaughter houses.

Determining an animal's weight does not cost much. All a farmer needs is a tape measure and the weight chart

Use the right dosage of drugs!

Treating sick animals is a challenging task. Farmers need not only to buy the right drug; it is important to choose the correct dosage depends on the weight of the animal and the severity of a disease.

Larger and heavier animals usually require a higher dosage than younger and lighter animals. In most cases, what matters is the amount of the active ingredient in the drug. The active ingredient is the substance that actually does the work of curing or preventing the disease. Some drugs have more than one active ingredient e.g. penicillin and streptomycin. For liquid medicines, the concentration is



Small animals

Measure the heart girth of small ruminants (goats or sheep) using a tape measure or string. Pull the tape tight. Use the table below to estimate the weight; cm (Centimetre) stands for heart girth and kg (kilogramme) for the weight.

cm	kg	cm	kg	cm	kg
27.3	2.3	52.7	15	78	40.8
28.6	2.5	53.9	15.9	79.4	42.2
29.9	2.7	55.3	16.8	80.7	44
31.1	3	56.5	17.7	81.9	45.8
32.4	3.2	57.8	19.1	83.2	47.6
33.7	3.6	59.1	20.4	84.5	49.9
34.9	4.1	60.3	21.8	85.7	52.2
36.2	4.5	61.6	23.1	87	54.4
37.5	5	62.9	24.5	88.3	56.7
38.7	5.4	64.1	25.8	89.5	59
40	5.9	65.4	27.2	90.8	61.2
41.3	6.8	66.7	28.6	92.1	63.5
42.7	7.7	67.9	29.9	93.4	65.8
43.8	8.6	69.2	31.3	95.9	70.3
45.1	9.5	70.5	32.7	97.2	72.6
46.4	10.4	71.7	34	98.4	74.8
47.6	11.3	73	35.4	101	79.4
48.9	12.2	74.3	36.7	102.2	81.6
50.2	13.2	75.6	38.1	103.5	83.9
51.4	14.1	76.8	39.5	104.8	86.2

Source: Veterinary Research Institute, Sri Lanka

printed on this page. Measure the circumference of the chest also known as heart girth. Measure from the point slightly below the shoulder blade, down over the front ribs and under body behind the elbow.

usually given in milligrams per millilitre of the medicine (mg/ml). For tablets and capsules, the concentration is normally given in milligrams per tablet or capsule. Antibiotics and vitamins are sometimes given in special units called International Units (IU) instead of milligrams. Because of these variations, it is not possible to direct a general rule on what dosage to use.

However it is important that farmers stick to the following guidelines:

1. Read the label carefully. Follow the directions on dosage, how to apply it and how often to repeat the treatment.
2. The medicine's label might direct you on how to apply a certain amount of

Continued on page 8

Rabies: a highly fatal disease we ignore

People in rural areas are often not well informed about rabies. The law demands vaccinations for dogs.

William Ayako

Rabies, also known as Hydrophobia (fear of water), is a highly serious viral infection. There are an estimated 55,000 human deaths annually from rabies worldwide, with almost half of them (24,000) occurring in Africa. Two cases of rabies related deaths have been confirmed recently in Nyanza province. The deaths were reported in Kombura location of Kadibo division between the months of May and July 2009.

The problem has been compounded by the increase in number of stray rabid dogs as well as by people's ignorance about appropriate control measures of rabies. Once infected, the public often resorts to traditional healers who are equally ignorant about the dangers of the disease. Some people think that religion or magic can protect them and their animals from rabies. This is indeed a dangerous belief, which ignores well-known medical facts and may lead to loss of life caused by the disease.

The disease is relatively common in rural than in urban areas. Most rural

Efforts in Kadibo division

In Kadibo division, the department of veterinary services, in collaboration with provincial administration and ministry of education, organized a mandatory vaccination campaign for all domestic dogs in the division as a control measure against the spread of rabies. The public was informed of this plan by the provincial administration through the local schools.

The first vaccination was done in Kombura location on 9th July 2009 at Kombura location chief's camp. About 200 dogs were vaccinated at a cost of Kshs. 50/- per dog, and their owners were issued with a vaccination certificate. Three more control campaigns are planned to cover the remaining locations. After completing the campaign in the division, all unvaccinated dogs will be killed by the veterinary department to eliminate further chances of transmission by dogs.

We appreciate the overwhelming publicity support by the chiefs of Kombura, Katho and Kochieng locations. The clinical support by the veterinary department of Kisumu east district was great. Lastly the cooperation and response from members of the public in Kadibo was very positive. W.A.



folk is not aware of the dangers associated with rabies which is often transmitted by dogs. Dogs are regarded as a source of security in the rural areas and are present in almost every homestead. Its occurrence is also attributed to the social attachment to the local dogs kept and regarded as pets by the youth. Vaccination against rabies is possible but expensive, and therefore hardly practised.

How rabies is spread

The virus affects humans, all warm blooded wild and domestic animals with the exception of birds. Dogs are regarded as the main transmitters of the disease but other domestic animals such as cats, cattle, sheep and goats can also transmit the disease among themselves as well as to humans.

Transmission happens when an infected animal bites another animal or a human being and the saliva containing the virus enters into the blood stream through the fresh wound. The virus then spreads from the location of the bite along the nerves to the brain, the spinal chord and the salivary glands. The infection may take between two weeks and several months to show symptoms. It is only after this period the typical signs of rabies are recognized.

The symptoms in animals

The inflammation of the brain caused by the disease results in unusual behaviour: Over excitement, mania and an attack complex by the infected animals. The disease can last for as few as two days to about a week, after the onset of the first clinical signs.

- The first sign is change of behaviour which may take two to three days in dogs.

- The next stage is the excitement stage whereby the animal displays the typical signs of rabies: Restlessness, aggressiveness and voice changes. Depending on the species of the infected animal, the voice changes may include howling, roaring and bleating.

- In the stage referred to as "furious rabies", dogs often make unprovoked attacks on other animals or objects.



Dog owners queuing to have their dogs vaccinated against rabies in the Mara.

This stage lasts for about four days. It is the most dangerous stage of transmission from dogs to humans.

- The infected animal then develops paralysis from the rear limbs and refuses to eat or drink while profusely salivating. This paralytical phase is often referred to as 'dumb rabies'.
- Death then quickly follows.

Prevention and control

The Kenyan law requires that all dogs be vaccinated against rabies. It is a fatal disease for infected animals and humans and there is no cure once the symptoms have started. Therefore, any suspected case of rabies must be reported immediately to the veterinary department.

There is only one way to survive an infection with rabies: Immediately after a bite from a rabid animal, getting immediate medical attention. Only an anti-rabies vaccine can prevent the virus from progressing.

The cost of anti rabies vaccine for human immunization is expensive. The cheapest of this costs about Kshs. 10,000/- in public hospitals, or more in private hospitals. Therefore, it is cheaper to vaccinate a dog at a cost of Kshs. 50/- per year! This protects your dog from getting or transmitting rabies to you or to other animals.

Warning!

Remember always that there is no cure for rabies and it is not advisable to try to treat an animal infected with rabies due to the dangers posed by handling such an animal.

Identify a market before going organic

Many farmers are interested in organic farming. The challenge however is finding a market for their products.

Su Kahumbu

Many farmers are inquiring from TOF about organic markets. Their questions usually centre on the themes of products for organic markets, the requirements of the organic market and the domestic organic markets.

A strawberry producer in Nyeri wishes to convert to organic strawberry production. He asked us to give him advice on organic markets. Using him as an example, I would suggest the following procedure.

1. Locate the market first.

Ask yourself:

- Where and to whom can I sell my organic strawberries?
- At what price shall I sell my commodity?
- How much can I deliver, how often can I supply?
- Who are my competitors? Are there farmers or farmers' groups in the region who are already successfully producing organically?

2. Experimental production.

When you are sure that you will be able to sell the organic strawberries, experiment with a small area under organic production at first. Produce for both markets while you get used to organic production. The diseases that afflict strawberries are quite difficult to manage organically, and you risk losing an entire yield. Alternatively, look at simple value addition of the strawberries (like making strawberry jam?)

In short, when growing any products for a market, the first step is always to identify the markets and the buyers. It has to be clear where and to whom you can sell your product before you start producing!

Other factors you have to consider include: distance to the market, prices at the market, production costs of your product, and the shelf life of the product (this is the period within which you have to sell the product, before it deteriorates). In the case of strawberries, shelf life is very short, and you have to identify the market long before the harvest.

3. Organic market requirements

Organic products can be produced either for export or for domestic markets.

The export market and formal mainstream markets usually require certified and labelled products. 'Certified' means that an independent company



has controlled the producer and has verified that the product has been produced within certain rules, 'an Organic Standard'. This standard describes in detail how a product must be produced in order to be labelled and sold as organic.

In other words, if you found a buyer who purchases certified organic products, you will have to follow precise production rules, the storage of the commodity controlled and you will also have to pay certification costs.

In Kenya, we have the 'National Organic Standards of Processing and Production' recognised by the Kenya Bureau of Standards, as well as the 'East African Organic Standards'. Usually, certified organic products can be sold at a higher price than the same conventionally produced products. Certification and labelling act as insurance against unscrupulous conventional producers who may claim their products are organic. A label gives a certain guarantee that a product has really been produced organically.

Less formal markets, institutions etc. may not be as strict. Home grown domestic markets may not require certification at all but rather a simpler more cost effective form of verification (see point 5: Domestic organic markets).

4. Change to organic

Any farmer wanting to convert from conventional to organic production should know what 'Organic Production' means and entails. Many people believe it is simply the non-use of chemicals. But organic production goes beyond zero use of artificial fertilizers, herbicides, fungicides and pesticides. It is a way of life, a style of producing healthy products by understanding, valuing and respecting the integrity of the people and the environment in which we live.

For small-scale farmers, conversion to

certified organic production is a challenge. They have to fulfil a long list of requirements, including some which are quite different from traditional or conventional farming practices. Knowing the requirements, as well as an understanding of the allowed substances for pest and disease control, is imperative.

Some companies which export organic products contract farmers' groups for organic production, and they usually offer them training. Because of the high costs for certification, which has to be repeated every year, small-scale farmers have to be organized in contractable producer groups. In a group, the certification fee is divided between the members.

5. Domestic organic markets

Many farmers would like to sell organic products on the local market. Is there really no demand for them? In the urban setting of Nairobi, organic products can be marketed successfully. Green Dreams (GD), which started as a little farm producing organic products for mainstream markets, is a good example of it. By using certification and symbols, consumers can be convinced of the integrity of the organic products.

Last year, the Kibera Youth Reform Group (KYRG) started an organic farm in Kibera which today markets and sells organic produce in Kibera. Each day the youth place their freshly harvested products out on a table beside the farm and educate their consumers about the high value of their production.

What if we tried to imitate this countrywide? Rural organic producers should make an effort to let their buyers in local markets know of the value of their produce. This can be done through word of mouth, with fliers, etc. Be self-confident! Let your buyers know what you have, and why they should buy from you!

Legumes are a valuable source of protein

Livestock fed on green manure legumes give more milk and produce highly valuable manure.

The Organic Farmer

Green manure legumes such as mucuna, clitoria, purple vetch, leucaena, lablab, Glycine and jackbean are not just used for improving soil fertility. Studies done by KARI found out that legumes are a valuable source of protein for cattle fed on low quality basic diets. The studies were carried out in coastal, semi-arid and North-Western Kenya to evaluate the potential of green manure legumes for improving the performance of livestock.

Increased feed intake ...

Coastal Kenya: The studies evaluated the lactation performance of Jersey cows fed on a basic diet of either Napier grass or maize stalks. The legumes (mucuna, clitoria and lablab) were shown to significantly increase dry matter digestibility by 13% and feed intake by 24% in cows fed on maize stalks as basic diet. For cows fed on Napier grass, which had higher concentration of nitrogen than maize stalks, legume supplementation had no effect on digestibility and intake.

North-Western Kenya: In cows fed on a basic diet of Napier grass, the supplements with mucuna or lablab had no significant effect on the intake of the basal diet. However, total intake increased by 23% while dry matter digestibility went up by 9%. In each of the studies there were no significant differences between the legumes.

...and higher milk production

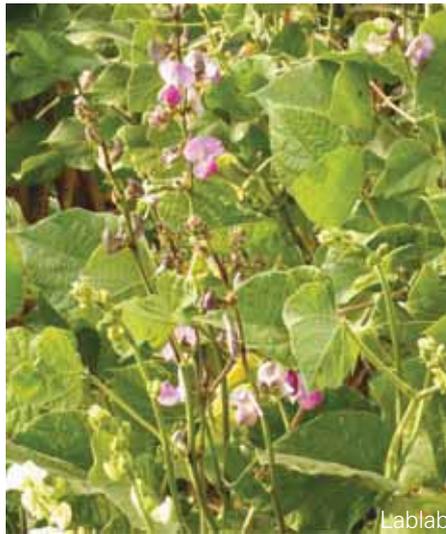
In coastal Kenya: Jersey cows supplemented with clitoria or mucuna produced 30% more milk than those fed on Napier grass alone. At the same site, cows fed on a basic diet of maize stalks and supplemented with clitoria or mucuna produced 15% more milk than those fed on maize stalks only.

In North-Western Kenya: mean milk yield of Friesian cows supplemented with mucuna or lablab was 15% more than the milk yield of cows fed on Napier grass alone.

Goats in semi-arid Kenya fed on a mixture of natural pastures and Napier grass lost 23.8 g daily while those supplemented with siratro and soya glycine gained 4 and 16.4 g daily, respectively.

High quality manure

Green manure legume supplements improve animal performance as well as the quality of manure produced by cattle and goats. Although manure output of Jersey cows in coastal Kenya



Lablab



Jack beans



Canavalia

was not affected by legume supplementation, supplementing the basic diet with clitoria or mucuna increased the nitrogen concentration in the manure by over 70% and reduced its phosphorus and potassium concentration. A similar trend was evident in the nitrogen concentration of manure from

goats fed on green manure, which was 51% higher than that of goats fed on the basic diet only.

NOTE: Farmers who need to buy seeds or seedlings of green manures mentioned above should seek assistance from KARI stations or extension workers near them.

Other uses of green manure legumes

For farmers who grow green manure legumes, it is like killing two birds with one stone. Almost all farmers who keep animals also grow crops. One advantage of green manure, legumes is their contribution to soil fertility. The use of green manures as we have mentioned before is one of the methods used in sustainable agriculture to maintain soil fertility.

Since all green manures are leguminous plants, they help fix nitrogen into the soil. This nitrogen enriches the soil and feeds all plants that may be planted in the same soil. Research shows that green manures can fix about 40 to 60 per cent nitrogen which is ready for use by any plant that is planted on rotation. For example, a purple vetch crop that accumulates 90 kg of nitrogen per acre will leave 45 kg nitrogen per acre that can be used by any other cereal or vegetable crop planted later on the same land. This amounts to increased yields. Indeed green manures boost crop yields for the next two or three growing seasons.

Provide more manure

Apart from providing nitrogen, green manures also help to suppress weeds and protect the soil from erosion, wind, water and direct sunlight. Green manures penetrate the soil with their roots, bind nutrients and support the infiltration of water into the soil. Their contribution of organic matter to the

soil from a green manure crop is comparable to the addition of 9 to 13 tonnes per acre (0.4 ha) of farmyard manure. The soil cover they provide reduces soil crusting, and surface water runoff during raining seasons. However, the following tips are important for farmers who grow green manures:

- Those using green manure crops to provide fodder and soil improvement need to balance their needs to ensure that they have enough to feed their livestock and reserve part of the green manure residue for incorporation into the soil.
- If you grow green manures in rotation, the time of sowing must be chosen such that the growing plants can be cut down and worked into the soil before the next crop is sown.
- If legumes and green manures are grown in a field for the first time, inoculation of the crop with specific rhizobia is necessary for one to benefit from nitrogen fixation. (Rhizobium is available for sale at the University of Nairobi, Kabete campus or Kenya Seed Company stores).
- Green manures can be worked into the soil easily, while still young, just before flowering.
- Green manures should be incorporated near the surface of the soil, between 5 to 15 cm deep in light soils, 10 cm to 20 cm in all other types of soils. **TOF**

Here are the *i*-TOF centres

The four *i*-TOF centres that we opened in various parts of the country are now busy providing information and training to farmers in the selected regions (see maps below). Our extension workers are receiving requests for training, information and organic inputs on a daily basis. Farmers are making calls, sending text messages and letters asking questions relating to sustainable agriculture and organic farming. This is a clear indication that farmers want to learn more to improve on their farming methods and practises. It is also meeting one of the main objectives of *The Organic Farmer*, which is to move closer to the farmers and solve their problems in a more practical way. The project will be reviewed periodically and the findings will form the basis for the continuation of the *i*-TOFs and for a possible expansion to other areas.

Observe punctuality

The *i*-TOFs have started very well. There are only two problems:

- Most farmers are not keeping time, forcing our extensionists to waste a lot of time, which would have been utilised in training. Are farmers not really interested? Coming half an hour or even one hour too late is an indication that some farmers do not take the programme seriously. We urge the farmers group leaders to ensure that they encourage members to keep time on training days.

- Some farmers groups are bothering our extension workers with requests for financial assistance to be able to implement various projects within their groups. We understand their wishes. But *The Organic Farmer* as well as our radio programme and the *i*-TOFs are concentrating on the information and sharing of knowledge and skills within the small-scale farming community. We do not offer any form of credit. Farmers' groups in need of credit facilities can make their own arrangements for these with the various institutions that offer

credit in their respective regions.

Our training conditions

Farmers interested in training have to fulfill the following conditions:

- The training will be conducted free of charge to all interested farmers groups.
- The farmers have to identify a training venue and organise a demonstration plot where the training will take place.
- Training can only be provided to farmers with a least 15 members or more.

- Each training session will take 4 to 5 hours. Farmers are therefore requested to be at the training venue on time.

The *i*-TOF programme is offering training modules in all areas of sustainable agriculture and organic farming to help farmers improve their farming practises which will help them increase yields and income. The farmers are also expected to use ecologically sound farming methods that utilise the available resources in a way that protects the environment.

i-TOF centre, Kangundo, Eastern

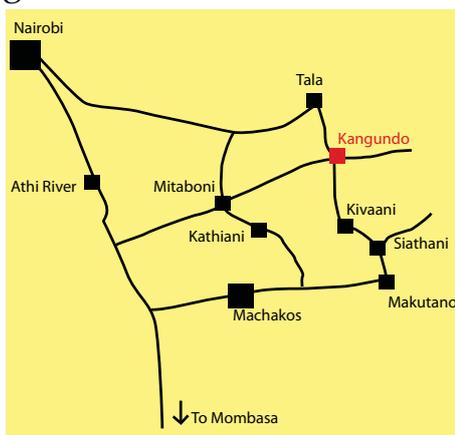
Host: CBO Kangundo Dairy Farmers (KDF), running a milk bar

Location: KDF-milk bar in Kangundo Town

i-TOF information: Within the premises of KDF, equipped with the whole information package, run by the TOF-extension worker

Contact: 0724 331 405

i-TOF organic inputs Shop: Situated within the premises of KDF in Kangundo town.



i-TOF centre Gatuto, Kerugoya

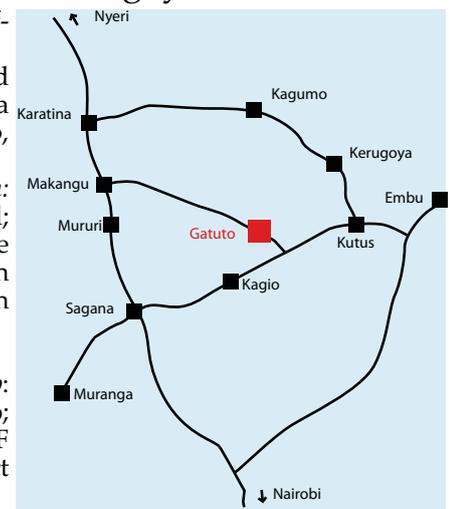
Host: Amuka Farmers Self-Help Group, Gatuto

Location: Meeting and education hall of Amuka Farmers Self Help Group, Gatuto

Location i-TOF information: Within this meeting hall; equipped with the whole information package, run by the TOF-extension worker

Contact: 0724331 375

i-TOF organic inputs Shop: An agrovet shop in Kagio; to be named in the TOF August-issue and by direct mail to farmers' groups.



i-TOF centre, Buyangu, Western

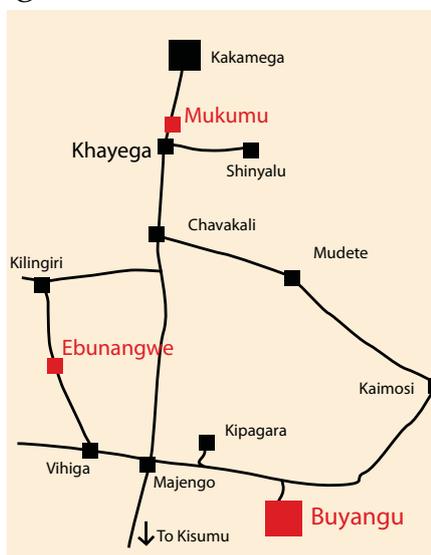
Host: Main office of the Sustainable Organic Farming Development Initiative (SOF-DI), Buyangu

Location: (SOF-DI) Buyangu, in the compound of the Catholic parish

i-TOF info centre: Within the premises of SOF-DI, equipped with the whole information package, run by the TOF-extension worker

Contact: 0724 331 456

i-TOF organic inputs Shop: Situated within the premises of SOF-DI main office in Buyangu



i-TOF centre, Baraka College, Molo

Host: Baraka Agricultural College, Molo

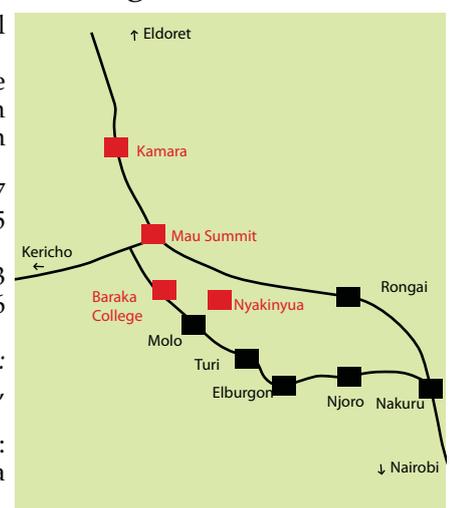
i-TOF info centres: In the three Baraka outreach centres each staffed with an extension worker

Contact Kamara: 0725 507 038, 0720 041 556, 0725 665 781

Contact Mau Summit: 0723 778 688, 0725 854 197, 0726 714 708

Contact Nyakinyua/Sirikwa: 0721107 981, 0723 792 099, 0724 704 586.

i-TOF organic input shop: Located within Baraka Agricultural college.



Green houses profitable but initial costs high

Many crops can do well in a green house. But pests and diseases can be a problem.

The Organic Farmer

Every month, TOF receives volumes of questions from small-scale farmers concerning greenhouse food production. The farmers' quest is to establish whether putting up a greenhouse would be a better option for them or not. Indeed, greenhouse food production system can be profitable. It has been encouraged in recent years by the Horticultural Crops Development Authority which offers free technical training on the same. Additionally, some banks offer credit facilities to farmers willing to put up greenhouses.

Greenhouse food production has been developed to prolong the growing season in cooler regions of the world, mainly for crops like tomatoes, peppers, chillies or cucumbers, which require high temperatures for growth. Greenhouses also protect the crops from rainfall, especially tomatoes, which do not like rain at all.

Greenhouse production is usually combined with a drip irrigation system, which allows for efficient use of water resources. If water management is well organized, it is possible to prolong the growing season in dryer areas. Greenhousing is also seen as a way of intensifying production for farmers who own small pieces of land.

In Kenya, greenhouse technology is being mainly practised around Naivasha in the flower industry, where higher temperatures and prolonged daylight are required. Industrial greenhouses use complicated techniques for temperature and moisture control and for fertilizer supply. Greenhouses of this type are not suitable for small-scale farming: they are too expensive and difficult to maintain.

Promises and problems

Less complicated greenhouse systems are now being advocated for tomato production (see box). Farmers are attracted by the information that tomato yields in greenhouses could be ten times higher compared to tomatoes grown in open fields. It is also claimed that labour input is low, and that less water and chemicals are needed.

However, there are several pitfalls for this technique. It is not easy to handle, especially for small-scale farmers who have little experience.

1. High initial investments are required. If you fail, you will end up heavily indebted. Check seriously whether you are able to carry this risk before you set up a greenhouse.



2. Labour requirements should not be underestimated. You will have to control irrigation continuously. Important as well is to keep a keen eye on the climate in the greenhouse permanently, otherwise your crop will easily do poorly. Very high temperatures for example reduce growth and fruit set.

3. Due to the higher temperature and moisture in greenhouses, pests and diseases develop very fast. Spidermites and fungal diseases (early and late blight for instance) and bacterial wilt need greater attention and most probably treatment with chemicals. This is a contradiction to the claims that are made by some people promoting greenhouses.

4. The best greenhouse will not fulfil the high expectations raised by agricultural advisors if the crop is not fertilized adequately and managed with attention. Tomatoes thrive in soils rich in organic matter, therefore it is an advantage if you are able to supply manure or compost.

5. If you grow tomatoes in your greenhouse season after season, diseases will quickly accumulate in the soil. This will result in high disease levels within a short time. The only way to avoid this would be to move your greenhouse to another location as soon as you discover that diseases are becoming serious.

Greenhouses and organic farming

We do not discourage you from building a greenhouse. But you should carefully consider the risks involved. This is especially so if you do not want to apply chemicals and cannot get a good premium for tomatoes which have been grown naturally (without

chemicals). In this case, greenhousing is not exactly what you should try to do - unless you have the resources.

Greenhousing can be challenging

Required materials:

- Woodwork for the construction of the frame (depending on the size, from Ksh 40,000 upwards)
- Polyethylene sheets: new ones are expensive
- Irrigation system (from Ksh 7,000 for 300 plants upwards)

Crop care

• **Temperature control:** When the sun is shining, temperatures in the greenhouse will go up very fast. Cooler air from outside must immediately be allowed to circulate in the greenhouse. You have to think of an adequate ventilation system. During colder periods (at night and in cloudy or rainy weather), you need to close the greenhouse.

• **Control of diseases:** The warm, moist climate in the greenhouse promotes not only the growth of the crop, but also fast multiplication of pests and diseases. Most probably you will not be able to control them without the use of chemicals.



Grow maize varieties compatible with the short rains

Failure to adapt to the inadequate rains by farmers has led to food shortage. This harsh condition can however be overcome.

The Organic farmer

Most Kenyan farmers do not like growing drought resistant crops. They prefer dealing with those that they have grown for decades. But with the problem of climate change, most of the crops may not do well at all.

Farmers have already witnessed what has happened this year; the rains which were expected in mid-March delayed until late April.

The farming community needs to look for varieties that can do well in their regions. Most seed dealers do not tell farmers the truth when they go to buy seeds; they will often advise a farmer to buy a particular variety that they want to sell, not the one that does well in the particular region where the farmer comes from. The other problem is that all farmers have abandoned traditional crops that used to withstand changes in weather, pests and even diseases. Most of these crop varieties now referred to as "orphan crops" hold the key to food security in Kenya and many other African countries. It is time that farmers started thinking about them in view of the changing climatic conditions. Below we give you some of the drought resistant crop varieties that can do well in most areas without adequate rains.

Sorghum

Sorghum is Africa's oldest food crop. Although it is often referred to as the continent's food for the poor, it holds the answer to Kenya and Africa's food security. Sorghum is not only drought-resistant; it is also adaptable to most of Kenya's climatic zones and soils. It is full of energy-giving nutrients, unlike other cereal crops such as maize



and wheat. The high concentration of potassium and starch in sorghum, its less acidifying effect and the fact that it is easily absorbed and well-tolerated makes it ideal food for those who are sick, diabetics, adults and children. Bakers use it to add flavour and colour to bread and other bakery products. Traditionally, sorghum is used to make ugali or fermented porridge. In Kenya, sorghum is grown in areas with as little as 250 mm of rainfall although it can do better in areas with an average rainfall of about 600 mm. Local varieties of sorghum are less prone to bird damage compared to hybrid ones. To get a good yield, farmers should buy seed varieties suitable to their climatic zones. They can get advice from agricultural research station or extension personnel near them.

Cassava

Cassava is an important food crop especially in Western Kenya which produces and consumes more than 60 per cent of the national cassava production. It produces tubers between 6 months and 3 years depending on the variety. It has the ability to withstand poor environmental conditions such as low rainfall and infertile soils. Cassava is a major source of carbohydrates for poor families because of its high starch content. It can grow well with little management, a reason why it becomes the main source of food in times of war



or natural calamities. Its leaves can also be eaten as a green vegetable. In some African countries, cassava flour has replaced wheat in making bread. Cassava Mosaic Disease outbreaks in 1994/95 threatened cassava production in the country but new varieties resistant to the disease have now been developed. The migyera variety is the most popular as it is CMD resistant.

Pigeon peas

Pigeon peas are a nutritious leguminous plant whose ripe seeds are made into flour while the green seeds can be used as a vegetable. The plant is drought resistant and grows well in dry areas with as little as 650 mm of rainfall. It can produce up to 8 bags



per acre. New varieties which mature in 4 months have been developed. In Kenya, four of the new varieties have been developed by the International Research Institute for Semi Arid Tropics (ICRISAT) which is giving free seeds to farmers. Farmers in Eastern province have abandoned maize production in favour of pigeon peas.

Choose right maize variety for the short rains

Below are some of the maize varieties that can do well in the short rains:

Katumani composite: The variety does well in both high potential and low potential areas. It matures between 3 and 4 months. It can be re-used as seed for up to three seasons, without affecting the yield. It can produce about 12 bags an acre.

H511 and H12: These two varieties do well in high altitude areas with moderate rainfall. They mature between 4 and 5 months. They can produce between 16 and 18 bags an acre. Other varieties that do well in depressed rains are DH01, DH02, DH03, DH04, DH09, DH10 and PH4 (suitable for coastal areas). Seeds for all these varieties are available in agro-veterinary shops and Kenya Seed Company stores.

medicine for every kilogram of weight. Use the weight chart to estimate this. If you are not sure, ask a veterinarian, experienced livestock farmers or the owner of the agrovet where you bought the drug. Note that applying too much or too little of a drug is dangerous as it can kill the animal. It might also fail to cure the disease. In addition, the disease organism might also become resistant to the drug which makes the disease more difficult to treat. **TOF**

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