



**FOOD SECURITY TECHNOLOGIES  
FOR DRY AREAS**



## **How to create an alternative, low-cost water storage cistern for irrigating small gardens**

A water storage at an affordable price is easy to satisfy the needs of a small garden. Here are 10 Essential Steps to follow in order to make a water storage cistern which will be a plastic-lined trench using 0.5mm LDPE dam liner black plastic material:

1 - Where to place the cistern is important; it must have a sufficient area from which to collect water but not to gather too much water too rapidly. If water is harvested from your field, it is important to slow the water flow into the well to reduce silt entry into the well. If the cistern is close to your house, water from the roof is a very good direct source and much cleaner.

2 - Dam liner is commonly available in rolls of 4 meters width, so the following measurements maximize the use of this material in making a 10,000 litre tank without cutting or splicing the plastic. If available in another width, other sizes and shapes of cisterns can be made. For this cistern a trench must be measured and dug to a width of 1.5 meters, 1 meter depth and 7 meters in length. A trench with a length of 5 meters will hold 7,000 litres, or of 10 meters will hold 12,500 litres. The one meter depth is in order to minimize the risk to people and animals who could fall into it and drown.

3 - Make a wall which slants a little, like \\_ / so as to minimize the chance that the earth sides could collapse into the trench later. At the end of the well, dig a 1.5m diameter hole, 0.5m deep which is a place for surface water to gather and

silt to settle before the water overflows this hole and enters the cistern. This will keep the water in the cistern cleaner.

4- The hole can be dug a few centimeters deeper on one end to facilitate removing all the water when it becomes less in the cistern. Crush and level the floor and smooth the sides of the trench so that plastic laid in the cistern will be unlikely to puncture.

5 - Make a small ditch around the trench edges, 10cm deep and 30cms distant from the trench edge, in which to place the plastic dam liner edges and fill with stones or soil so that the dam liner will not come loose and fall into the cistern. Thus, the plastic is not going come away from the wall of the cistern.

6 - If it is necessary to splice two pieces of plastic, it is advisable to overlap pieces by at least 5cm and to use a special water-proof glue, such as 'Simba Contact Adhesive' ©. Leave it to dry briefly before joining the two pieces, as per instructions on the glue can.

7 – Place the dam liner such that the middle of the liner lies in the middle of the cistern. Use a blunt implement or your hands and feet to push the liner into the corners of the trench. The plastic should lie loosely in the trench, so that the water as it fills the cistern will not stretch it. Fold the plastic at the corners, and at the point of entry of water into the cistern, one corner of the plastic dam liner is rolled around a small stick and buried so that water will not go underneath the plastic dam liner when entering into cistern. Secure the plastic dam liner corners and edges in the small ditch surrounding the cistern and cover the edge of the plastic with soil or rocks.

8 - Make contours to steer water slowly toward the entrance into the cistern. Small earth terraces are enough to gather the water and steer it. If water enters the cistern slowly, it carries less silt; it is better to prevent silt entering than to have to dig it out in the future.

9 – Place poles over the cistern and cover them with dam liner or tarpaulin and bury their edges also in the ditches surrounding the cistern. Pierce the tarpaulin between the poles so as to allow rainfall to enter the cistern and not pull the cover down into the cistern.

10 - HAZARD - WARNING AGAINST DROWNING: Cover the top of the cistern with thorns to reduce access by children and small animals. Plant a living fence using

thorns to further prevent small children and animals from falling into the cistern. Lift back and remove one corner of the top cover in order to insert a bucket or a water pump to remove water for irrigating the garden.



### **How to make a minimum tillage garden**

A minimum tillage garden is a certain way to produce food for the home with a minimum of water, labor, land, and external inputs. Here are 12 Steps to consider carefully in order to succeed:

1 – Measure your plot of land carefully, and make holes in rows 60 centimeters (2 feet) from one to the next in the line of contour, with a length and breadth and

depth of 15 centimeters (6 inches). The soil should be placed on the lower side of the hole. The distance between rows should be 75 centimeters (2.5 feet ). These holes are to be used year after year.

2 – Mix lime or ashes 5ml (3 teaspoons) with soil at the base of each hole.

3 – Place half a kilo (1 pound) of compost (preferred) or old loose manure in each hole and cover with 5cm (2 inches) of soil. The hole is now ready for planting. [If your crop is beans or peas, instead of holes make rows in lines 5 cm (2 inches) deep and place compost or manure in the row a half a kilo (1 pound) per 60 cm (2 feet). Then it is ready for planting.

4 –You may wait for the rains to start before planting, or you may irrigate the holes and plant before the rains. Planting should be done at the first good rain or just before at the closest point when the ground will be thoroughly soaked.

5 - Planting: Soak the seeds of corn (not necessary to soak beans or peas seeds) for 6 hours prior to planting. It is good to use quality open-pollinated seed which can be used year after year.

6 - Cover the seeds with soil without pressing the hole. Mulch should be gathered and placed to cover the soil between the holes and rows. Corn stalks, grass and leaves make good mulch. Water the holes every third day if rains have not fallen.

7 – Within 10 days after planting, the plants should have germinated to 4 cm; add seeds to holes with less than three plants. After reaching a height of 10 cm (4 in), reduce the average plants to 2 plants per hole, averaging with the number of plants in the nearby holes. Remove the weakest plants first, and retain all 3 seedlings if a nearby hole has only one plant.

8 - Weeding and irrigation: After every 10 to 14 days, weed the plot when the plants are only 5 cm (2 inches) high – at this time it is an easy task. Remember weeds are a problem even if left for 1 year out of 7 years. It will be easier in subsequent years. As the plants get older, less frequent watering is necessary, ideally once per week.

9 - Keep the field in a state of cleanliness throughout the year. Corn/maize when it is 30 cm (1 foot) high can be top-dressed with fertilizer (Urea - 1 tablespoon per hole) and it should be covered. It can be top-dressed again when it begins to tassel (flowers at the top).

10 - When the corn/maize tassles (flowers), it is the most critical time for moisture; it is most important to irrigate at this time if rains are not adequate so that the plants set seed and have full cobs.

11 - Make sure the hay and straw mulch is completely covering the ground. Weeding must also be done even as the maize matures.

12 - Crop rotation: it is encouraged to do agricultural diversification through crop rotation and changing plant cover crops for improving fertility. Third year rotations should be done so as not to repeat planting the same crop for more than two years in succession. Divide the field into 3 parts for the crop rotation, eg, part 2 corn, 1 part beans. A cycle can be pulses (beans, soybeans, peas, peas, lentils, peas, nuts stones, nuts) and cereal crops (maize, sweet potatoes, potatoes, sorghum, millet, mbege) or sunflower, or the rotation can include various vegetables.





### **How to run a Farmer Field School with your neighbors**

A Farmer Field School (FFS) is a group of farmers who have similar needs who with one mind agreed to work with an extensionist to research a new technique and/or to obtain training so as to apply it in their fields or farms. Training may involve livestock farming, methods of using alternatives to chemicals, organic farming, animal husbandry techniques, soil conservation and agro-forestry, irrigation and cultivation of vegetables, integrated pest management to protect crops and grain after harvest, Village Cooperative Banks, processing/post-harvest of crops, and even different ways of increasing income such as group marketing. A FFS is similar to other farmer groups, but usually focuses on a single field crop, to improve yields and income by experimentation using innovations. Dialogue of farmers, supported by advice provided by extension staff, on how a technology may be best utilized in the context of the farmer's situation can enable better understanding (why, what and how) and give opportunity to discover the technologies that are best suited in the local context and most sustainable. It is good to use extension staff if available so that they work together to establish the FFS in your area, and may become a link to useful outside resources.

Special challenges typically guiding FFS:

- Generating better yields while using low external inputs or organic farming
- Improving crop production or Storage without pesticides

- Weekly, carefully checking a crop's progress to observe the developments in the field from time to time, and monitoring needed action; farmers need to commit to regular meetings and walking to observe their fields
- Recognizing that farmers are professionals with knowledge just as are extension agents

How to cover the costs of a FFS:

- FFS need not to cost a lot of money; it depends on what is being handled. In general, self-reliance brings least cost and lasting success; obtaining outside support from charity does not guarantee success. Facilitators would do well to reduce unnecessary costs in order to build self-reliance and commitment of groups to avoid dependency. Reducing travel costs by facilitators and participants is possible by selecting neighbors who can meet together readily. A good facilitator over time will enable the FFS to develop their own goals, work plan and motivation for meeting. This way reduces costs and lends to FFS continuing with or without an outside facilitator.

The main objectives of the FFS:

- Increase production by unit of land
- Reduce production costs by reducing the need for unnecessary external inputs or reducing the use, e.g., fertilizers, herbicides, insecticides
- Reduce the possibility of farmers misusing agricultural chemicals and other inputs
- Enable farmers to make confident decisions based upon shared knowledge
- Practice field work in a timely way
- Provide opportunities for independent and collaborative learning.

Common practices in the FFS:

- conduct extensive research in the context of the farmer's situation
- identify factors that lend to good or bad crop yields
- regular inspection of the field
- decide what steps should be taken and consider alternative designs



**How to prevent Newcastle Disease which kills  
70% of chickens annually in Africa**

There is no treatment for Newcastle Disease. However, chickens can be made immune from this disease by a simple eye-drop vaccination 3 times a year, the same dose for all ages. It is a simple procedure which even children can perform. Currently, this I-2 heat stable vaccine is manufactured within several African countries, and can be obtained by farmers to enable chickens to be vaccinated every fourth month. The vaccine is called I-2; it can be kept out of a refrigerator for up to one week if not kept in the sun, and may be transported using common materials such as within a wet cloth in a basket. It can be used for 3 days after opening the vial of vaccine. Vaccines can be kept in the refrigerator and last for 6 months without losing effective strength.

Important things to consider before starting a campaign:

- 1 - Prepare a calendar of vaccinations and get village and livestock officer support
- 2 – Ensure that you can get the vaccine called I-2
- 3 - Make an agreement with the village leadership as to announce the campaign, what to charge for vaccinating chickens at homesteads.
- 4- Get the villagers' support to encourage chicken keepers to withhold their chickens indoors on the scheduled days until mid-morning, allowing the vaccinator to reach all households in a daily coverage area. By an agreed upon time, chickens then are released for the next day.
- 5 - Set the dates for each subvillage area in order to find chicken keepers at home
- 6 - Prepare forms to fill to record number of chickens vaccinated, who has paid, who remains to pay, and other data if possible on deaths, sold and slaughtered for home consumption after each vaccination campaign. This information will enable the effort to be evaluated by any stakeholder to measure success.
- 7 – Re-vaccinate in the area without fail every 4 month

How to identify if the vaccine campaign is working:

- 1 - There are no new cases of large death losses of chickens
- 2 - Many chicken keepers have continued to allow vaccinations of their chickens
- 3 – There are no complaints at all about the services of the chicken vaccinators
- 4 – There is an increase in poultry, both eggs and meat, in the village and marketed

Note:

1 - There is no vaccine capable of 100% for all diseases. When Newcastle Disease is controlled, other poultry diseases become more visible, and many are treatable.

2 - If continued chicken losses are experienced, especially of large numbers, there are steps to take when such incidents occur: dead carcasses should be taken with care to the veterinary laboratory for further investigation to check for another very similar disease, Avian flu, which may be highly infectious and dangerous for humans. [Newcastle Disease cannot be transmitted to humans.] In such cases:

(a) Make sure you provide information to the relevant authorities

(b) Do not enter the area of the dead chickens or wear protective clothing before entering the area

(c) Make sure you gather a history of disease losses in the area

(d) Take caution when disposing or dissecting a chicken carcass not to touch blood or body fluids of the carcass. The veterinarian will compare (validate) the symptoms observed and other diseases with similar symptoms.





### **How to create a bio-intensive deep dug bed garden**

Bio-Intensive Agriculture (BIA) is a kind of organic farming rooted in maintaining soil fertility/ living soil. BIA is called Bio-Intensive because it maintains a natural biological balance between soil, nutrients and plants. It employs crop rotation and intensive planting to maximize harvest levels while protecting the natural soil health and the local environment.

Important aspects of BIA include:

- ◇ Composting
- ◇ Double-dug, raised beds
- ◇ Intensive planting
- ◇ Carbon and calorie farming
- ◇ The use of open-pollinated seeds

The three core activities are: Composting, to restore nutrients to the soil, Double-digging to break up the hard pan, several centimeters below the surface, which impedes the flow of air and water and the penetration of roots, and Companion Planting / Crop Rotation, which provide a mix of plants, encouraging growth, deterring pests and diseases, and conserving soil and space. The combination of these activities enables plants to access nutrients locked deep in the soil.

In addition to compost and double-digging, BIA employs a number of methods known to traditional farmers but neglected in recent years, such as:

- ◇ Crop rotation: relieves mineral drain on the soil
- ◇ Companion Planting: discourages pests / improves soil cover
- ◇ Liquid manure: made as a top dressing
- ◇ Beneficial plants: lure away or deter pests from crops
- ◇ Natural pesticide sprays: made of plants, weeds and herbs
- ◇ Raised beds: allow closer spacing of crops
- ◇ Water harvesting: retains water during the dry season

Planting leguminous shrubs and trees (Agro-forestry): adds nitrogen to the soil / provides fodder, fuel wood and fence posts

#### METHOD:

1. Select an area approximately 5 ft. by 20 ft. (the bed can be any length, but it must be 5 ft. wide so planting and harvesting can be done easily from either side of the plot). Ideally, choose an area close to the house, compost supply, and a water source. The area may need to be fenced off to prevent animals from entering.
2. Mark the bed with sticks and strings. Remove grass and weeds.
3. Loosen the top soil one foot deep and remove the soil, placing it on one side of the measured area.
4. Loosen the sub soil one foot deep and place this soil on the other side of a measured area. Now you will have a trench two feet deep.
5. With the third layer of soil now loosen one foot deep but the soil is not removed from the trench. Instead mix it with compost, at an interval of one bucket full of compost per meter length of the trench.
6. Now return the subsoil to the trench, and intermix it with compost at the same amount as in step five.
7. Finally return the top soil to the trench, intermixing it with compost of the same amount as previous layers.
8. The bed now will have the shape of a semi-cylinder. The shape obtained increases about 25% of an area. The bed is covered by cry grass (mulch).
9. The bed is ready to be planted with any crop

#### PLANTING SEEDS OR SEEDLINGS:

Plant seeds according to spacing recommendations. Cover the seeds with a thin layer of soil. Newly planted seeds need adequate moisture, shade and air. Water your seeds at least twice a day for quick germination. Water gently, careful not to miss the corners and edges. A simple watering can may be made by placing small, closely-spaced holes in the bottom of a tin, providing an even, gentle flow.

If planting seedlings, about 2 hours before transplanting, water them and the new planting bed. Choose seedlings which have good root– leaf balance. Example: crowded conditions in a seed flat will result in long, spindly, “top heavy” seedlings with shallow, weak, and often interwoven roots. For a plant to undergo a healthy transplant, its roots must be able to provide adequately for top growth.

Transplanting is best done late in the evening or on a cool day. Prepare bed, laying down mulch if desired, and mark the location where seedlings are to be transplanted. The diagonal offset pattern is used making the most efficient use of bed space and helping create an eventual living-mulch. Dig holes large enough to place seedlings up to their first true leaves. This is done for several reasons:

- \* As the soil settles, the roots will remain covered
- \* Members of the cabbage family as well as tomatoes form adventurous roots from their stems
- \* It prevents seedlings from bending over

Press down firmly, but not too tightly, allowing for aeration, water penetration and nutrient uptake. Finish by giving the seedlings a gentle yet thorough watering, enough to settle the soil around the roots, eliminate excess air space, and provide an adequate amount of water for growth. Again, if one can provide the seedlings with some form of sun and wind protection for a few days, a more successful transplant will result.

To reduce transplant shock:

- 1) Expose roots to the air for shortest time possible
- 2) Carry soil with roots
- 3) Minimize handling of seedlings and handle them gently
- 4) Place seedlings into a more nutritious, moist flat/garden bed
- 5) Provide shade if necessary
- 6) “Harden off” the seedlings by reducing watering and introducing them to slightly harsher environmental conditions several days before transplanting
- 7) Transplant in the early evening, or on a cool, cloudy day, and avoid windy, very dry conditions

Weed and inspect your garden bed frequently; monitor and control pests and diseases using companion planting, physical removal of pests and infected leaves.



### **How to create a kitchen garden**

A kitchen garden is a small garden which uses recycled kitchen water for irrigating, and uses wasted vegetable and fruit scraps to make compost within the circular center part. The Keyhole garden is a typical design, made from stones,

bamboo or bricks, having a height of half a meter on the outside rim and 1.5 meters on the inside compost column, and having a radius of 1.5 meters planting area. A pathway is built wide enough to enter to the center of the circle to ease putting water and vegetable scraps into the center compost column.

Steps to follow:

Prepare the outside wall 3.30 m diameter wide and 0.5m high, with a small pathway described above giving access to the central compost column. In the center a circular compost column is erected 1.5 m height and 1/3 meter diameter column (1 foot wide), which is filled with composting materials. This column also slowly filters the soap from the kitchen water. The area between the inside column and the outside wall is filled with soil and compost in a ratio of 1 part soil to two parts compost, if possible. This rich soil mix enables a very high density planting of vegetables and long-term fertility of the Keyhole garden. Kitchen water for irrigating is poured in the middle column of the garden every day, mainly from the kitchen as it has a mild soap and dirt which could bring harm to the plants if directly applied. The water flows slowly into the garden, enabling the whole garden to flourish.

Many factors make kitchen gardens to be appreciated, such as the following:

- Keyhole gardens or sack gardens are possible where there is no soil to make a garden, e.g., in stoney areas or in the city center. Soil may be gathered to fill the Keyhole garden.
- They are constructed close to home and provide easy access to healthy groceries, even for the elderly or sick.
- They are easy to demolish if someone moves house.
- They allow fresh healthy garden produce to be obtained without hard work and at your doorstep.
- It is easy to throw water from the kitchen and kitchen food waste, and produce food.
- You can plant vegetables which go to seed and can produce continually without buying inputs.
- All favorite vegetables grow well, e.g., carrots, sweet potatoes, greens, salad, beetroots, etc.

- Human urine can be used as well, diluting 3 parts water and 1 part urine, and poured in the column to increase fertility.

Despite these benefits, it must comply with all the terms of other gardens:

- The garden must be protected from birds, livestock, chickens, pigs, cows, goats or dogs which can destroy them overnight. A living fence or net can do this, and will also prevent soil drying winds.
- It is important to renew the compost and provide adequate irrigation water or 'manure tea' so as to renew fertility.

Keyhole kitchen gardens are planted with all kinds of vegetables, especially leafy vegetable species for providing family foods with more vitamins.





## **How to make compost, the best way to have additional fertility in a field or garden**

Compost is a valuable resource:

Compost is made using green and dry waste materials as available; it is created by the decomposition of raw natural materials, and provides a fertilizer of unsurpassed quality with diverse nutrients enabling plants to grow fast, resist pest, and stay healthy.

Five key pillars of organic farming are as follows:

- 1 – Use compost
- 2 - Rotate crops and use Companion plants which aid each other
- 3 - Control diseases using biological pest controls and natural methods
- 4 – Have a garden plan and keep records
- 5 – Produce your own natural seed

Materials needed to make compost:

First make sure raw materials are available and adequate. It is advisable to have them chopped in small pieces to speed fermentation and decay. Materials (raw materials) needed:

- 1 - stalks of corn, sorghum or dry stover
- 2 – dry leaves
- 3 - green leaves
- 4 - ashes

- 5 – manure from chickens, goats, sheep, pigs, cattle or other livestock
- 6 – soil
- 7 - water
- 8 – a stick to measure temperature

12 steps to make compost:

- 1 - Choose an area with a natural shade or make a shade the area should not be far from the garden.
- 2 – Measure an area with the same width and height (square meters) should be 1.5 meters by 1.5 meters; erect four 2m posts at each corner.
- 3 - Loosen the soil in the area to a depth of 30 cm [one foot].
- 4 – Lay a layer of mulch or dry sticks or dry stalks 5-10 cm thickness.
- 5 - The second layer should be a finer mulch of dry straw of a thickness of 5-10cm
- 6 – The third layer consists of green mulch 5-10cm.
- 7 - Sprinkle green ash on top, a volume of 1 – 1.5kg.
- 8 - Put a layer of livestock manure 2-3 cm thickness; do not use cat or dog manure
- 9 - Put a layer of topsoil 2-3 cm
- 10 - Spray plenty of water
- 11 - Repeat step 5 – 10 until the pile is two meters high or until your materials are fully utilized. Cover the pile with dry straw and keep it under a shade to prevent hot sun and rain from falling on it. Insert a stick into the center of the pile.
- 12 - After 3 days the compost will have settled to a height of 1.5 meters. Measure the temperature using the inserted stick to see if there is heat produced. If it is turning white, it is too hot and the pile should be turned over. If it is just hot enough to touch this is good. Check the compost temperature regularly. For rapid composting, turn the pile after each week, adding water if it is not hot enough. After six weeks to three months, depending on the temperature and speed of decomposition, the compost may be ready. It is deemed ready when it becomes dry and a brown color.



## **How to dry fruit and vegetables to improve nutrition throughout the year**

One aim of drying your own vegetables and fruits is to have quality nutritious products from your own garden or from the wild throughout the year. Storage is not difficult. Containers need not to allow sunlight or moisture to enter, to ensure that the dried food does not spoil from oxidization or moulds. Only the best quality garden produce should be collected and dried; cleanliness is very

important. Even wild fruits and greens can be dried for use during the dry months to improve nutrition in the home.

Storage of dry foods requires them to be adequately dried, free of moulds, and out of access to insects, vermin, sunlight or moisture. Bacteria grows rapidly in unclean food, and moisture causes breakdown by enzymes with increasing danger of mould and damage to the dried foods. Dried foods can be stored in plastic bags (as used to store nuts), and plastic air-tight containers such as buckets, and should be in dark rooms.

How to dry fruits (mango, banana, pineapple, papaya)

1 - Choose a good ripe fruit which is not damaged, for example if you use bananas select those with egg shell color which are not too brown or too hard. Wash fruit and dry.

2 - Peel and cut into small pieces.

3 - Take cold, clean water and add a little sugar (1 liter of water to 1 cup of sugar) You can also make diluted lemon juice (one large lemon squeezed into 1 cup of water), for sour, or acidic forms of citrus. For some fruit, even salt is used in water.

4 - Put the pieces of fruit in the mixture for 5 minutes.

5 - Put on a platter to dry.

6 - Let the fruit dry outside in semi-shade if there is a hot sun, for one day as the sun will be strong enough or 2 days if there are clouds and mild sunlight.

7 – Guard the fruit from rain.

8 - Another option is to pass the fruit through hot steam or place in boiling water for a period not more than 5 minutes. After this, called 'blanching', it can be dried as usual.

How to dry other vegetables

1 - Choose vegetables which are clean, not damaged, and mature. Wash them well.

2 - Cut or dice the vegetables as you like them. They should be no larger diameter than a pen.

3 - Make a strong mixture of cold water and salt .

4 - Soak vegetables in the mixture for 5 minutes, this will help preserve the color, nutrients and flavor.

5 - Put on a tray for drying

6 - Let dry at least 2 - 3 days if needed.

How to cook

You can boil or fry after soaking for 5 to 15 minutes. Some dried fruits can be enjoyed best fresh.





### **Alternative ways to store grain for to prevent damage**

The importance of good conservation of grains cannot be overstated. Typical losses of grains and pulses from harvesting to eating or selling range from 20% to 100% and the average is 40 percent. Few technologies can improve household production at this scale. Why produce it if you cannot store it?

Grains in rural African communities are normally stored at home. Commonly households store 400-600 kg per year although many have tons more in reserves of grains and legumes to eat and sell. Because of losses from insects, rodents, temperature and moisture, losses are excessive, and growth of molds and toxins in cereals are common. To prevent losses, grains should be clean before drying, dried adequately before storing, and placed in well constructed stores to prevent attack after storage. In all the above mentioned, it is best to store grain combined with alternative pest control methods, e.g., ash residue from rice hulls, neem leaves, manure ash, tobacco leaves, hot peppers or pyrethrum dust. Mixing corn/maize with these compounds should be done well before putting in a traditional storage, or barrel, or in a modern storage bin.

Methods of improving the harvesting and storage of grains:

1 - Drying corn enough in the sunlight is very helpful to enable safe long-term storage. It reduces the possibility of bacteria and mold attack, and it causes insects to escape from the seeds. Mold does not grow without moisture / water in the grain. So it is important to dry the grain either within the field or spreading it out to dry sufficiently before storing. It is good to spread it on mats or sheets of plastic to reduce dust being mixed with the grain, and also reduce moisture from the ground or from falling rain.

2 - If you take seed corn off the ears before storing, this helps to reduce the growth of molds and aflatoxins.

3 – If you separate broken or mouldy seeds, this will also reduce the potential growth of mold and insect attack later.

4 – You should focus on preserving during transport as this can prevent much of the corn being broken and damaged. When you put it in bags, or in vehicles, also take note not to damage it.

Best practices and alternative grain storage methods:

i – A tunnel under ground where rainwater can not enter, with a sheet of plastic or stalks of maize or sorghum spread on the bottom and sides, has shown effective to protect grains for more than a year. The beauty of the tunnel under ground is the temperature is colder, and the lack of oxygen and the presence of carbon dioxide prevent insects and rodents from enduring.

li - Different traditional stores [Mahenge] are known in African society and some are well known to be effective. Many types are often circular, built above the ground and thatched, in order to reduce moisture. Some have rat guards which prevent rats from entering from below. The better stores are made of concrete or mortar. Roofing with corrugated iron may be better protective from rain but also heats the grain; good thatch is better.

lii - Steel barrels or boxes prevent rats, water and insects from entering. Storing grain in them is easier and cheaper, and spreads risks by dividing grains according to type, season of harvest, and treatment or quality.



## **How nutrition contributes to health and enables those affected by HIV to withstand**

Mothers with children: protection based nutrition is the best way in which our bodies fight germs like bacteria and viruses in our bodies. Pregnant and lactating mothers need proper nutrition so their immune system is strengthened to enable them to fight infections. If they eat a poor diet, it undermines the immune system, and so puts them at risk from diseases such as HIV and other opportunistic infections. Disease causes deficiencies especially if they have not eaten enough. Those who nurse children have even greater needs.

Children: A child has a small stomach, so eats less food. However, children grow very quickly, so they need energy, protein, vitamins and minerals in order to grow, to become strong physically and mentally. Care should be given to make sure children get enough nutritious food; they should eat foods often which contain more fluids like vegetables and fruits.

Water:

Water works as a lubricant to help the body digest food, to give people energy, to help reduce fatigue and make us feel good.

5 reasons to eat 5 types of vegetables every day:

Vegetables and fruits help keep our bodies healthy. There are also many kinds of vegetables and fruits containing nutrients. To be healthy you need to eat a hand full of fruits and vegetables every day of at least 5 types.

Vegetables:

- 1 – have a mixture of minerals and vitamins
- 2 - help to have good health
- 3 - are a major source of fiber
- 4 - reduce risk of disease and help to recover or to feel better when sick
- 5 - are delicious and there are many types from which to choose

Foods to protect the body

Vitamin and Minerals:

Vegetables: traditional greens of all types, spinach, carrots, tomatoes, onions, celery, cucumbers, avocados, fresh corn, peas,

Fruits: many traditional fruits exceed the nutrition from guavas, mangoes, papayas, bananas, oranges, pineapples, watermelons, etc.

(They are important for people with HIV or other diseases. People who are ill or whose immunity is low have a great need of foods rich in vitamin B, C, E, and minerals like iron, zinc and iron)

Power Foods

Carbohydrates and Fats:

Carbohydrates: porridge, rice, corn, cassava, plantain, potatoes, sweet potatoes, millets, sorghum, taro root, yams

Fats: butter, coconuts, meats, nuts, avocados

Sugars: honey, brown sugar, sugar cane, sugar

Proteins

Proteins:

Legumes: beans, peas, soy beans,

Nuts: Cashew nuts, pumpkin seeds, sunflower seeds

Animal Products: milk, meat, poultry, eggs, fish, insects

Vegetables: bean leaves, pumpkins, leafy vegetables





## **How to prevent HIV infection and stop stigmatization of those affected**

Young people in East Africa are the majority of newly infected by HIV:

- 1 - Each year 60 percent of new infections are among people aged 15-24.
- 2 – In East Africa over 3 percent of men and 4 percent of women are infected.
- 3 - 37 percent of women and 43 percent of men not married report that they have active sex lives and have used condoms when last having sex.
- 4 - only 15 percent of young people between age 13 – 25 have been tested for HIV.
- 5 – Adult knowledge of HIV / AIDS worldwide is at 99.5 percent while education about HIV / AIDS in Africa is under 50 percent in the same age range.
- 6 - Many young people (boys and girls) do not think it is appropriate for a girl tell a boy to use a condom during sex.

Behaviour changes occur with community awareness and commitment and life skills. Let us get educated!

Stigma:

It is wrong to consider someone guilty for their need for healing. For example, many people feel that a person with HIV does not have equal rights with persons who do not have the virus.

#### Discrimination

Discrimination is denying rights due to someone. For example, an employer may not have offered employment to someone because the potential employee is infected with HIV.

Fear of stigma and discrimination against a person because of HIV status are real but should not exist. The public needs to understand how these situations affect those with HIV and their families.

Often people living with HIV are discriminated against, they have lost their jobs, their property, or their children; sometimes their families are expelled from homes, they cannot be given food to eat together with others, or they are denied quality health care. Families with HIV-positive people are discriminated against as well. Children whose parents have been affected sometimes can be expelled from school. These situations are highly illegal but common.

How can we end stigma and discrimination?

Knowledge and understanding brings behavior change. Love enables a person to have good behavior skills.

What are ways to help a person with HIV after the initial infection? What happens if no steps are taken?

After infection, many possible symptoms appear, there are often present symptoms like the flu. A few weeks after infection one again there may be no symptoms. From 3 to 14 days after infection, antibodies are produced by the body and a person who may be infected shows no symptoms. Months or years later, such a person may become ill, and may have already infected others. Such a person is normally called a victim of HIV +. A victim of HIV may continue living for 10 - 20 years or more if properly cared for. It is best to begin monitoring and using ARVs and improved nutrition to improve the immunity of a person BEFORE they start to show any symptoms. This is why it is so important for people to be tested to know their status. Once a person has been infected but waits until s/he begins

to show symptoms, it is harder to reverse some severe symptoms. However, by introducing anti-retroviral therapy s/he may reduce the danger of contracting diseases and prolong a life. Be positive. People should be monitored to control the ARVs used. When the amount of white blood cells is reduced to less than 200 per ml, ARVs can help to reverse a negative trend. ARVs prevent many opportunistic diseases from being given a chance to emerge. Without ARVs and good nutrition, the body begins thinning and a diminished health leads eventually to death.



## **How to prevent the deaths of cattle from East Coast Fever**

Immunizing cattle against East Coast Fever can reduce death losses significantly. Immunity is for life. We can prevent deaths which currently exceed 50% of Maasai herders calves each year. To protect the assets of pastoralists, it is necessary to provide immunity to this disease. The existence of a sustainable ECF immunization service can solve a major problem for livestock. The immunization is needed only 1 time in the lifetime of cattle. Pastoralists say that the value of their immunized animals increases immediately after immunization by more than the cost of the treatment itself. Mortality is reduced significantly, and this gives more assurance of livestock longevity and security of their livelihoods as animals increase. Because it is provided by a cost-recovery basis, many pastoralists are reluctant to invest in this technology. However, it is better to sell one cow to save many.

The main reason to vaccinate:

50 percent of newborn calves and cattle pastoralists like the Maasai and Sukuma die every year from this tick-borne disease - ECF. Thirty years ago there was no cure for ECF and no immunization known. Twenty years ago the treatment was discovered but until now the cost of the treatment is too high, about ½ the price of an animal. Most cattle keepers decided to slaughter sick animals rather than pay for the treatment, and often the treatment was not successful.

Since the immunization was discovered ten years ago, it is now available for less than the original cost, and it is delivered by private and public veterinarians.

Cattle keepers who want to access the immunization should contact veterinarians and their assistants who are willing to provide such services. The cost per calf is less if done in numbers of 30 to 40 at a time. With fewer, some doses will be lost, so the veterinary officer may postpone the exercise until a whole straw of 40 doses can be used. Therefore, it is important for livestock keepers to gather together to form clusters of animals to be immunized to reduce the price.

Steps to follow:

- 1 – An awareness raising session by the leadership of the village or group of herders or at the home of someone with cattle, to educate herders about the

benefits and costs of immunization, and the steps to be followed as keepers will want to participate.

2 - If they choose to have an immunization campaign, it is organized and the date announced to all pastoralists in the area, so they agree to pay, to organize their money and to collect their cattle together on that date, coming with cattle and money to the site.

3 - If possible, follow-up communication continues to ensure that they bring their livestock and money ready for the service.

4 – On the day of immunizing cattle, the veterinarian or livestock assistant arrives early, and starts immunizing if the number of livestock is satisfactory.

Immediately after immunization, antibiotic treatment follows, an important part of the program to ensure recovery and lifetime immunity. Then a tag is placed in the livestock's ear to show that it was immunized. This tag identifies the animals whose value is higher because of greater immunity to ECF.





## **How to begin a garden of fruit trees and tree seedlings**

The importance of fruit and vegetable trees:

Many people fail to have complete nutrition for the lack of fruits and vegetables in some areas. To overcome this problem, they must be educated about the importance of fruits and vegetables, how to grow them and pointers to success.

More important to note is:

- 1 - How to prepare seedlings correctly and on time
- 2 - How to integrate trees with good qualities, and how to do budding & grafting
- 3 - How to prune branches to make the trees fruitful
- 4 - How to prevent pests and diseases of trees
- 5 - It is not enough to plant fruit trees, but it is important to know how to care for the trees to bear fruit in abundance.
- 6 - How to harvest fruits and conserve them in travel to the marketplace without blemish
- 7 - There are two types of nurseries: Primary Nursery and the Secondary Nursery. It is important to know how to start nurseries.

Primary nursery - Steps to follow

- 1 - Choose an area and measure 1 meter by 6 meters, the compound should have shade and be near the water.
- 2 - Remove weeds and then loosen the soil to a depth of 30cm [one foot]

- 3 - Add compost, sand and ashes in the following ratios: 2-3 wheelbarrows of sand per each per wheelbarrow of compost, wheelbarrow of soil, and 6 Kg of ash.
- 4 - Mix the soil, compost, sand and ashes and then smooth it into a bed with rakes to be slightly elevated above the nearby ground level.
- 5 – The location should contain shadowed sunlight.
- 6 - Put the seeds in small canals and cover the seeds with soil only 0.5 cm.(1/4 inch) and a light layer of leaves.
- 7 – When the seeds have germinated remove the leaves.
- 8 - Once the seedlings or trees with two to three leaves form, they will be ready to be moved into the secondary nursery, or from the nursery to the field if rains have begun and the seedlings are planted immediately and are well protected and weeded.

#### Secondary nursery - Steps to follow

- 1 - Mix the soil in the following ration: 2 parts soil, 5 parts mulch, 1 part sand, and 0.1 part ash.
- 2 - The nursery seedlings need to be planted and grown to at least five leaves. The secondary nursery is also a good place to plant tree cuttings which can be grown in sheaths.
- 3 - Seedlings should be moved into sheaths which are moist, arranged in rows in the bed and not watered for 2-3 days as the roots take hold.
- 4 – The transplanting exercise should be done in the evening, not on a day which has strong sunlight.

#### Managing the nursery:

The nursery is a separate area for growing seedlings. This area must be able to have irrigated water. The purpose of a garden is to create an environment that enables seedlings to reach the point of relocation ready for production.



## **How Food Security committees can ensure food for the village poor, and serve to bring a change in the village**

Committees for rural food security have significance such as the following:

1 – They manage food development initiatives, including trainings, and review the implementation of food related work. Therefore they are required to know the

procedures used for any initiatives, to coordinate them and keep people accountable.

2 – They receive and analyze requests for assistance that should be given support such as building wells or food stores for alternative food storage. They help in the selection of village volunteers such as chicken vaccinators and farmer trainers. Having chosen them, the committee may be a link with the responsible district staff, (e.g., veterinary officer). They may visit village volunteers individually if possible, to get a report on their activity to see if they really deserve to continue or need support.

3 - Each member of the committee shall have the responsibility to identify needy families, assist in the care of beneficiaries of any food aid, for those who are close to them, and thus to provide information about their progress in the meetings of the committee.

4 – The Committee members attend meetings at least three times a year, and visiting some of the villagers at least three times a year.

5 – They recommend ways to increase development among the villagers in order to sustain themselves and increase food security.

6- They strengthen cooperation of villagers and external actors so that they can sell food produced or processed together, look for the key drugs for poultry vaccines, oversee the delivery and use of materials provided by external actors, safeguard marketing of produce, and channel various material assistance for the activities of the villagers.

7 – They identify markets for product, e.g., poultry and products.

8 – They encourage the villagers to cooperate with veterinary department or other relevant departments so that they can learn and implement various techniques of modern farming.

9 – They collect donations from villagers for the development and management of a community food security initiatives.

10 – They ensure the proper use of donations and other income of the committee.

11 – They ensure that the vulnerable among village households are linked to charities or caregivers, or are given a priority in the services provided, as well as ensuring orphans to enable them to attend school.

12 – They take appropriate action against the villagers who violate village by-laws.

13 – They take legal action against a villager who sabotages the committee initiatives.

14 – They prepare project progress reports for the village office and other stakeholders if needful.

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