

Mazingira Bora



TIST

The International Small Group & Tree Planting Program
www.tist.org

English Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Some of the members of Karima Ka Mbica Child Cluster. They are leading other community members in protecting and conserving a nearby Water Catchment Area.

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Benefits from Protecting Our Rivers

Planting more Indigenous and water friendly trees.

TIST Small Groups are happy for the success in the riparian pilot program initiated by TIST to help conserve and protect our waterways. Farmers are choosing to stop cultivating near the river's edge to stop erosion and pollution of the river. Today, we have framers who have continued planting indigenous trees in their riparian areas and are following best practices for riparian areas. We are proud of their accomplishments and celebrate their work to conserve the rivers that we all depend on.

What are the benefits of indigenous trees in riparian areas (along the riverbanks)?

- (a) Indigenous trees reduce soil erosion and flooding.
- (b) Indigenous trees help to clean water in rivers, streams and wells.
- (c) Roots of indigenous trees catch and retain soil.
- (d) Indigenous trees help clean air.
- (e) Indigenous trees produce shade for preventing water evaporation.
- (f) Indigenous trees provide habitat and food for birds, animals, and insects. Preserving this biodiversity in this way can benefit our farms since, for example, some animals are important for pollinating crops and controlling pests.

Why is it important to conserve river buffers?

- (a) Plants and trees in a buffer along rivers keep the environment clean and secure as the soil fertility remains intact all year round.
- (b) Plants and trees in a buffer along rivers reduce waterborne diseases.
- (c) Increases fish in rivers due to clean water without pollution.

What are your successes? What advice do you have for your neighbors along the riverbanks?

- a) We have qualified to be riparian members.
- b) We have received an extra Payment for Environmental Services (PES) for our work.
- c) We have eliminated eucalyptus in the riparian areas.
- d) We have improved the quality and quantity of water in rivers and streams.
- e) We advise our neighbors to be kind to those others who are in lower parts of the river, and to protect the river so these others can also get clean water.

Their own grove will also remain secure from soil erosion when they plant trees and follow these best practices.

Karima Kambicha TIST Cluster: Protecting our Water catchment Areas and Reaping Biodiversity Benefits.

Prepared by John Kimathi, Cluster Servant.

We, Karima Kambicha TIST Cluster, are a child cluster that was started on August 2014 with 28 Small Groups. Today, we have planted more than 35,000 trees and 25,000 of those trees have been quantified.

As we continue to participate in TIST, we have gained tremendous knowledge and awareness about our environment. Until recently, members and the local community have been our animals around Kathima Catchment area. This contributed to degradation of this catchment area, hurting the water sources for us and people downstream.

Our Cluster took the lead in involving other community members to rehabilitate and conserve this watershed. Our Cluster leaders, Mr. Robert Mbaya, Daniel Kigunda and Josephine Nyoroka provided the necessary leadership in mobilizing resources, community goodwill and the necessary labor need to plant more than 1,000 indigenous trees.

We are proud that this effort will not only restore our environment and biodiversity but also assure our children and generations to come a sustained environment for their benefit too.



Mazingira Herbal Small Group Enjoying the Benefits from TIST Best Practices.

Prepared by Peter Mithiru, Cluster Servant.

TIST farmer, Mr. Dickson Kamau, belongs to the Mazingira Herbal Small Group of Salama Cluster in Nyahururu. His Small Group joined TIST in May 2008 with 6 members of four women and two men.

So far, Dickson's Group has planted more than 2,000 trees of which 90% are indigenous. He chose to plant indigenous trees following TIST trainings and understanding the benefits of indigenous trees.

He says, "I started planting indigenous trees from the year 2009 and through TIST trainings I learned Best Practices on tree nurseries, transplanting and taking care of my trees." In his grove, Dickson has a variety of indigenous trees such as *Prunus Africana* (484), Red cedar (404), *Warbugia Ugandensis* (331), and *Olea Africana* (557).

Today, Dickson says that he has begun learning the medicinal benefits of the trees. "I never realized that these trees have a high demand for medicine. Today many people seek my help to offer them leaves, barks, or roots. A Herbalist has approached

me to buy", he says.

Dickson's future plans are to set up beehives in his groves to continue adding more value and benefits. He also intends to plant more trees, especially fruit trees in his other part of the farm. Already, he has established a tree nursery with mangoes and avocado seedlings.

Besides receiving the benefits from TIST Best Practices, Dickson's Group has also received tree payments. "We are happy to have joined TIST!"



Dickson Kamau in his indigenous tree grove.

Soil Fertility

Get the most Benefits out of your Land.

What is soil?

Soil is the uppermost layer of the earth. It contains air, water, organic matter and mineral matter.

How is Soil formed?

The weathering (breakdown) of rocks provides the minerals needed to support plant life. Plants are then added to the soil as organic matter. As more rock is broken down and more organic matter is added, so more water can be held in the soil, further promoting plant growth.

Why is organic matter important?

Organic matter (mainly formed through the decomposition of plant material) releases a lot of nutrients, which are available for uptake to new plants. It also supports the life of beneficial microorganisms in the soil, helps with water infiltration and helps to bind the soil together.

What determines the type of soil found?

- *The climate:* both the temperature and water availability affect the rate of weathering of rock.

- *Organisms:* bacteria, fungi and worms amongst many others live in the soil. Some play a key role in mixing the soil, such as earthworms. Soil organisms help decompose organic matter, and some help plants to fix nitrogen (e.g. *Rhizobium* bacteria).
- *Topography:* the shape of the land. For example, soil on slopes is generally thinner and more easily eroded than the soil found collected in valleys.
- *Parent material:* the type of rock the soil is formed from.
- *Human behavior:* the way we use and care for our soil (or not) will greatly affect its fertility.

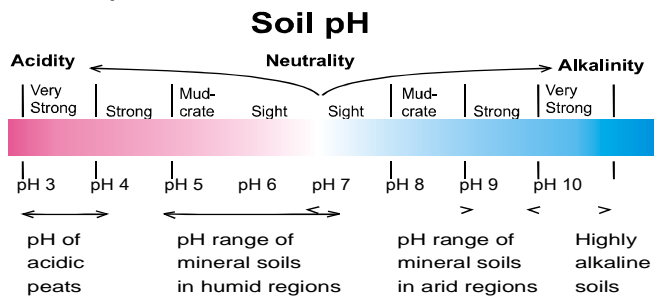
The texture of the soil you have depends on how much sand, silt and clay it is made from. The diagram on the following page shows you the main categories of soil texture. The texture of the soil and structure influence how easily roots can penetrate the soil, and how much water can be retained.



Why is soil pH important?

How acidic or alkali a soil is (its pH) affects how available soil nutrients are for plant uptake and what type of soil organism life can be supported. Generally, most soil nutrients are more soluble (and therefore available for plant absorption) when in an acidic soil compared to a neutral or alkaline soil.

However, if the soil is too acidic many bacteria cannot grow, and this will affect the rate of decomposition of organic matter. Most good top soils have a pH between 5.5 and 7.5 and are relatively dark in color.



What is a fertile soil?

A fertile soil is one that has an available supply of all the nutrients needed to support plant life.

- *Primary nutrients:* nitrogen, phosphorus, potassium
- *Secondary nutrients:* sulphur, magnesium, calcium
- *Micronutrients:* iron, manganese, boron, chlorine, zinc, copper, molybdenum, nickel

Strategies to improve soil fertility

- Consider adding nitrogen (in the form of green manure from nitrogen-fixing plants) and phosphorus (in the form of rock phosphate).

- Collect and use livestock manure and urine. This is better in composted form. Fresh sources may contain too much ammonia content (which may harm plants) and may contain higher amounts of pathogens (disease-causing organisms). Composted manure contains fewer pathogens. If you do use fresh manure, use moderately and leave a minimum of two months in between applications.
- Add organic matter through composting (details below).
- Practice conservation agriculture best practices as described in previous units:
 - Crop rotation
 - Intercropping
 - Agroforestry
 - Planting leguminous cover crops
 - Leaving land fallow
 - Use of mulch
 - Using conservation farming holes
 - Reduce water erosion through tree planting, terraces, fanya juu
- Consider intercropping with Pigeon pea (*Cajanus cajan*), Dolichos lablab, Mucuna pruriens, Crotalaria, Canavalia.
- Consider adding ash, which is rich in calcium and potassium carbonate.
- Add lime if you know your soil is too acidic
- It is best not to add additional minerals (apart from those found in compost) without testing the soil first to see what nutrients and minerals are actually needed.

There may be some circumstances when you need to apply inorganic chemical fertilizers. Use accordingly to the manufacturer instructions and research which ones are most ecologically sound for your area through getting advice from your extension officers.

Nitrogen	Phosphorus (P ₂ O ₅)	Potassium (K ₂ O)
<ul style="list-style-type: none"> • Leguminous crops that are used as green manures or as mulch provide between 20 to 80 kg N / acre which can be used by subsequent crops. • Blood meal / feather meal 12-15% N. They are applied directly to the crops. • Uriness from all species contain pure urea (up to 1% N). It is not a stupid idea to urinate on the compost heap! • Poultry manure 8-20 kg N/t • Pig manure 3-5 kg N/t • Goat / Sheep manure 2-4 kg N/t • Cattle manures 2-3 kg N/t • Compost * 1 kg N/t • Manure teas and plant teas provide easily available nitrogen and can be used as top dressing or foliar feeds 	<ul style="list-style-type: none"> • Rock Phosphate 20-33% • Bone Meals 12-25% • Poultry manure 10-25 kg N/t • Pig manure 3-6 kg N/t • Goat / Sheep manure 2-5 kg N/t • Cattle manures 2-3 kg N/t • Compost * 4 kg N/t 	<ul style="list-style-type: none"> • Wood Ash 3-7% • Goat / Sheep manure 12 kg N/t • Cattle manures 5-12 kg N/t • Poultry manure 5-12 kg N/t • Compost * 6 kg N/t • Pig manure 3-7 kg N/t • Urines: 1-3 kg N/t
Content of purely vegetative compost. If compost is prepared with livestock manures, rock phosphate and wood ash, the product will have higher nutrient contents. Nutrient contents of manures and composts are highly dependent on handling and storage and on feed quality!		

Composting

Compost manure is a natural fertilizer to help your crops grow. It is better than chemical fertilizer because it is natural and has no damaging effects to the crops and environment. Composting is one of the easiest, cheapest and most effective ways of improving soil fertility.

What can be used for compost?

- Crop residues, weeds, dead leaves, any trimmed vegetation, manure and urine from livestock, bedding from livestock, kitchen food waste from fruit and vegetables, ash, shredded paper and cardboard.
- Don't use meat, dairy products, fats, oils, metal or plastic.

**General best practices for composting:**

- Choose a shaded area for your compost
- Cover with banana leaves or a plastic sheet
- Sprinkle with water during the dry season
- Protect from rain (which will wash nutrients away)
- As a general guide aim for:
 - One third 'green vegetation' (grass clippings, fruit, vegetables, egg shells, nut shells, manure, weeds, or plants)
 - One third 'brown vegetation' (dry leaves, straw, sawdust, cardboard and fine crop residues)
 - One third bulky material such as chopped branches and larger crop residues.
 - Ensure you use plant material that has not yet seeded, and do not use diseased material
 - Layer the materials in a pile or in a hole. Air is needed for compost, so mix the materials together and do not compact the material down
- Water the pile of material, cover and leave so that material decomposes over the next couple of months. You can occasionally mix the material.
- If the material becomes slimy or smelly over time it may be too wet or have too much green vegetation. Add more brown vegetation if this is the case, and mix.
- Try to have your batch of material ready for mixing, watering, covering and leaving 2-3 months before the rainy season so it will be useful for the planting season.
- The compost should be brown and crumbly when ready. You can sieve the material to get a finer mixture, and add the larger pieces back into the compost pile for the next batch.

Some of the TIST groups use a more specific

method, which they have found effective. They have described the process below:

Preparation of compost manure by some TIST groups:

- 1) Choose an area 4m x 4m for your compost pit
- 2) Clean the area
- 3) Dig a hole of diameter 3 - 4m and 1.5m deep
- 4) Collect all the remains of the crops you have and cut them into small pieces. (e.g. the leaves and stalks of maize, millet, beans)
- 5) Put these crops remains into the hole up to a depth of 0.5m
- 6) Then add 5 liters of ash
- 7) Next add about 30cm (or as much as available) of animal dung (e.g. dung from pig, cow, goat or chicken)
- 8) Next put another layer of crop leaves and stalks (0.5m)
- 9) Add another 5 liters of ash
- 10) Add the leaves and stalks again until the hole is almost filled
- 11) Finally, add a layer of soil until the hole is filled
- 12) While filling the hole with soil, put a long stick in the middle of the hole so it reaches the bottom.
- 13) Leave the compost pit for 90 days (3 months)
- 14) During this period use your dirty water to water the compost pit. For example, after cleaning your house or clothes, empty the used water over the compost pit. If you have animals you can also pour animal urine over the pit.
- 15) Try to water the compost pit in this way every day, or whenever water is available.
- 16) After 90 days the manure will be ready. Use the stick as a thermometer – when the compost is ready it should be hot and you may even see steam coming from the stick after you have removed it.

TIST: Avocados can give you good income.

As extracted from *The Organic Farmer* (<http://www.theorganicfarmer.org/profile/2>) and Jürgen Griesbach, 2005: *Avocado growing in Kenya*. ICRAF (World Agroforestry Centre), Nairobi, Kenya.

Avocado is an important commercial fruit in Kenya both for local and export markets.

There are three main types of avocado trees, which are suitable for different altitudes. Check which avocado varieties do best under your specific local conditions. Using seeds or grafted trees from healthy and vigorous local trees and from local nurseries is recommended, such trees will be more likely to do well at your site.

Seedling production.

Seeds are collected from healthy mother trees and healthy, mature fruits. The extracted and cleaned seeds can be dipped into a fungicide solution and are then planted into seedbeds or into perforated polythene bags. Shade is important for germination. When seedbed seedlings are 20 cm high and have 2 pairs of well-developed leaves, they are uprooted, culled and transplanted into containers.

Grafting can be done after about six months. Grafted trees remain smaller and start flowering earlier (at 3 to 4 years after planting into the field) than ungrafted seedlings. The small trees will be ready to be transplanted into the field about three to four months after they have been grafted.



Tree planting and establishment.

Soils should be deep, fertile and well aerated. Avocados do not like poorly drained, heavy soils and flooding or high water tables, and they will also not tolerate salty or very acidic conditions. The most favorable planting time is at the beginning of the rainy season. Spacing between trees lies between 6 and 10 m, depending on soil fertility, climate, and variety. Planting holes are usually dug two feet wide and two feet deep, making sure to break hard pans and to allow good drainage and undisturbed root development. The excavated soil can be mixed with manure, compost and rock phosphate if available. Plant the seedlings carefully without damaging the roots at the same depth as it was in the container. Build a basin from soil around the tree for better irrigation and water harvesting. After planting, seedlings must be irrigated immediately. Use 5 to 20 liters of water depending on the size of the seedling. Mulching can be very beneficial as it reduces moisture loss and controls weed growth. Irrigation will be necessary for some time. Another important measure is to protect each seedling against livestock and wild animals.

Irrigation of fruit trees.

Irrigation is important during several stages of tree development and the fruiting cycle. During the first months of establishment, but also later during their first years of growth, trees must be checked frequently and irrigated when they show symptoms of water requirement. Avocados develop long tap roots, but depending on the climate they may need some additional irrigation, especially during prolonged dry spells. During flowering, fruit set and fruit development sufficient moisture is critical for good fruit development.

Fertilization.

For good productivity, it is beneficial to support avocado trees with manure regularly. Between 5 and 20 kg of fertilizer can be given per tree and per year. Be careful with nitrogen – it promotes leaf growth but not flowering, and avocado roots are sensitive to high salt concentrations in the soil. Phosphorous is usually also necessary, and potassium is important for mature trees that bear fruit.

Pests and diseases

Preventive measures are central so choose an appropriate and fertile site, plant at reasonable distances, choose healthy varieties, control weeds, use mulch, do not over fertilize, and irrigate when necessary. Pests are usually not a problem in avocado production in Kenya. Use neem products, pyrethrum preparations, or tephrosia extracts etc. against insect pests such as fruit moths, thrips or scales if the damage is severe.

The following diseases can be serious:

Avocado root rot: (a Phytophthora fungus disease) Trees produce sparsely, and they have fewer leaves, which are pale and wilted. Branches are sunburnt and die back. Roots decay and the whole trees die prematurely. Affected trees should be uprooted and destroyed. Hot water treatment

and fungicide treatment of seeds for seedling production are generally recommended as a preventive measure. There are two chemicals registered against this disease - Ridomil and Aliette.

Anthracnose: Fruits develop dark brown, dry spots. Young fruits may drop, but in more mature fruits, the infection remains hidden until the fruit is harvested and ripens. Usually, copper-based fungicides are used against Anthracnose.

Cercospora fruit spot: Small, pale yellowish spots appear on the fruits and leaves. Later, they turn brown and crack, making it easy for other organisms to attack the fruits. This disease is also controlled with copper-based fungicides.

Fruit drop: Fruit drop is not a disease and is common for many fruit species. Trees drop excess fruits that they will not be able to nourish until maturity. Avocados drop excess fruits when they are pea-sized, and a second time when they have reached the size of an egg.

Harvesting avocados

Grafted trees usually start to flourish and bear fruit 3 to 4 years after they have been planted in the field.

There are some indicators of approaching maturity:

- In dark varieties, there is a change in color from green to black or purple.
- On green varieties, the fruit stems turn yellow, the skin may appear less shiny, or the end develops rust-like spots.
- Some varieties develop a whitish appearance.
- Fruits that float on the surface when immersed into water are usually mature.

Markets

Handle all avocados with great care! Export markets, especially the European market, have very strict quality requirements which smallholders may find difficult to meet. Local markets are less complicated but also tricky, because avocados tend to mature all at the same time, making it unprofitable for farmers to sell them. It is almost impossible for farmers to store or process avocados. Commercial avocado growers must therefore be linked closely to a good market.

Common avocado varieties:

1. **Hass and Fuertes:** These two varieties are used as scions (upper parts of grafted fruits). They are popular because of their high oil content.
2. **Puebla:** Used as rootstock by many farmers as it has no fiber and is resistant to diseases.
3. **Singapore:** This is a new variety that is fast growing and reaches maturity in 14 to 15 months. It grows to a height of 2 ft.
4. **G5 and G6:** These two varieties are popular as they can do well in both highlands and lowlands. They can be grafted with all the other varieties to improve fruit quality.

Farmers are advised to buy seedlings from certified seedling producers.

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Kimereu Version

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Some of the members of Karima Ka Mbica Child Cluster. They are leading other community members in protecting and conserving a nearby Water Catchment Area.

Inside:

Baita kumania na umenyeeri bwa nduujji gukurukira kuanda miti ingi imingi ya gintwire na iria ikaraganagiria bwega na ruuji. *Page 2*

Cluster ya TIST ya Karima Kambicha: Kumenyeera ntuura iria ciri biumo bia nduujji na guketha baita kumania na gukaranira kwa imera na nyomoo cia mithemba mwanya. *Page 2*

Gikundi gikinini kia Mazingira Herbal
Nigikugwirirua baita kumania na mitireiria miega ya kuthithia mantu ya TIST. *Page 3*

Unoru bwa muthetu Gwata baita cionthe iria ciumba kumania na munda jwaku. *Page 3*

TIST: Mabukandu nojalete mbecha inyingi. *Page 5*



Baita kumania na umenyeeri bwa nduuj gukurukira kuanda miti ingi imingi ya gintwire na iria ikaraganagiria bwega na ruuji.

Ikundi bibinini bia TIST birina gikeno mono niuntu bwa kuumbana gwa muradi jwa kwambiria umenyeeri bwa nteere cia nduuj juria jwambirirue ni TIST jutegete gutethia gwika na kumenyeera nduuj cietu. Arimi nibagutaara gutiga kurima akui na nduuj nikenda batigithia gukamatwa kwa muthetu na kuthukua kwa nduuj. Narua rurina arimi baria betite na mbele kuanda miti ya gintwire ndene ya ntuura ciao iria ciankene na nduuj na nibagutumira mitire iria miega buru ndene ya ntuura iji. Nitugwikumiria mono mantu jaria boombite kuthithia na gukenera ngugi ciao cia umenyeeri bwa miuro iji iria twinthe tutumagira.

Baita cia miti ya gintwire nterene cia nduuj ni iriku ?

- Miti ya gintwire ninyiagia ukamati bwa muthetu na kuigara kwa ruuji.
- Miti ya gintwire nitethagia kutheria ruuji ndene ya miuro iminene, iminini na ithimene.
- Miri ya miti ya gintwire nigwatagia na ikarikia muthetu.
- Miti ya gintwire nitethagia kutheria ruugo.
- Miti ya gintwire niejanaga kirundu kana kithiiki kiria kiebagia gukamatwa kwa ruuji ni riuu
- Miti ya gintwire niejaga nyoni, nyomoo na tunyomoo antu a gutuura. Gwika gukaranja kwa imera na nyomoo cia mithemba mwanya na njira iji no kue miunda yetu baita nontu, mung'uanano, nyomoo imwe cirina bata kiri guciarithia imera na kunyiyia tunyomoo turia

tuthukagia imera bietu.

Niki burina bata kumenyeera antu aria kuthiurukite miuro?

- Imera na miti iria iri antu au niikaga aria kuthiurukite kuri atheru na kumenyeera ati unoru bwa muthetu burio mwaka junthe.
- Imera na miti antune aja nterene cia nduuj ninyiagia mirimo iria igwatagwa kumania na nduuj.
- Nikwongagira makuyu miurone niuntu bwa ruuji rurutheru niuntu rutikuthukua.

Ni mantu jariku umbite kuthithia? Niatia umba kwatha aturi baku baria bari nterene cia nduuj?

- Nituumbite gutonyithua murandine juju jwa kumenyeera nteere cia nduuj.
- Nituriitwe mbece ingi niuntu bwa ngugi cietu cia jakumenyeera naria gututhiurukite (PES)
- Nituritite mibau yonthe buru miundene yetu iria yankene na nduuj.
- Nituthongometie utheru na wingi bwa ruuji ndene ya nduuj cietu inene na inini.
- Nituathaga aturi betu kwithirua babui kiri baria bari nturene cia bwagaiti cia ruuji, na kumenyeera muuro juju nikenda baba kinyabo bakinyirwa ni ruuji rurutheru.

Miunda yao kinyayo ikebera ukamati bwa muthetu baanda miti na bathingatira mitire iji imiega.

Cluster ya TIST ya Karima Kambicha: Kumenyeera ntuura iria ciri biumo bia nduuj na guketha baita kumania na gukaranira kwa imera na nyomoo cia mithemba mwanya.

Ureteri ni John Kimathi, nthumba ya cluster.

Batwi, cluster ya TIST ya Karima Kambicha, turi cluster inini iria iumanitie na cluster ingi na iria yambiririe mweri jwa inana 2014 irina ikundi bibinini mirongo iiri na banana. Narua, nituandite nkuruki ya miti ngiri mirongo ithatu na ithano na imwe ya iu, miti ngiri mirongo iiri na ithano nitari.

O uria tugwita na mbele ndene ya TIST, nitwitite na mbele kugia umenyo bubwingi na umenyeeri bwa naria gututhiurukite. Mwanka rua mono, amemba na aturi nibarithagia ndithia ntuurene iji ya biumo bia nduuj ya Kathima. Untu bubu buratumite ntuura iji yathuukua, na biumo bibi bietu na bia baria bari

bagwaiti bia nduuj biagitarua.

Kucokeria na gwika antu aja aria nduuj ciumaga. Atongeria ba cluster yetu, Robert Mbaya, Daniel Kigunda na Josephine Nyoroka nibajukiria utongeria buria bwendekaga kiri gucwa na kuritithia ngugi into, wendo bwa ntuura na ariti ngugi baria bendekaga kuanda miti ya gintwire ingi ngiri.

Nitugwikumiria ngugi iji iria iticokaniria naria gututhiurukite na gukaraniria kwa imera na nyomoo cia mithemba mwanya amwe aki, indi ikaa aana betu na nthuki ingi iria ikeja antu gukuumbika niuntu bwa baita yao kinyabo.



Gikundi gikinini kia Mazingira Herbal Nigikugwirirua baita kuumania na mitireiria miega ya kuthithia mantu ya TIST.

Ureteri ni Peter Mithiru, Nthumba ndene ya cluster.

Murimi wa TIST, Dickson Kamau, ari ndene ya gikundi gikinini kia Mazingira Herbal kia cluster ya Salama ndene ya Nyahururu. Gikundi kiawe giatonyere TIST mweri ja itano 2008 kirina amemba batantatu, aka banna na arume bairi.

Gukinyira nandi, gikundi kia Dickson ikiandite nkuruki ya miti ngiri ijiri gicunci kenda kiri ya ikumi kiri miti ya gintwire. Atarire kuanda miti ya gintwire akurikia gukurukira moritani ja TIST na kumenya baita cia miti ya gintwire.

Akauga, "Ndambiririe kuand amiti ya gintwire kuuma mwaka jwa 2009 na gukurukira moritani ja TIST nindamenyere njira iria njega buru cia minanda ya miti, kuthamiria muundene na kumenyeera miti." Muundene jwawe, Dickson arina miti ya mithemba mwanya ya gintwire ja as *Prunus Africana* (miti magana janna ja mirongo inana na inna), Red cedar (magana janna na inna), Warbugia Ugandansis (magana jathatu mirongo ithatu na jumwe), and *Olea Africana* (magana jatano mirongo itano na mugwanja).

Narua, Dickson ariuga ati nambiritie kuthoma kwegie baita cia kindawa cia miti iji. "Ntamenya ati miti iji nitagua mono niuntu bwa ndawa. Narua antu babaingi nibejaga gucwaa utethio bwakwa bwa mathangu, ikonde na miri. Muntu umwe uria

uthithagia ndawa cia miti nambonete kenda mwenderia," akauga.

Mibango ya Dickson ya ntuku iria cijite ni gwika maugu ndene ya miunda yawe na gwita na mbele kuongera utonga kuumania na miunda iji na baita. Nabangite kinya kuanda miti ingi, mono mitunda ndene ya rutere rungi rwa munda. Gukinyira nandi, nambiritie munanda jwa miembe na mibukandu.

"We are happy to have joined TIST!" Amwe na gukinyirwa ni baita kuumania na gutumira mitire imiega nkuruki ya TIST, gikundi kia Dickson nigikinyairwa ni marii kuumania na kuthambia ruugo.



Dickson Kamau ndene ya munda jwawe jwa miti ya gintwire.

Unoru bwa muthetu

Gwata baita cionthe iria ciumba kuumania na munda jwaku.

Muthetu nimbi?

Muthetu ni gicunci kia iguru buru kia nthi. Jwithagirwa jurina ruugo, ruuji, biria biorete na kinya mineral.

Muthetu juthithagua atia?

Kunangwa kwa maiga nikuejanaga mineral iria ciendekaga kiri imera nikenda bitigakue. Imera riu nibiongagirwa muthetune niuntu nibioraga na bikathuthurukanga. O uria maiga jamaingi jakuunikanga nou imera bibi biori bikwongereka, nikenda ruuji rurwingi nkuruki rumba gwikwa ndene ya muthetu, na kwou rumba gwitithia na mbele gukuria imera.

Niki into bibi biori birina bata?

Into bibi biori (mono kuumania na kwora kwa imera) nibiritaga irio bibingi, biria biithagira birio niuntu bwa imera bibieru. Kinya nibiikaga tunyomoo turia turi baita ndene ya muthetu, bigatethia ruuji gutonya muthetune na kinya bigatethia muthetu kugwatana amwe bwega.

Nimbi yugaga muthetu juria jurio ni jwa muthemba juriku?

- *Rera:* Murutira na ruuji ruria rurio niruugaga mpwi ya iiga ya kuunikanga
- *Tunyomoo:* Tunyomoo tumwe nituritaga ngugi ya bata ya kuungania muthetu ja mang'ionyo jaria jetagwa earthworms. Tunyomoo twa muthetu nitutethagia kworia imera na nyomoo na tungi nitutethagia gwikira nitrogen ndene ya muthetu (ja *Rhizobium bacteria*).
- *Uria muunda jukari:* Mung'uanano, muthetu kibarine ni jumuceke na jukamatangagwa nkuruki ya muthetu juria jwithagirwa juri miurone.
- *liga riria juumenie nario:* muthemba jwa iiga riria muthetu juumite.
- *Mathithio ja antu:* uria tutumagira na kumenyeera muthetu jwetu gukauga unoru bwaju.

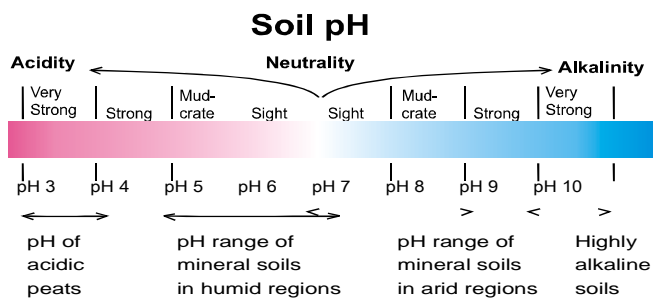
Uumo kana woro bwa muthetu jwaku bulinganaga nani muthanga, muthetu jumworo jwa silt kana jwa clay jung'ana juri muthetune jwaku. Mbicha iji ithingatite igakwonia ikundi mwanya bia woro kana



uumo bwa muthetu. Woro kana uumo bubu na uria muthetu jukari niyo jatumaga miti yumba na iremwa gutonya muthetune na uuthu na kinya ruuji ruria rumbaga gwikwa muthetune.

Niki pH ya muthetu irina bata?

Acidi kana alkali iria iri kiri muthetu (PH yaju) niugaga kethira irio birio niuntu bwa imera nani tunyomoo turiku muthetune tukoomba gutuura. Jaria maingi irio bia muthetu nibitonyaga ruujine (na kwou imera nobibijukie bikijukia ruuji) riria muthetu jurina acidi nkuruki ya riria jukiri kii kana juri alkaline.



Indi, kethira muthetu jurina acidi inyingi mono bakteria inyingi itiumba gukura, na bubu bukanya kwora kwa imera na nyomoo. Mithetu imiega ya iguru imingi iri PH ya 5.5 gwita 7.5 na niimiru (rangi)

Muthetu jumunoru ni juriku?

Muthetu jumunoru ni juria jurina irio bionthe biria bikwendeka niuntu bwa imera gutuura bing'ani

- *Irio bia bata nkuruki:* nitrogen, phosphorus, potassium .
- *Biria bitethagiria:* sulphur, magnesium, calcium
- *Irio biria biendekaga bibikai:* iron, manganese, boron, chlorine, zinc, copper, molybdenum, nickel.

Kuongera unoru bwa muthetu

- Thugania kwongera nitrogen (mboleo itiumi kuumania na imera biria biikagira nitrogen muthetune) na Phosphorus (rock phosphate).
- Uthurania na utumire ntaka ya ndithia na maumago. Ni injega nkuruki yathithirua kirinyene. Mboleo itiumi no ithirwe irina amonia inyingi mono (iria iumba kugitaria imera) na noithirwe iri tunyomoo turia turetaga mirimo tutwingi. Watumira ntaka itiumi, tumira inkai na ukare mieri nkuruki ya iiri mbele e wikira yo kairi.
- Ongera mati gukurukira gwika kirinyene (ja uria ukwirwa aja nthi)
- Tumira mitire iria miega bubu ya urimi bubwega ja uria wathiri jamaingi kanyuma au:
 - Kugarurania imera
 - Kuanda imera biungene
 - Kuungania miti na imera
 - Anda imera biria bicokagia nitrogen muthetune biri bia gukunikira nthi
 - Tiga muunda jutiandi
 - Gukunikira muthetu
 - Tumira marinya ja kilimo hai
 - Nyiyia ukamati bwa muthetu gukurukira kuanda miti, kwinja mitaro
- Thugania kuandaniria Pigeon pea (Cajanus cajan), Dolichos lablab, Mucuna pruriens, Crotalaria, Canavalia.
- Thugania kwongera muju, juria jurina calcium na potassium carbonate na wingi.
- Ongera lime kethira nwiiji muthetu jwaku jurina acidi inyingi
- Ni bwega nkuruki kurega kwongera minero ingi (nkuruki ja iria ciithagirwa ciri mboleone) utithimite muthetu jwaku kwona ni irio na minero iriku cikwendeka.

Magitene jamwe no witie gwikira fertilizer ya nduka.

Nitrogen	Phosphorus (P ₂ O ₅)	Potassium (K ₂ O)
<ul style="list-style-type: none"> • Leguminous crops that are used as green manures or as mulch provide between 20 to 80 kg N / acre which can be used by subsequent crops. • Blood meal / feather meal 12-15% N. They are applied directly to the crops. • Uriness from all species contain pure urea (up to 1% N). It is not a stupid idea to urinate on the compost heap! • Poultry manure 8-20 kg N/t • Pig manure 3-5 kg N/t • Goat / Sheep manure 2-4 kg N/t • Cattle manures 2-3 kg N/t • Compost * 1 kg N/t • Manure teas and plant teas provide easily available nitrogen and can be used as top dressing or foliar feeds 	<ul style="list-style-type: none"> • Rock Phosphate 20-33% • Bone Meals 12-25% • Poultry manure 10-25 kg N/t • Pig manure 3-6 kg N/t • Goat / Sheep manure 2-5 kg N/t • Cattle manures 2-3 kg N/t • Compost * 4 kg N/t 	<ul style="list-style-type: none"> • Wood Ash 3-7% • Goat / Sheep manure 12 kg N/t • Cattle manures 5-12 kg N/t • Poultry manure 5-12 kg N/t • Compost * 6 kg N/t • Pig manure 3-7 kg N/t • Urines: 1-3 kg N/t
<p>Content of purely vegetative compost. If compost is prepared with livestock manures, rock phosphate and wood ash, the product will have higher nutrient contents.</p> <p>Nutrient contents of manures and composts are highly dependent on handling and storage and on feed quality!</p>		

Ikira kulingana na uria muthithia aandikite na urie afisa ba urimi ni iriku ciri injega kiri ntuura yaku.

mboleo iji ni njira imwe ya iria mbuthu, itina goro na injega ya kwongera unoru bwa muthetu.

Kuthithia mboleo

Mboleo ya kuthithia na imera ni fertilizer ya kuumania na into bitina ugwati ya gutethia imera biaku bikura bwega. Ni injega nkuruki ya fertilizer cia nduka niuntu icithithitie yongwa na itina ugwati kiri imera na kiri naria kuthiurukite. Kuthithia

Nimbi yumba kuthithia mboleo?

- Matigari ja imera, iria, mathangu jamoomu, imera biria bigiti, mboleo na maumago ja ndithia, mati jaria ndithia imamagira, matigari ja irio kuuma riiko na manyani, muju, maratati jagitangi na kandibodi



- Ugatumira nyama, into kinya biriku kuumania na ndithia, maguta jamomu kana ja ruuji, sikerebu kana mikebe ya mibira.

Mitire iria miega buru ya kuthithia mboleo ya imera:

- Taara antu kurina kirundu gwa gwika int bibi biri au iguru
- Kunikira na mabura kana kiratasi kia nailoni
- Ikiira ruuji igitene ria uumo
- Karia kuumania na ngai (iria yumba gukamata irio biria bikwendeka)
- Ja mutaratara tegera ati:
 - Gicunci kimwe kiri bithatu ni imera bitinyaari (manyaki, matunda, nyani, makonyo ja nkara, makonyo ja nkandi, mboleo kuumania na ndithia, maria, imera)
 - Gicunci kimwe kiri bithatu ni “imera binyaari (mathangu joomi, nyaki injumu, sondasti, makandibondi na matigari ja imera warikia guketha)
 - Gicunci kimwe kiri bithatu ni into bibirito ja biang’i bigitangi na matigari jamanene ja imera.
 - Menyeera ati uritumira imera biria bitirathithia mbeu na ugatumira imera biria biajitu.
 - Rikanira into bibi amwe kana kirinyene. Ruugo nirwendekaga kuthithia mboleo iji, kwou urugania into bibi amwe bwega na ukamamiria into bibi mono.
- Ikiira ruuji, ukunikire na urekane nabio mieri imikai nikenda into bibi bikoora. No uruganie into bibi o igita nyuma ya igita.
- Mboleo iji yeja gutendera kana kununka no ithirwe irina ruuji rurwingi mono kana ithirwe irina into bitiumi bibingi mono. Ongera imera bibiumu gwakarika ou na uruganie.
- Geria into biaku biithirwe biri tayari kuunganua, gwikirwa ruuji, gukunikirwa na gwikwa mieri iiri kana ithatu mbele ya mbura yambiria nikenda igatethia igitene ria kuanda.
- Mboleo iji ibati kwithirwa iria ya rangi ya

muthetu na ikiunikang’aga riria iri tayari. No ucunke mboleo iji nikenda wona iria iunikangi bwega, na wongere jau manene kirinyene nikenda ija gutumirwa riu ringi.

Bimwe bia ikundi bia TIST nibitumagira njira imwe iria boonaga igitaga ngugi. Nibaejene matagaria jaja:

Kuthuranira mboleo ya mati na njira iria ikundi bimwe bia TIST bitumagira:

- 1) Taara antu aria ukeenja kirinya giaku kia warie bwa mita inya na uraja bwa mita inya.
- 2) Theria antu au
- 3) Inja kirinya kirina warie bwa mita ithatu gwita inya na mita imwe na nusu kwinama.
- 4) Uthurania matigari ja imera biaku jaria urinajo na ugitange tue tunini. (mung’uanano mathangu na mati ja mpempe, miere na ming’au)
- 5) Ikira matigari jaja kirinyene mwanka gitigare nusu mita.
- 6) Ongeera lita ithano cia muju
- 7) Riu wongere centimita mirongo ithatu (kana o iria ikwoneka) cia mburi kana nguku).
- 8) Ongera matigari ja imera nusu mita
- 9) Ikira lita ingi ithano cia muju
- 10) Ongera matigari ja imera kairi mwanka kirinya kiende kuujura
- 11) Mutia, ikira muthetu mwanka kirinya kiujure
- 12) Ukiujuria kirinya na muthetu, tonyithia muti jumuraja gatigati ga kirinya mwanka jukinye nthiguru buru.
- 13) Tigana na kirinya giki ntuku mirongo kenda (mieri ithatu)
- 14) Igitene riri tumira ruuji rwaku rwa ruko gwikira bole. Mung’uanano, warikia kuthambia nyomba kana nguo ciaku, ituura ruuji ruru ugutumagira kirinyene. Kethira urina ndithia ituura maumago jacio iguru ria kirinya.
- 15) Geria wikagire kirinya kiu ruuji na njira iji ntuku cionthe kana oriria ruuji rurio.
- 16) Ntuku mirongo kenda ciathira, mboleo ikethira iri tayari.
Tumira muti kuthima mwanki – mboleo yayia no mwanka ithirwe irina mwanki mwanka toi yoneke ikiumaga mutine wajurita ku.

TIST: Mabukandu nojalete mbeca inyingi.

Mantu jaja jajukitue kuuma *The Organic Farmer*(<http://www.theorganicfarmer.org/profile/2>) and Jürgen Griesbach, 2005: *Avocado growing in Kenya*. ICRAF (World Agroforestry Centre), Nairobi, Kenya.

Mbukandu ni itunda ria thoko ria bata mono kiri Kenya na kiri thoko cietu na kinya cia oome.

Kurina mithemba ithatu iria minene buru ya mibukandu, iria ibujaga guntu mwanya mwanya. Menya ni mibukandu ya mithemba iriku ithithagia bwega nkuruki iandi kiri rera na mantu ja ntuura yaku. Gutumira mpindi kana mbeu kuuma kugita miti irina thiria na iminene na minandene iria iri akui niku kwega, miti iji niu yumba kuthithia bwega nkuruki au gwaku.

Kuumithia mibukandu

Mpindi niciritagwa mitine iria irina thiria na kuuma kiri matunda jarina thiria na jakuri. Mbeu iu ijukitue na yatherua no ikirwe kiri ndawa ya kurigiria tunyomoo tutikamirie na riu ikaandwa mibukone ya kuumithia kana maratasine ja nailoni jaturi makutho. Kirundu kiri na bata mono kiri kuuma kwa mbeu iji. Mibukandu iji yakinya centimita mirongo iiri na yagia tuthangu tuna tuumite bwega, nikuragwa, igakamatwa na gwikua mikebene. Kurita mbeu kuumania na muti nikujukia mieri u itantatu. Miti ikurite kuumania na kugitwa kuuma kiri ingi nithagirwa iri imikui nkuruki na yambagiria guciara maua kurio (miti ithatu gwita inna yarikia kuandwa muundene) nkuruki ya iu ingi. Miti iminini ikethirwa iri tayari kuthamirua muundene nyuma ya mieri iiri gwita ithatu yarikia kugitwa.

**Kuanda miti na kumirikia**

Mithetu nibati kwithirwa iri imiarie, iminoru na irina ruugo rung'ani. Mibukandu itibujaga mithetune igwika ruuji na iritui mono na ikwigara kana aria kuri na ruuji rwanthi ruri akui mono, na kwou itiumagiria kinya nduji cia chumbi na cia acidi. Igita riria riega buru ria kuanda ni mwambirio jwa mbura. Kanya kuuma muti gwita kiri jungi ni mita ithanthatu gwita ikumi, kulingana na unoru, rera na muthemba jwa muthatu. Marinya jakuanda nijenjagwa jaria maingi jarina warie bwa fiti ijiri na uraja bwa fiti ijiri, ukimenyagiira ati ukuunanga mang'enyua jamanene na kumenyeera ati ruuji rutiigara na miiri igukura itikugitarua. Muthetu jou juriti kirinyene nijubati kuunganua na mboleo, mati na rock phosphate kethira irio. Anda imera biu utikugitaria miiri ukimenyaira ati uandite uraja o buria biraandi mukebene. Thithia karai kuumania na muthetu kathiurukite muti nikenda irio na ruuji rugwatua bwega.

Warikia kuanda, miti iu nibati gwikirwa ruuji orio.

Tumira lita ithano gwita mirongo iri cia ruuji kulingana na uraja bwa kimera. Gukunikira muthetu kwaomba kwaithirwa kurina baita nontu nikunyiagia kuura kwa ruuji na kunyiyia kuuma kwa iria. Gwikira ruuji gukendeka igita ririkai. Untu bungi bwa bata ni kumenyeera o kimera kuumania na ndithia na nyomoo cia kithaka.

Gwikira mitunda ruuji.

Ruuji ruri bata mono igita ria gukura na guciara kwa mutunda. Mieri yambele iiri ya kuuma, na kinya miaka yiayo ya mbele ya gukura, miti nibati gutegerwa o igita nyuma ya igita na igekirwa ruuji riria yonania nikwenda. Mibukando niuмага miri imiraja, indi kulingana na rera no yende gwikirwa ruuji rungi, mono igitene ria uumo. Igita ria gwita maua, guciara matunda, na gukura kwa matunda ruuji rung'ani ruirbata mono niuntu bia gukura gukwega kwa matunda.

Mboleo.

Niuntu bwa guciara bwega, kuri baita gwikira mibukandu mboleo o igita nyuma ya igita. Kilo ithano gwita mirongo iiri cia fertilizer no ciikirwe o muti o mwaka. Menyeera riria ugutumira nitrogen – niongagira gukura kwa mathangu indi ti kuuma kwa maua na miiri ya mibukando itiendaga muthetu jurina chumbi inyingi. Phosphorus jaria maingi niendekaga, na potassium iri bata kiri miti iria ikuri ya guciara matunda.

Tunyomoo na mirimo.

Njira cia kwebera tunyomoo na mirimo ni untu bwa bata mono kwou taara antu aega na anoru a kuanda, anda itarenie bwega, taara mithemba irina thiria, nyinyia maria, kunikira muthetu, ukanoria mono, na wikiire ruuji riria rwendeka. Tunyomoo jaria maingi ti thina kiri uandi bwa mabukandu Kenya. Tumira into bia muarubaine, bia pyrethrum kana bia tephrosia kurua na tunyomoo ta moths, thrips kana scales kethira muti nijugitaritue mono.

Mirimo iji no ithirwe iri hatari:

Avocado root rot: (murimo jwa Phytophthora fungus) Miti nicaraga maciara jamakai na irina mathangu jamakai na ikari jaka yajitue ikiendaga kunyara. Biang'i nibiithagua ni riu na bigakua. Miri no yore na muti junthe jukakua jutikuri. Miti yajitue nibati gukurwa na ikaithua. Ruuji rwa mwanki na utumiri bwa ndawa cia tunyomoo kiri mbeu iria ikaumithua niyo njira iria ikairwa inya ya kuebera murimo juju. Kurina ndawa ijiri cia kurua murimo juju - Ridomil na Aliette.

Anthracnose: Matunda nijagijaga macunci ja rangi ya brown jamoomu. Matunda jamaanake nojagwe, indi kiri jaria jagukura kura, murimo juju nijwicithaga mwaka gitunda gigakura na gikagunda. Jaria maingi, ndawa cithithitue na copper nitumagirwa kurua na Anthracnose.

Cercospora fruit spot: Macunci ja yellow jamanini nijonekaga matundene na mathangune. Kanyuma, nijagaruraga rangi ikaa brown riu jakaunikanga, na kwou gutuma tunyomoo tungi twija na uuthu. Murimo juju kinyaju nijuthiragua na ndawa cithithitue na copper

Kugua kwa matunda.

Kugua kwa mathangu ti murimo na nikwonekanaga mono kiri mitunda ya mithemba imingi. Miti nigwithagia matunda iria jaingia na jaria jutumba kurera bwega mwanka jakura. Mibukando nigwithagia matunda jaja janyii ja nono, na kairi riria jang'ana ta nkara.

Gutua mabukandu.

Miti iria ithithiritue grafting niambagiria kurita maua na guciara matunda nyuma ya miaka ithatu gwita inna yarikia kuandwa muundene.

Kuri mantu joonanagia ati gukura kuri akui:

- Kiri mithemba imiiru, nikwithagirwa kurina kugaruka kwa rangi kuuma green gwita black kana purple.
- Kiri mithemba ya green, kiang'l kia gitunda nikiejaga yellow, ngozi no yonekane igitiga kumeta meta, kana gitina gikauma icunci bigukara jaka gukurota.
- Mithemba imwe niambagiria gukara jaka ikwerua.
- Matunda jaria jakaraga iguru riria jekirwa ruujine nijethagirwa jakuri.

Thoko.

Tonga mabukandu jonthe na umenyeeri bubwingi! Thoko cia oome, mono cia Europe, ciri mantu na mawatho jamoomo jaria arimi babanini boomba kwona jarina uumo gukinyira. Thoko cia aja citi uumo bubwingi ou indi kinyacio ciri mantu, niuntu mbokandu nicikuraga cionthe igita rimwe, na kwou gutuma arimi baaga baita kuumania na kujendia. Gwika kana kuthithia into bia mabukandu ni akui burema kuumbika. Arimi ba Mabukandu jwa kwendia kwou no mwanka bagwatane na ukui mono nikenda boona thoko injega.

Mithemba iria yonekanaga mono ya mibukandu:

1. **Hass na Fuertes:** Mithemba iji nitumagirwa kuthithia mbeu injeru (gicunci kia iguru kia mitunda ithithiritue grafting). Niendagwa mono niuntu bwa maguta jamaingi.
2. **Puebla:** Muthemba juju nijutumagirwa ni arimi babaingi kuandiraingi nontu itina mirri ndene na itigwatagwa ni mirimo
3. **Singapore:** Juju ni muthemba jumweru juria jukurangaga na juumba guciara jwakinya mieri ikumi na inna gwita ikumi na itano. Nijukinyaga uraja bwa fiti ijiri.
4. **G5 na G6:** Mithemba iji iri niendi mono nontu nithithagia bwega guntu kuri iguru na kinya kuria kuri nthi. No iumithirue kiri mithemba ingi yonthe kenda matunda jathongomua.

Arimi nibakuurua bagure miti ya kuanda kuumania na aumithia baria baijikenena bena baruga.

Mazingira Bora



TIST

The International Small Group & Tree Planting Program
www.tist.org

Kiswahili Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Some of the members of Karima Ka Mbica Child Cluster. They are leading other community members in protecting and conserving a nearby Water Catchment Area.

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Rutuba katika udongo
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TIST: Makorobia nomakuhe mbeba makiria. *Page 5*



Faida za kulinda mito yetu

Kupanda miti zaidi ya kiasili na isiyotumia maji mengi.

Vikundi vidogo katika TIST vina furaha kwa sababu ya mafanikio ya mradi wa kulinda na kutunza maeneo yaliyo karibu na mito ambao ulianzishwa na TIST ili kuhifadhi na kulinda maji yetu. Wakulima wanachagua kuacha kulima karibu na mito ili kuachisha mmomonyoko wa udongo na kuchafua mto. Leo, tuna wakulima walioendelea kupanda miti ya kiasili katika maeneo yao yanayokaribia mito na wanafuatili njia hizi bora zaidi. Tunajivunia waliyoweza kufanya na tunasherehekea kazi yao ya kuhifadhi mito ambayo ni uhai wetu.

Ni faida zipi za miti ya kiasili katika maeneo yaliyo karibu na mito (kando ya mito)?

- Miti ya kiasili hupunguza mmomonyoko wa udongo na mafuriko.
- Miti ya kiasili husaidia kusafisha maji katika mito mikubwa, midogo na visima.
- Mizizi ya miti ya kiasili hushika na kuuzuia udongo kubebwa.
- Miti ya kiasili husaidia kusafisha hewa.
- Miti ya kiasili huupa mto kivuli na kuzuia maji kubebwa na joto la jua.
- Miti ya kiasili huwapa ndege, wanyama na wadudu mahali pa kukaa na chakula. Kuhifadhi bionuwai hii kwa njia hii hufaidisha mashamba yetu kwani, kwa mfano wanyama wengine ni muhimu kwa mimea inayozalisha na kuthibiti

wadudu waharibifu.

Ni kwa nini ni muhimu kuhifadhi mipaka ya mito?

- Mimea na miti katika mipaka ya mito huweka mazingira yakiwa safi na rutuba ya udongo hubaki sawa wakati wote.
- Mimea na miti katika mpaka kando ya mito hupunguza magwonjwa yanabebwa na maji.
- Huongeza samaki katika mito kwani maji ni safi.

Mafanikio yako ni yapi? Ni ushauri upi utawapa majirani wako walio kando ya mito?

- Tumehitimu kuwa memba wa huu mradi.
- Tumepata malipo ya kando kwa sababu ya kazi ya kimazingira (PES) ambazo tumefanya.
- Tumetoa mikaratusi iliyokuwa katika maeneo kando ya mito.
- Tumeboresha usafi na idadi ya maji katika mito mikubwa na midogo.
- Huwa tunawashauri majirani kuwa wema kwa wanaoishi katika sehemu za chini za mto, na kulinda mto ili hawa wengine pia wapate maji safi.

Mashamba yao pia yatahifadhi udongo kwani mmomonyoko wa udongo utapungua wakipanda miti na kufuatilia njia hizi bora zaidi.

Cluster ya TIST ya Karima Kambicha: Twalinda maeneo yenye vyanzo vya maji na kuvuna faida za bionuwai.

Umetayarishiwa na John Kimathi, Mtumishi katika cluster.

Sisi, cluster ya TIST ya Karima Kambicha, cluster ambayo ilizaliwa kutokana na cluster nyingine na ambayo ilianza mnamo Agosti mwaka wa 2014 ikiwa na vikundi vidogo ishirini na nane. Leo, tumepanda zaidi ya miti elfu thelathini na tano na elfu ishirini na tani ya hii miti ishahesabiwa.

Tunapoendelea kujiunga nashughuli za TIST, tunazidi kupata ujuzi mwingi na mwamko kuhusu mazingira yetu. Hadi hivi karibuni, memba na jamii yetu wamekuwa wakilisha ng'ombe katika eneo la vyanzo vya maji la Kathima Kambicha. Jambo hili lilisababisha uharibifu wa eneo hili, likadhuru vyanzo vya maji yetu na watu walio chini zaidi ya mto.

Cluster yetu ilichukua uongozi katika kuwahusisha memba wengine katika jamii kukarabati na kuhifadhi hapa maji yanapotoka. Viongozi katika cluster yetu, Bwana Robert Mbay, Daniel Kigunda na Josephine Nyoroka walitupa uongozi uliohitajika kuhamasisha rasilmali na nia njema ya jamii na kazi iliyohitajika kupanda zaidi ya miti ya kiasili elfu moja.

Tunajivunia kuwa juhudi hii haitakarabati mazingira yetu na bionuwai tu ila itawahakishia watoto wetu na vizazi vijavyo mazingira endelevu kwa faida yao pia.



Kikundi kidogo cha Mazingira Herbal

Kufurahia faida kutokana na kutumia njia bora zaidi katika TIST.

Umeletewa na Peter Mithiru, Mtumishi katika cluster

Mkulima wa TIST, Bwana Dickson Kamau, ni wa kikundi cha Mazingira Herbal kilicho katika cluster ya Salama, Nyahururu. Kikundi chake kilijiunga na TIST Mei mwaka 2008 kikiwa na memba sita ambapo wane walikuwa wa jinsia ya kike na wawili kiume.

Kufikia sasa, kikundi cha Dickson kina zaidi ya miti elfu mbili ambapo asilimia tisini ya miti hii ni ya kiasili. Alichagua kupanda miti ya kiasili baada ya mafunzo ya TIST na kuelewa faida za miti ya kiasili.

Anasema, “Nilianza kupanda miti ya kiasili mwaka ya 2009 na kupitia mafunzo ya TIST nilijua njia bora zaidi za kutunza vitalu vya miti, kuhamisha miti shambani na kutunza miti yangu.” Katika ardhi yake, Dickson ana miti ya kiasili kama Prunus Africana (mia nne, themanini na nne), Red cedar (Mia nne na nne), Warbugia Ugandansis (mia tatu thelathini na moja), and Olea Africana (mia tano hamsini na saba).

Leo, Dickson asema kuwa ameanza kusoma kuhusu faida za kidawa za miti hii. “Sijawahi kujua kuwa miti hii inatafutwa sana kwa sababu ya dawa. Leo, watu wengi hunitafuta ili niwape majani, makonde au mizizi. Mtengenezaji wa dawa kutokana

na miti shamba amenitafuta ili aweze kununua”, anasema.

Mipango ya Dickson ya wakati hujao ni kuanzisha mizinga ya nyuki katika mashamba yake ili kuongezathamani na faida zake. Pia ana nia ya kupanda miti zaidi, san asana mitunda katika sehemu nyingine ya shamba lake. Ashaanzisha vitalu vyenye miembe na miche ya avocado.

Pamoja na kupata faida kutokana na kutumia njia bora zaidi katika TIST, Kikundi cha Dickson kimepata malipo ya miti pia. “Tuna furaha kwa kuwa tulijiunga na TIST!”



Dickson Kamau katika shamba lake lenye miti ya kiasili.

Rutuba katika udongo

Pata faida zote ziwezekanazo kutokana na ardhi yako.

Udongo ni nini?

Udongo ni safu ya juu zaidi ya ardhi. Udongo una hewa, maji, viumbe hai na madini.

Udongo utengenezwa aje?

Kuvunjika kwa miamba ya mawe hutoa madini yanayoshikilia maisha ya mimea. Mimea ndipo huongezwa udongoni kama viumbe hai. Jinsi mawe zaidi yanavyovunjwa na mabaki ya viumbe hai zaidi kuongezwa ndivyo maji mengi zaidi yaweza kushikiliwa katika udongo, na kuendelea kuboresha ukuzi wa mimea.

Mbona mabaki ya viumbe hai ni muhimu?

Viumbe hai (sana sana kutokana na kuoza na kutengana kwa mimea) hutoa virutubisho vingi, vinavyopatikana ili kuchukuliwa na mimea mipya. Pia hushikilia maisha ya vijidudu vyenye faida vilivyopo katika udong, husaidia maji kuingia udongoni na pia husaidia kushikilia udongo pamoja.

Ni nini huamua aina ya udongo unaopatikana?

- *Hali ya hewa:* joto pamoja na uwepo wa maji huathiri wepesi wa kuvunjika kwa mawe.
- *Viumbe hai:* bakteria, kuvu na minyoo pamoja na viumbe hai vinginevyo vinavyoishi katika udongo.

Baadhi yavyo hufanya kazi muhimu ya kuchanganya udongo kama minyoo. Viumbe hai katika udongo husaidia kuvunja vunja viumbe hai na vingine husaidia kuingiza naitrojeni udongoni (kwa mfano Rhizobium bacteria).

- *Sura ya ardhi:* Kwa mfano, udongo katika miteremko ni kondefu zaidi kwa ujumla kuliko udongo uliopo katika mabonde.
- *Mawe ulipotoka udongo:* aina ya jiwe udongo ulipotoka.
- *Tabia ya binadamu:* tunavyotumia na kuhudumia udongo wetu huathiri rutuba kwa ukubwa.

Udongo unavyohisika kwa mkono hulingana na ni kiwango kipi cha mchanga, silt na clay kilichopo. Picha iliyopo kwa ukurasa unaofuata inaonyesha aina za udongo tukifuatilia unavyohisika kwa mkono. Udongo unavyohisika kwa mkono na ulivyojengwa huathiri wepesi ambao mizizi itaingia kwa udongo na kiwango cha maji kinachowekwa.

Ni kwa nini PH ya udongo ni muhimu?

Jinsi udongo una acidi au chokaa (PH) huathiri virutubisho vilivyopo ili kutumiwa na mimea na vijidudu vipi katika udongo vyaweza kuishi. Kwa kijumla virutubisho vingi katika udongo umumunyika (na hivyo



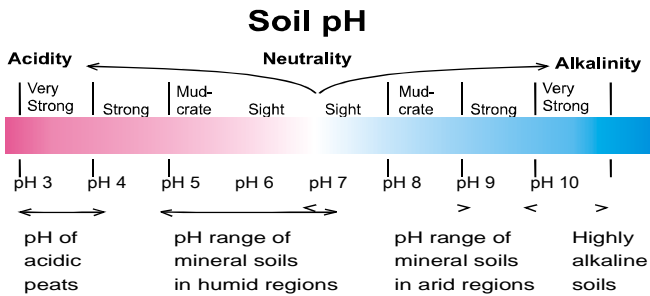
basi huwa tayari kuchukuliwa na mimea) katika udongo wenye acidi ikilinganishwa na usio na chochote au uliona chokaa.

Hata hivyo, ikiwa udongo una acidi nyingi sana, bakteria haziwezi kuishi na jambo hili litaathiri kutenganishwa kwa viumbe hai. Udongo wa juu mwingi ulio mzuri huwa na PH ya kati ya 5.5 na 7.5 na huwa na rangi ya giza.

Udongo wenye rutuba ni upi?

Udongo wenye rutuba ni uliopo na virutubisho vinavyohitajika ili mimea kuishi kwa wingi.

- Virutubisho vya kimsingi: nitrogen, phosphorus, potassium



- Virutubisho vya sekondari: sulphur, magnesium, calcium
- Virutubisho vinavyotakikana kwa kiwango kidogo: iron, manganese, boron, chlorine, zinc, copper, molybdenum, nickel

Mikakati ya kuboresha rutuba ya udongo

- Fikiria kuongeza naitrojeni (iliyopo katika mbolea ya kijani iliyotokana na mimea inayoweka naitrojeni udongoni) na Phosphorus (iliyopo kama Rock phosphate).
- Kusanya na utumie kinyesi na mikojo ya mifugo yako. Hii ni bora zaidi ikiwa katika mbolea iliyotengenezwa katika shimo. Vyanzo safi huwa na ammonia nyingi zaidi (ambayo hudhuru mimea) na

vyaweza kuwa na vijidudu vingi zaidi (vijidudu vinavyoleta magonjwa). Mbolea iliyotengenezwa katika shimo huwa na wadudu wachache. Ikiwa utatumia mbolea isiyokauka, tumia kidogo na ukae kwa muda wa miezi miwili kabla ya kuweka tena.

- Ongeza viumbe hai kupitia kutengeneza mbolea kama ilivyoelezwa hapa chini
- Tumia njia bora zaidi za kilimo hai kama ilivyoelezwa katika makala ya hapo nyuma:
 - Mzunguko wa mimea
 - kulima mimea tofauti pamoja
 - Kilimo mseto
 - Kupanda mimea ya kufunika ardhi inayoongeza naitrojeni udongoni
 - Kuacha mashamba yakiwa hayajapandwa misimu mingine
 - Kufunika ardhi kwa kutumia mimea
 - Kutumia mashimo ya kilimo hai
 - Kupunguza mmomonyoko wa udongo unaosababishwa na maji kwa kupanda miti, kuchimba mitaro
- Fikiria kupanda pamoja Pigeon pea (Cajanus cajan), Dolichos lablab, Mucuna pruriens, Crotalaria, Canavalia.
- Fikiria kuongeza jivu kwani lina madini ya calcium na potassium carbonate kwa wingi.
- Ongeza chokaa (lime) iwapo wajua udongo wako una acidi kali
- Ni bora zaidi usiongeze virutubisho vingine (isipokuwa vilivyopo katika mbolea) kabla ya kupima udongo kwanza ili kuona ni virutubisho na madini vinahitajika.
- Kuna wakati mwingine unahitajika kuongeza mbolea ya viwandani. Tumia kama ilivyoelekezwa na uulizie nizi ni ni nzuri kwa mazingira ya eneo lako kupitia kupata ushauri kutokana na wasimamizi wa kilimo wako

Nitrogen	Phosphorus (P ₂ O ₅)	Potassium (K ₂ O)
<ul style="list-style-type: none"> Leguminous crops that are used as green manures or as mulch provide between 20 to 80 kg N / acre which can be used by subsequent crops. Blood meal / feather meal 12-15% N. They are applied directly to the crops. Uriness from all species contain pure urea (up to 1% N). It is not a stupid idea to urinate on the compost heap! Poultry manure 8-20 kg N/t Pig manure 3-5 kg N/t Goat / Sheep manure 2-4 kg N/t Cattle manures 2-3 kg N/t Compost * 1 kg N/t Manure teas and plant teas provide easily available nitrogen and can be used as top dressing or foliar feeds 	<ul style="list-style-type: none"> Rock Phosphate 20-33% Bone Meals 12-25% Poultry manure 10-25 kg N/t Pig manure 3-6 kg N/t Goat / Sheep manure 2-5 kg N/t Cattle manures 2-3 kg N/t Compost * 4 kg N/t 	<ul style="list-style-type: none"> Wood Ash 3-7% Goat / Sheep manure 12 kg N/t Cattle manures 5-12 kg N/t Poultry manure 5-12 kg N/t Compost * 6 kg N/t Pig manure 3-7 kg N/t Urinates: 1-3 kg N/t
<p>Content of purely vegetative compost. If compost is prepared with livestock manures, rock phosphate and wood ash, the product will have higher nutrient contents.</p> <p>Nutrient contents of manures and composts are highly dependent on handling and storage and on feed quality!</p>		

Kutengeneza mbolea ya majani

Mboleo ya majani ni mbolea ya kiasilia ya kusaidia mimea yako kukua. Ni bora zaidi ya mbolea za viwanda kwani ni ya kiasilia na haina athari za kuumiza mimea na mazingira. Kuandaa mbolea hii ni moja ya njia zilizo nyepesi, zenye gharama ndogo na bora zaidi za kuboresha rutuba ya udongo.

Ni nini hutumika kutengeneza mbolea hii?

- Masali ya mimea, magugu, majani yaliyokauka, mimea iliyokatwa, kinyezi na mikojo ya mifugo, matandiko ya mifugo, chakula kilichobaki jikoni kutokana na matunda na mboga, jivu, makaratasi yaliyokatwa na mbao nyepesi
- Usitumie nyama, vitu vinavyotokana na mifugo, mafuta, chuma au plastiki.

**Mazoezi ya kijumla yaliyo bora zaidi katika maandalizi ya mbolea hii:**

- Chagua eneo lenye kivuli la kuchimba shimo lako
- Funikia kwa majani ya ndizi au kwa karatasi ya plastiki
- Nyunyizia maji wakati wa kiangazi.
- Linda dhidi ya mvua (ambao hubeba virutubisho)
- Kama mwongozo wa kijumla, lenga:
 - Sehemu moja kwa tatu 'mimea ya kijani' (nyasi iliyokatwa, matunda, mboga, mabaki ya mayai, mabaki ya mbegu za mafuta, magugu, mimea)
 - Sehemu moja kwa tatu mimea iliyokauka (majani makavu, nyasi iliyokauka, mabaki ya mbao, mbao nyepesi na masalamadogo madogo ya mimea)
 - Sehemu moja kwa tatu vitu vizito kama matawi yaliyokatwa na mabaki makubwa ya mimea.
 - Hakikisha unatumia mimea ambayo haina mbegu, na usitumie mimea iliyo na ugonjwa.
 - Weka vitu hivi kwa safu au katika shimo. Hewa huhitajika kutengeneza mbolea, kwa hivyo changanya vitu hivi pamoja na usifinyilie chini
- Nyunyizia maji, funika na uache ili vitengane kwa muda na miezi michache inayofuata. Waweza kukuchanganya tena kila baada ya wakati.
- Ikiwa mbolea itakuwa yenye kuteleza au inayonuka jinsi inavyoendelea, yaweza kuwa na maji mengi sana au kuwa na mimea ya kijani mingi sana. Ongeza mimea iliyokauka ili likionekana na uchanganaye.
- Jaribu kuhakikisha masala yako yapo tayari kuchanganywa, kuwekewa maji, kufunikwa na kuachwa kwa miezi miwili au mitatu kabla ya msimu wa mvua kuanza ili mbolea iwe tayari wakati wa kupanda.
- Mbolea yafaa kuwa ya rangi ya kahawia na yenye kuvunjika kwa urahisi inapokuwa tayari. Waweza kutenganisha mboleo iliyo na vipande vidogo vidogo na ile yenye vikubwa vikubwa, na kurudisha yenye vipande vikubwa shimoni ili iwe tayari wakati utakaofuata.

Baadhi ya vikundi vya TIST hutumia njia maalum zaidi ambayo waliiona kuwa yenye ufanisi. Wameeleza mchakato huo hapa chini:

Hatua za Maandalizi ya mboleo zinazotumika na baadhi ya vikundi katika TIST:

- 1) Chagua eneo lenye upana wa mita nne na urefu wa mita nne la kuchimba shimo lako la taka
- 2) Fagia sehemu hiyo
- 3) Chimba shimo la mduara lenye upana wa mita tatu au nne na mita moja na nusu kina.
- 4) Kusanya masala yote ya mimea uliyo nayo na uyakate kuwa sehemu ndogo ndogo (kwa mfano majani na mashina ya mahindi, mtama, maharagwe)
- 5) Weka masala haya ya mimea katika shimo ilo hadi kina cha nusu mita.
- 6) Halafu ongeza lita tano za jivu
- 7) Halafu uongeze centimita thelathini (ama kiwango kiliopo) za kinyesi cha mifugo (kwa mfano kinyesi cha nguruwe, ng'ombe, mbuzi au kuku).
- 8) Ongeza safu nyingine ya majani ya mimea na mashina (nusu mita)
- 9) Ongeza lita zingine tano za jivu.
- 10) Ongeza majani na mashina tena hadi shimo likaribie kujaa.
- 11) Hatimaye, ongeza safu ya udongo hadi shimo lijae.
- 12) Unapokuwa ukiweka udongo shimoni, ingiza fimbo ndefu katikati mwa shimo hadi ifike chini ya shimo.
- 13) Liache shimo la taka kwa miezi mitatu (siku tisini).
- 14) Katika kipindi hiki tumia maji yako machafu kuweka katika shimo hili. Kwa mfano, baada ya kuosha nguo au nyumba, yamwage maji uliyotumia juu ya shimo. Ikiwa una mifugo waweza pia kumwaga mikojo ya mifugo juu ya shimo.
- 15) Jaribu kuweka maji kila siku kwa njia hii, ama wakati maji yapo.
- 16) Baada ya siku tisini mbolea itakuwa tayari. Tumia fimbo kama kipima joto – mbolea inapokuwa tayari lazima iwe na joto na waweza kuona mvuke ukitoka kwa fimbo hiyo baada ya kuitoa.

TIST: Avocado zaweza kukupa mapato mazuri.

Kama ilivyotolewa katika *The Organic Farmer* (<http://www.theorganicfarmer.org/profile/2>) na Jürgen Griesbach, 2005: *Avocado growing in Kenya*. ICRAF (World Agroforestry Centre), Nairobi, Kenya.

Avocado ni tunda lenye umuhimu la biashara Kenya katika masoko ya hapa na pia ya nje.

Kuna aina tatu za miti ya avocado ambayo hufaa katika miinuko tofauti. Angalia ni aina zipi za avocado hufanya vizuri zaidi katika hali maalum za kwako. Kutumia mbegu au miti ya kupandikizwa kutoka kwa miti iliyopo tulipo na pia kutoka katika vitalu vilivyopo katika maeneo tulipo yenye afya na mikubwa hupendekezwa, kwani miti hii itakuwa na uwezekano mkubwa wa kufanya vizuri katika eneo hilo.

Uzlishaji wa miche.

Mbegu hutolewa kwa miti iliyo na afya na kwa matunda yaliyo na afya na yaliyokomaa. Mbegu zilizochukuliwa

na kusafishwa zaweza kuloweshwa katika maji yenye dawa ya kukabili vimelea halafu zipandwe katika matandiko ya vitalu au katika mifuko ya nailoni iliyotobolewa. Kivuli ni muhimu kwa ukuaji. Miche iliyo katika vitalu inapofikisha urefu wa centimita ishirini na kuwa na jozi mbili za majani yaliyokomaa vizuri, hung'olewa, kubebwa na kupandwa katika mikebe. Upandikizi waweza kupandwa baada ya miezi sita. Miti iliyopandikizwa huwa mifupi zaidi na huanza huzalisha maua mapema zaidi (miaka mitatu au mine baada ya kupandwa shambani) ya miche iliyopandikizwa. Miti hiyo midogo itakuwa tayari kuhamishiwa shambani miezi mitatu au mine baada ya kupandikizwa.

Upanzi wa miti.

Udongo wafaa kuwa wenye kina kirefu, rutuba na hewa tosha. Miti ya avocado haipendelei udongo usio lowa haraka na wenye uzito. Wakati mwafaka zaidi wa kupanda ni mwanzoni mwa msimu wa mvua. Nafasi



kati ya miti yafaa kuwa mita sita kufika kumi, kulingana na rutuba ya udongo, hali ya hewa, na aina. Mashimo ya kupanda huchimbwa sana sana yakiwa na upana wa fiti mbili na kina cha fiti mbili, hakikisha umevunja udongo ulioshikamana na kuwa mgumu ili kuruhusu maji kulowa vizuri na kuruhusu mizizi kukua bila ya usumbufu. Udongo uliotolewa waweza kuchanganywa na mbolea, mbolea ya mimea au madini ya phosphate ikiwa yapo. Panda miche kwa utaratibu bila ya kuumiza mizizi katika kina kimoja kama ilivyokuwa katika mikebe. Jenga bonde kutokana na udongo likizunguka mti ili kupata maji zaidi na kushika maji.

Baada ya kupanda, miche yafaa kutiliwa maji papo hapo. Tumia lita tano hadi ishirini za maji kulingana na ukubwa wa mche. Waweza kufunika udongo kwani ni faida kwa sababu hupunguza upotevu wa maji na kudhibiti ukuzi wa magugu. Kutia maji kutatakikana mara kwa mara. Jambo linguine lenye umuhimu ni kulinda kila mche kutokana na mifugo na wanyama pori.

Kutilia mitunda maji.

Kunyunyuzia maji ni muhimu katika hatua nyingi za ukuzi wa mti na uzalishaji wa matunda. Katika miezi ya kwanza ya kujishikilia, na pia katika miaka ya kwanza ya ukuzi, miti lazima iangaliwe kila baada ya wakati mfupi na itiliwe maji inapoonyesha alama za kuhitaji maji. Miti ya avocado huwa na mizizi mirefu, lakini kulingana na hali ya hewa yaweza kuhitaji kuongezwa maji sana sana wakati wa kiangazi ukiongezeka. Wakati wa kupata maua, matunda kuanza kutokeza na matunda kukomaa, maji tosha ni muhimu ili matunda yakomae vizuri.

Mbolea.

Ili upate uzalishaji mzuri, ina faida kusaidia miti ya avocado kwa kutia mbolea kila baada ya wakati mfupi. Kilo kati ya tano hadi ishirini zaweza kuwekewa kila mti kila mwaka. Kuwa mwangalifu na naitrojeni – huwa inaongeza ukuzi wa majani bali si wa maua, na mizizi ya avocado huharibiwa na chumvi nyingi katika udongo. Phosphorus sana sana huhitajika pia, na potassium ni muhimu katika miti iliyokomaa inayozaa matunda.

Wadudu na magonjwa.

Hatua za kuzuia ni muhimu kwa hivyo chagua mahali panapofaa na palipo na rutuba, panda ukinafasisha vizuri, chagua aina zilizo na afya zaidi, dhibiti magugu, funikia udongo, usirutubishe zaidi ya inavyohitajika, wekea maji yanapotakikana. Wadudu si shida kwa uzalishaji wa avocado Kenya. Tumia vitu vinavyotokana na Muarobaini, bidhaa za pareto na maji ya yephrosia na kadhalika dhidi ya wadudu kama nondo, chiriku na magamba ikiwa uharibifu ni kali.

Magonjwa yafuatayo yanaweza kuwa hatari: Avocado kuoza kwa mizizi: (a Phytophthora fungus disease) Miti huzalisha kwa uhaba, na ina majani chache zaidi, yaliyogeuka rangi na kuanza kukauka. Matawi huchmwa na jua na kufa, mizizi huozwa na miti yote inakufa bila kukomaa. Miti iliyoadhirika yafaa kung'olewa na kuharibiwa. Maji ya moto na dawa ya wadudu ikitumika kwa mbegu zinazokuza miche hupendekeswa kama njia ya kuzuia. Kuna kemikali mbili zilizothibitishwa dhidi ya ugonjwa huu - Ridomil na Aliette.

Anthracnose: Matunda huwa na madoa ya hudhurungi yaliyokakuka. Matunda machanga yaweza kuanguka lakini katika yaliyokomaa zaidi, ugonjwa hujificha hadi tunda linapovunwa na kuiva. Sanasana, madawa ya wadudu yenye copper hutumika dhidi ya Anthracnose.

Cercospora fruit spot: Madoa madogo yenye rangi ya njano hutokeza kwa matunda na majani. Baadaye hugeuka na kuwa hudhufungi na kuanza kuvunjika, hivyo basi kurahisisha viumbe hai kazi ya kushambulia matunda hayo. Ugonjwa huu pia hudhibitiwa na dawa za wadudu za copper.

Kuanguka kwa matunda: Kuanguka kwa matunda si ugonjwa na huonekana sana katika matunda ya aina nyingi. Miti huanguka matunda yaliyozidisha na ambayo haitawezi kulisha hadi yafike ukomavu. Miti ya avocado huanguka matunda yaliyozidi yakiwa na ukubwa wa kunde na mara ya pili yakifikisha ukubwa wa yai.

Kuvuna avocado.

Miti iliyopandikizwa huanza kupata maua na kuzaa matunda miaka mitatu au mine baada ya kupandwa shambani.

Vifuatavyo ni viashiria vya ukomavu unaokaribia:

- Katika aina zilizo na rangi nzito, kuna mabadiliko katika rangi kutoka kijani kuenda nyeusi au zambarau
- Katika aina za kijani, mashina ya matunda hugeuka njano, ngozi yaweza onekana ikimeta meta kidogo zaidi, au madoa yanayofanana na kutu kuonekana katika mwisho wa matunda.
- Aina zingine huchukua rangi nyeupe.
- Matunda yanayoelea juu yanapoingizwa majini sana sana huwa yamekomaa.

Soko.

Shughulikia avocado zote kwa utaratibu mkubwa! Masoko ya nje, sana sana ya uropa, yana mahitaji magumu sana ambayo wakulima wadogo huona yakiwa magumu sana kutimiza. Masoko ndani ya nchi hayana ugumu huo mwingi lakini pia yana ni magumu kiasi. Kuweka au kutibu avocado zilizovunwa ni jambo lililo karibu kushindwa kuwezekana. Wakulima wa avocado za kuuza hivyo basi, lazima wawe na ushirikiano wa karibu sana na soko.

Aina za avocado:

1. **Hass na Fuertes:** Aina hizi mbili hutumiwa kama sehemu ya juu ya matunda yaliyopandikizwa. Zinajulikana sana kwa sababu ya mafuta mengi.
2. **Puebla:** Hutumika kama vipandikizi na wakulima wengi kwani hayana ufumwele na ni sugu kwa magonjwa.
3. **Singapore:** Hii ni aina mpya inayokua haraka na kufika ukomavu katika miezi kumi na nne au kumi na tano. Hupanda hadi urefu wa fiti mbili.
4. **G5 na G6:** Aina hizi mbili hupendwa sana kwani zaweza kufanya vizuri katika nyanda za juu na za chini. Zaweza kupandikizwa na aina zingine zote ili kuboresha tunda.

Wakulima wanashauriwa kununua miche kwa wazalishaji wa miche waliothibitishwa

Mazingira Bora



TIST

The International Small Group & Tree Planting Program
www.tist.org

Kikuyu Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Amemwe a amemba a Karima Ka Mbica Child Cluster magithomithia ambemba a itura riao kugitira na kumenyerera mai.

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Guteithika Kumanagia na kugitira Njui ciitu - Kuhanda miti ya Kiunduire hamwe na miti iria yagiriire kuhandwo ndeere cia ruui.

I kundi nyingi cia TIST mena ngatho niundu wa kugaciira hari kugitira njuui. Arimi aingi nimatigite kurima hakuhi na ndeere cia rui nigetha kugitira tiiri na guthukia maai. Nginyagia riu, arimi nimathiite makihandaga miiti ya kiunduire ndere-ini cia ruui. Nitukenire uhotani wao hari wira ucio nwega.

Uteithio wa miiti ya kiunduire ni uriku ndere- ini cia ruui?

- Miiti ya kiunduire niiteithia kunyita tiiri na kugitira kiguo na muniko wa ruui.
- Miiti ya kiunduire niiteithagia gucunga maai na tukagia na maai matheru.
- Miiri ya Miiti ya kiunduire ni inyita tiiri wega
- Miiti ya kiunduire ni itheragia riera.
- Miiti ya kiunduire ni ituheaga kigunyi ikagiriria riu ihu.
- Miiti ya kiunduire ni ehaaga uikarwo nyoni, nyama hamwe na tumbuki turia tuteithagia mimera iitu

Baata wa kugacirithia ndere cia rui ni kii?

- Mimera na miti iria ihanditwo ndereini cia rui. niigacirithagia maaria maturigiciirie hamwe na kurehe unoru wa tiiri.
- Mimera na miiti iyo ni iteithagia kugitira mirimu iria yukaga na maai.
- Miiti na mimera iyo ni irio cia thamaki ningi ni itheragia maai thamaki ikona uikaro.

Uhotani wiitu ni uriku? Ni mataaro mariiku tungira andu a itura riitu?

- Nitukoretwo turi akinyaniru hari kugitira njuui
- Nitukoretwo nikiamukira marihi kuuma TIST niundu wa wira wa kugitira njui
- Nituhotete kweheria miiti ya minyua maai kuma ndere-ini cia njui
- Wira wiitu niuhotithie njui igie na maai matheru na maingi
- Ni turathie na mbere kuuria andu mathie na mbere na kugitira njui. Nitugukuria uthie na mbere na kuhanda miiti ya kiunduire.

Cluster ya Karima Ka Mbicha: Kugitira nyanjara cia maai.

I thui amemba a Karima Ka Mbicha Cluster iria twmbiririe mwaka wa 2014 mweri wa Kanana riu twina ikundi 28. Nginyagia riu tuhandite makiria ya miiti 35,000. Miiti 25,000 niikoretwo ii mitare.

Nginyagia riu, nituthiite na mbere kuruta wira twi TIST. Kahinda karariho, ithui hamwe na andu a itura riitu, tukoretwo tukiriithia mahiu maitu nyanjara ya maai ya Kathima. Undu ucio niwatumire

nyanjara ino ituike ya kuhua maai undu uria wachungiriirie kuhuka kwa maai.

Riria twonire thiina uyu, ithui turi Cluster, nitwoire ikinya na tukinyitanira na andu aria angi a itura, tutongoretio ni atongoria aitu a Cluster, Robert Mbya, Daniel Kigunda na Josephine Nyoroka, nitwambiririe kuriukia na guthondeka nyanjara iyo.

Nitukenete ni wira uria tukoretwo tukiruta tondu ugututeithia na uteithie njiaro ciitu.



Mazingira Herbal Small Group: Riu nituonete maciaro kuuma TIST.

Dickson Kamau ni murimi wa TIST wa gikundi kia Mazingira Herbal Small Group kiria gikoragwo Salama Cluster, Nyahururu. Namba ya Gikundi giake ni 2008KE926. Maingirire TIST mweri 1/5/2008. Makoragwo maari atandatu, atumia 4, arume 2.

Dickson ekuga uu: "Kuuma ndathomithio baata na miiti ya kiunduire ni TIST hamwe na njira njega ya kumihanda, ni ndambiririe kuhanda miiti ino kuuma mwaka wa 2009. Gwa kahinda ndina miiti makiria ya 1,500 miti ngurani ya kiunduire.

Nginyagia riu, Dickson niakoretwo akiuna maciaro ma miti ino ya kiunduire. Miiti ino ni ikoretwo ikimuhe dawa cia kimerera iria nginya arigitani ayo makoretwo makinda kumugurira.

Mubango wa Dickson ni kuuiga miatu ya njuki nigetha athie na mbere na kuongerera maciaro. Makiria ya uguo, Dickson arauga ni aguthie na mbere na kuongerera miiti muno ya matunda. Kahinda-ini gaaka ena nathari ya matunda.

Gikundi kia Dickson ni gikoretwo gikiamukira marihi ma miiti kuuma TIST. Dickson ekuga mena gikeno kuuma maingira TIST



Dickson Kamau mugunda-ini wake wa miti ya kimerera.

Unoru wa Tiiri: Njira cia kugia na magetha maingi kuuma mugunda-ini waku.

Tiiri ni kii?

Tiiri ni mwen wan a-iguru wa thi. Ukoragwo na riera, maai na unoru hamwe na minerals.

Tiiri uthondekagwo atia?

Gwatukanga na kumumuthuka kwa mahiga nikuo guthondekaga tiiri uria uhotithagia mimera gukura. Mimera ningi niyongagirirwo tiiri-ini. Riria mahiga makiria mamumuthuka, noguo tiiri muingi uthondekagwo kwa uguo maai maingi nimakuigwo tiiri-ini na kwongerera gukura kwa mimera.

Nikii organic matter iri ya bata?

Organic matter (Iria ithondekagwo muno kumana na kubutha kwa mimera) niurutaga unoru muingi uria woyagwo ni mimera na ikanyitirira miturire ya indo cia tiiri-ini iria cikoragwo na umithio muingi kuri tiiri na ukauteithia kugia na hinya na kuhotithia maai gutonya thiini.

Nikii kimenyithanagia muthemba wa tiiri?

- *Riera:* Urugari na maai riria cioneka nicikoragwo na effect kuri kumumuthuka kwa mahiga.

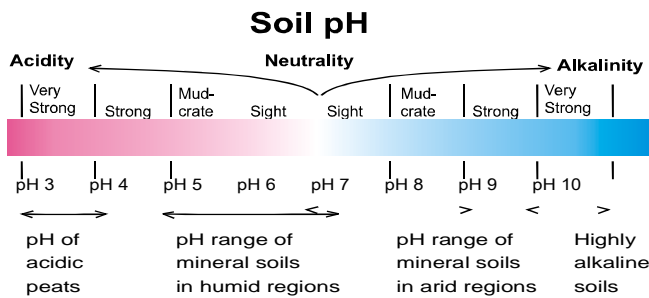
- *Organisms:* Bacteria, fungi na minyongoro ni imwe cia iria ciikaraga tiiri-ini. Imwe nicinnyitaga itemi hari gutukania tiiri ta earthworms. Organisms cia tiiri niciteithagia kubutha na gueithia mimera.
- *Topography:* Uria mugunda uikare. Kwa muhiano, tiiri uri kundu kuinamu niukoragwo uri muceke na ugakuu ni maai na-ihenya gukira tiiri ungi uri kundu kuigananu.
- *Parent material:* Muthemba wa mahiga maria mathondekete tiiri.
- *Human Behaviour:* Uria tuhuthagira na kumenyerera tiiri witu niutumaga unoru ukorwo uria uri.

Uria tiiri uhana kuringanaga na muigaa wa muthanga, silt na clay uuthondekete. Diagram ino ironania mithemba ngurani ya tiiri. Muthemba wa tiiri niwonanagia uria miri ingiingira tiiri-ini na muigana wa maai uria ungiingira thi.



Bata wa soil pH nikii?

Uria tiiri uri na acini na alkali niyo pH na niyugaga nutrients iria iri tiiri-ini na muthemba wa tiiri uria ungikorwo mwena ucio na unyitirirwo wega. Nutrients nyingi cia tiiri nicikoragwo na uhoti wa kumumuthuka na kwa uguo cigateithia kuiyukio ni mimera riria tiiri uri na acid gukira riria uri na alkali. Ona kuri o uguo, angikorwo tiiri uri na acid nyingi noguo bacteria nyingi citangikura na organic matter cikaremwo ni kubutha. Tiiri muingi uria wa iguru ukoragwo na pH ya 5.5-7.5 na ukoragwo na rangi



muiru.

Tiiri munoru ni uriku?

Tiiri uria munoru ni uria ukoragwo na nutrients iria cibataranagia hari gukura kwa mimera.

- *Primary nutrients:* nitrogen, phosphorus, potassium.
 - *Secondary nutrients:* sulphur, magnesium, calcium.
 - *Micronutrients:* iron, manganese, boron, chlorine, zinc, copper, molybdenum, nickel
- Maundu ma kwongerera tiiri unoru.

- Ongerera nitrogen (na njira ya thumu muigu) ohamwe na phosphorus (na njira ya mahiga).
- Ungania na uhuthire thumu wa mahiu na mathugumo. Uyu ukoragwo uri mwega riria wabutha. Uria utar mubuthu noukorwo na ammonia nyingi (iria ingithukia mimera). Thumu uyu niukoragwo na pathogens nini. Ungihuthira utari mubuthu, huthira utari muingi na uutige gwa kahinda ka mieri 2.
- Ongerera organic matter kuhitukira composting.
- Huthira njira iria njega na hitukie.
 - o Kuhanda mithemba miingi ya irio hamwe na gucjenania imera.
 - o Kuhanda miti mugunda-ini wa irio.
 - o Gutiga mahuti mabuthire mugunda.
 - o Kuhuthira marima ma Kilimo Hai.
 - o Nyihia erosion na kuhanda miti, kwenja terraces kana fanya juu.
- Huthira intercropping na Pigeon pea (*Cajanus cajan*), *Dolichos lablab*, *Mucuna pruriens*, *Crotalaria*, *Canavalia*.
- Ongerera muhu, uria l ukoragwo na calcium na potassium carbonate.
- Ongerera lime anatarikgikorwo tiiri waku niukoragwo na acid nyingi.
- Niwega kwaga kwongerera minerals (tiga iria cikoragwo thumuini) utarorete tiiri wega niguo wone kana nicirabatarikana.
- Nikuri hiingo wagiriirwo nikuongerera inorganic chemicals fertilizers. Huthira kuringana na mawatho ma athondeki na ataalamu a maundu egii tiiri.

Nitrogen	Phosphorus (P ₂ O ₅)	Potassium (K ₂ O)
<ul style="list-style-type: none"> • Leguminous crops that are used as green manures or as mulch provide between 20 to 80 kg N / acre which can be used by subsequent crops. • Blood meal / feather meal 12-15% N. They are applied directly to the crops. • Uriness from all species contain pure urea (up to 1% N). It is not a stupid idea to urinate on the compost heap! • Poultry manure 8-20 kg N/t • Pig manure 3-5 kg N/t • Goat / Sheep manure 2-4 kg N/t • Cattle manures 2-3 kg N/t • Compost * 1 kg N/t • Manure teas and plant teas provide easily available nitrogen and can be used as lop dressing or foliar feeds 	<ul style="list-style-type: none"> • Rock Phosphate 20-33% • Bone Meals 12-25% • Poultry manure 10-25 kg N/t • Pig manure 3-6 kg N/t • Goat / Sheep manure 2-5 kg N/t • Cattle manures 2-3 kg N/t • Compost * 4 kg N/t 	<ul style="list-style-type: none"> • Wood Ash 3-7% • Goat / Sheep manure 12 kg N/t • Cattle manures 5-12 kg N/t • Poultry manure 5-12 kg N/t • Compost * 6 kg N/t • Pig manure 3-7 kg N/t • Urines: 1-3 kg N/t
<p>Content of purely vegetative compost. If compost is prepared with livestock manures, rock phosphate and wood ash, the product will have higher nutrient contents.</p> <p>Nutrient contents of manures and composts are highly dependent on handling and storage and on feed quality!</p>		

Composting

Compost manure ni thumu utari wa fertilizer uria uteothagia mimera gukura. Niukoragwo urimwega gukira wa chemical tondu ni wa ki-nduire na nduthukagia mimera na maria maturigiciirre. Composting ni nnjira imwe ya iria huthu makiria na citari na mahuthiro maingi cia kwongerera onoru wa tiiri.

Nikii kingihuthika hari guthondeka compost?

- Matigari ma irio, riia, mahuti na mahuti ma miti, main a mathugumo ma mahiu, irio cia nyumba matunda, muhu na maratahi.
 - Ndukahuthire nyama, daily products, fats, oil
- Cuma kana plastic.

**Maundu maria wagiriirwo nikurumirira riria urathondeka compost.**

- Huthira handu hari na kiiruru.
- Humbira na marigu kana plastic.
- Itiriria maai riria kuri na riuu.
- Gitira kumana na mbura(iria ingithambia unoru wothe).
- Ta njira ici, tigrira;
 - o 1/3 “green vegetation” (nyeki, matunda, mboga, makorogoca, makoni, thumu, riia na mimeru).
 - o 1/3 ‘brown vegetation’ mahuti momu, straw, nuura, cardboard na matigari ma irio)
 - o 1/3 indo nene ta miti.
 - o Tigrira niwahuthira indo citari nambegu na ndukahuthire kindu kiri na murimu.
 - o Iganirira indo ici hamwe na ndugakindire.
- Itiriria indo icio maai,humbira na utige niguo cibuthe gwa kahnda ka mieri ta iiri. Nouikare ugitukanagia indo icio.
- Indo icio cingiambiriria kununga, nikuga ati ciri na maai maingi kana green vegetation ni nyingi, ongerera brown vegetation na utukanie.
- Geria gukorwo na indo ici ciothe niguo utukanie, uitiririe maai na uhumbire na utigie 2-3 months mbere ya mbura niguo ukorwo uri mwega ukihanda.
- Thumu uyu wagiriirwo gukorwo uri wa brown na unyitanite.No ucunge thumu niguo wehutie giko na ukoro na mutukanio mwega.

Ikundi imwe cia TIST nichuthagira njira ngurani na makona ciri njega na magataariria haha.

Kuhariria compost manure na TIST groups

- 1) Hariria handu ha 4mx4m ha kwenja irima.
- 2) Theria handu hau.
- 3) Enja irima ria 3-4m na 1.5 uriku.
- 4) Ungania matigari mothe ma irio na umatinangie tunini tunini(muhiano mahuti ma mabebe, muhia na mboco)
- 5) Itirira mahuti macio irima-ini na utigie 0.5m.
- 6) Ikira 5l cia muhu.
- 7) Ongerera 30cm mai ma mahiu.
- 8) Ikira mahuti mangi.
- 9) Ikira 5l cia muhu ingi.
- 10) Ikira mahuti nginya uihurie mahuti nginya uihurie irima.
- 11) Muthia, ikira tiiri nginya iguru.
- 12) Riria uraihuria tiiri, ikira muti miraihu gatagati niguo ukinye thi.
- 13) Eterera thumu waku matuku 90 kannaa (3months).
- 14) Gwa kahinda gaka, huthira maai mari na giko gwikira irima-ini. Kwa muhiano, thutha wa guthambia nyumba, nguo huthira maai macio kana mathuguma ma mahiu.
- 15) Itiriria irima maai o muthenya na njira ino kana riria maai monekana.

Thutha wa 90days thumu waku niugukorwo uri mwega. Huthira muti uria uhandite gatagati ta thermometer – riria thumu wagira niwagiriirwo nigukokorwo uri muhiu na waruta muti ucio.

TIST: Makorobia nomakuhe mbecha makiria.

Ta uria turutite from *The Organic Farmer*(<http://www.theorganicfarmer.org/profile/2>) and Jürgen Griesbach, 2005: *Avocado growing in Kenya*. ICRAF (World Agroforestry Centre), Nairobi, Kenya.

Makorobia ni matunda ma bata Kenya ma kwedio guku bururini ona nja ya bururi.

Kuri mithemba iria minene itatu ya makorobia, iria ikuraga miena ngurani. Roar ni muthemba uriku wa makorobia ungikura kwanyu. Ukihuthira mbegu kana muciarithanio na kuma nathariini cia kwanyu nikuo kwega makiria, miti ta iyo noikure wega kwanyu.

Guthondeka mbegu.

Mbegu ciunganagio kuma kuri miti iria miega na mikuru. Mbegu iria ciarutwo nociikio dawaini ya kuninafungi na cicoke cihandwo tuta-ini kana maratathi-ini. Kiiruru nikiega niguo cimere wega.

Riria mbegu ciakinya 20cm uraihu na ciri na mahuti mana niguo cimunyagwo na cihakandwo mikebe-ini.

Guciarithania nogwikwo thuha wa kahinda ta ka mieri 6. Miti iria micarihanie niikaraga iri minini na ikambiriria kuruta kiro tene(ta 3-4 years thetha wa kuhandu mugunda-ini) gukira iria cihanditwo mugunda-ini. Miti iyo minini niikoragwo ikinyite ya kuhandwo mugunda-ini thutha wa 3-4 months thutha wa guciarithanio.

Uhandi wa miti.

Tiiri wagiriirwo nigukorwo uri muriku, munoru na muhinyu. Makorobia matiendaga tiri utatemeirwo maai wega, tiiri mumu, miaraho ya maai kana ugunyu muingi, na ningi ndwendaga tiiri uri na cumbi kana acid. Kahinda karia keega muno ga kuhandu ni kimera kia mbura .utaganu wa miti wagiriirwo



nigukorwo uri wa 6-10m, kuringana na unoru wa tiiri, riera na maundu mangi. Marima magiriirwo nikwenjwo mari na utaganu wa 2ft na uriku wa 2ft, ukgitigagirira tiiri nimuhinyu na maai makaunithio wega na miri ndirathuburwo. Tiiri uria wenjwo noutukanio na thumu na phosphate ya mahiga angikorwo iri ho. Handa mimera umenyereire utaguthmbura na guthukia miri na uriku ota uria irari nagui iri mikebe-ini. Thondeka handu hahana basin guthiururukiria muti niguu ukorwo na maai. Thutha wa kuhanda, mimera yagiriirwo kuheo maai orio. Huthira 5-20 lt cia maai kuringana na muigana wa mumera. Humbira na mahuti niguu ugunyu wa tiiri uikare na ikure wega. Guitiriria maai nigukoragwo kuri kwa bata makiria. Gitira miti kumanana mahiu.

Kuhe maai kwa miti ya matunda.

Kuhe maai ni kwa bata muno hingo ya ikiro ngurani riria muti urakura. Hingo ya mweri wa mbere, na ningi mwaka wa mbere wa gukura, miti niyagiriirwo ni guikara ikiroragwo na kuheo maai riria yonania ta ing'ariirwo. Mikorobia niikoragwo na miri minene kuringana na riera niibatara maai maingi na muno kimera kia riuu. Riria iraruta kiro, matunda niwega ithondekwo niguu irute matunda mega.

Kuhe fertilizer.

Niguu ukorwo na maciaro maingi, niwega na undu wa bata gwikira mikorobia thumu maita maingi. Gatagati ka 5-20 kg cia fertilizer nociikirwo muti-ini umwe o mwaka – niitumaga mahuti makorwo mari mega na ti kuruta kiro, na miri ya makorobia ndiiguanaga na cumbi muingi tiiri-ini. Phosphorus niya bata ohamwe na potassium niya bata niguu mimera igie na maciaro maingi.

Tutambi na mirimu.

Njira cia kwigitira ni cia bata kwa uguo caria handu hari na tiiri mwega, tagania miti yaku, cagura miti iria miega, gitira kumana na tutambi, humbira na mahuti, ndugekire fertilizer nyingi makiria na uhe maai riria kwagiriire. Tutambi ti thina munene hari urimi wa avocado thiini wa Kenya. Huthira indo cia neem, kuhariria pyrethrum, kana tephrosia. Niundu wa tutambi ta fruit moths, thrips kana scales angikorwo nimaritwo muno.

Mirimu ino noikorwo na ugwati munene:

Avocado Root Rot: (**a Phytophthora fungus disease**) miti iciaraga matunda matari maingi na ikoragwo namahuti manini, maria makoragwo mari na rangi ungi na makahoha. Hongi cikoragwo ciumagariti na cikoma thutha wa kahinda kanini. Miri niibuthaga na muti wothe ukoma. Miti iria inyititwo ni murimu uyu yagiriirwo ni kumunywo na iteo. Kuhonia na maai mahiu na kuuraga tutambi nikwega niguu muti ugie na maciaro maingi. Kuri na dawa

mithemba 2 iria niya murimu uyu. Ridomil na Aliette.

Anthracnose: matunda magatuika ma brown, makagia na maroro, matutnda matari makuru makagua thi. Murimu uyu wihithaga nginya riria matunda makagethwo. Muno dawa ciri na copper nichuthagirwo.

Cercospora fruit spot: maroro manini ma rangi wa yellow nimonekaga matunda-ini, thutha, nimacokaga magatuika ma brown n Mtunda magatukanga njira iria ihotithagia titambi guthukangia. Murimu uyu onaguo uninagwo na dawa cia copper.

Fruit Drop: murimu uyu niwonekanaga muno kuri mithemba miingi ya matunda. Miti iguithagia matunda maingi makiria. Makorobia iguithagia matunda maigi riria matakinyite ma kugethwo na riria makinya muigana wa itumbi.

Kugetha makorobia.

Matunda maria maciarithanie mambagiriria guciara thutha wa 3-4 miaka thutha wa kuhandwo mugunda-ini

Ici ni dalili ati mutu niukinyite wa guciara.

- Gucenja rangi na kuiirira.
- Matunda kuhana yellow, ngothi guthenga.
- Kuhana ta maeruha.
- Matunda maria maraareramaai-ini nimo makuru.

Thoko.

Menyerera makorobia na umenyereire munene! Thoko cia nja na makiria Europe nicikoragwo na mawatho manene maria arimi anini mangiremwo ni gukinyiria. Thoko cia guku nicikoragwo ciri nditu tondu makobia makuranagira hamwe. Arimi nimaremagwo ni kuiga na guthondeka makorobia. Kwa uguo arimi nimagiirwo kunyitithanio na thoko njega cia makorobia.

Mithemba iria yonekanaga ya makorobia.

1. **Hass and Fuertes:** mithemba ino ihuthagi guciarithania makorobia maria mangi. Nimakoragwo na maguta maingi muno.
2. **Puebla:** mahuthikaga guciarithania mwana wan a-thi na matikoragwo na fibre na matinyitagwo ni mirimu.
3. **Singerpore:** uyu ni muthemba mwega na ukuraga thutha wa 14-15 months ukuraga na uraihu wa 2ft.
4. **G5 na G6** mithemba ino niyo ikuraga kundu kuingi na noiciarithanio na mithemba ino ingi yothe niguu kumiagirithia.

Arimi nimarahinyirio magure mbegu kuma kuri aria metikiritio.

Mazingira Bora



TIST

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Kikamba Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Some of the members of Karima Ka Mbica Child Cluster. They are leading other community members in protecting and conserving a nearby Water Catchment Area.

Inside:

Vaita kuma kusuvia mbusi situ na kuvanda miti ya kiene na miti ila yi nduu na kiw'u. Page 2

Ngwatanio ya Karima Kambicha: Kusuvia kiw'u, Mbumo sya mbusi na kuketha moseo ma syindu kivathukany'o kwikala vamwe. Page 2

Kakundi kanini ka miti ya ndawa ka Mazingira Herbal kuendee kutania vaita wa kutumia nzia nzeo sya TIST. Page 3

Unou wa Muthanga: Kwata vaita w'othe kuma kithekani kyaku. Page 3

TIST: Mavokoto/Makolovea nimatonya ukunenga ueti museo. Page 5



Vaita kuma kusuvia mbusi situ na kuvanda miti ya kiene na miti ila yi nduu na kiw'u.

Tukundi tunini twa TIST twina utanu kwithiwa twambiite uvandi wa mbee wa kuvanda miti nguumoni sya mbusi walany'o ula wambiwe ni TIST na utetheesye kusuvia kiw'u na nzia syakyo. Aimi nimasakuite kulea kuima nguumoni sya mbusi nikana kusii kukuwa kwa muthanga na kuthokoanwa kwa mbusi. umunthi twina aimi ala maendee na uvanda miti ya kiene isioni sya nguumoni sya mbusi na nimaatiie mawalany'o maseo ma uvandi wa miti nguumoni. Nitukwikathiia nundu wa wia woo kutata kusuvia mbusi ila ithyoothe tutumiaa.

Vena vaita mwau wa miti ya kiene kuvandwa nguumoni sya mbusi?

- Miti ya kiene ni iolaa kutuuka kwa muthanga na muthanga kukuwa ni kiw'u kana nzeve.
- Miti ya kiene nitetheesya kuthesya kiw'u kila ki mbusini, mikaoni, silanga na ithimani.
- Mii ya miti ino nilumasya muthanga na kuusiia kuthi.
- Miti ya kiene nitheesya nzeve.
- Ingi nietae muunyi ula uolaa kiw'u kungala.
- Miti ino niyithiawa yi liu kwa nyamu syakitheka na mawikalo masyo vamwe na tusamu na nyunyi sya yaya. li nitumaa kisio kyaila nundu imwe ta nyunyi niisaa tusamu tula twanangaa malaa na kutetheesya mbeu kunyaiika vamwe na moseo angi na kwongela unou wa muthanga.

Niki ve vata wa kusuvia Nguumo na syanda sya mbusi?

- Uthui, ikuthu na miti nisuviaa nguumo sya mbusi na kwikalya mbusi syi ntheu na muthanga kwikala wi munou uteukuwa.
- Miti ila yi nguumoni sya mbusi ni iolaa mowau ala maumanaa na kiw'u kwa kusunga kiko.
- Ingi miti nitumaa makuyu mongeleka nundu kiw'u ni kitheu.

Nata wikite utalika ta ukilyo? Ni utao mwau utonya unenga atui na anyanyau ala matwie nguumoni sya mbusi?

- Nituvitukithitwe ta ene ma usuvia nguumo sya mbusi.
- Nitukwatite ndivi ya iulu nundu wa wia witu wa usuvia mawithyululuko (Payment for Environmental Services (PES)).
- Nituvetete misanduku nguumoni sya mbusi.
- Nitwailitye useo wa kiw'u na kikongeleka kila ki mikaoni na mbusini.
- Twi taa atui na anyanya maitu methiwe na inee kwa ala meutumia kiw'u kila kimbusini ila mevakui nasyo meutumia kiw'u kiu naku itheo kula usi welekele na kusuvia mbusi nikana mavikiwe ni kiw'u kitheu.

Ingi miti yoo nikwikala yisuviiku na muthanga uteukuwa yila mevanda miti na kuatiia mawalany'o maseo ma TIST.

Ngwatanio ya Karima Kambicha: Kusuvia kiw'u, Mbumo sya mbusi na kuketha moseo ma syindu kivathukany'o kwikala vamwe.

(livoti iseuvitw'e ni John Kimathi, Muthukumi wa ngwatanio).

Ithyi mangwatanio ya Karima Kambicha twi ngwatanio kana ila ya syaikie August 2014 yina tukundi tunini 28. Umunthi nituvandite miti mbee wa 35,000 na miti 25,000 ya isu nimithiane na ikavitukithw'a.

Oundu tuendee na kwosa kilio nthini wa Tist, now'o tuendee na na ukwata umanyi mwingi iulu wa mawithyululuko maitu. Kuvika omituki amemba na mbai yitu nimethiitwe me nyamu situ ila ithyululukite mwambiio wa mbusi ula ni Kathima. Kii nikinatetheesye kwanangika kwa mawithyulluluko na wumo wa mbusi imwe na kwoou tukethiwa tuyiumisya andu ala me naku itheo meutumia mbusi na mikao ila yumite kiimani kii kya Kathima.

Ngwatanio yitu niyatongoisye na kukony'a andu ma mbaitu walany'oni wa kutungia na kwailya w'umo uyu wa kiw'u. Atongoi ma ngwatanio yitu ala ni Mr. Robert Mbaya, Daniel Kigunda na Josephine Nyoroka nimatunengie utongoi ula waile na matutongoesya kwony'a andu ma mbaitu useo wa kwiyumya kwitu ithyoothe kwailya wumo uyu wa kiw'u vala twavikie ukwata uthukumi mwianu na twavanda miti mbee wa 1,000 ya kiene.

Twina utanu nundu wia uyu twakunie twi vamwe nditungia tu mawithyululuko na kumailya tu indi ukeethiwa wi undu wa ulilikano kwa kisyao kitu myaka yukite na undu maile ika kusuvia mawithyululuko otuendee na utania moseo ma miti ino.



Kakundi kanini ka miti ya ndawa ka Mazingira Herbal kuendee kutania vaita wa kutumia nzia nzeo sya TIST.

(Isevitw'e ni Peter Mithiru, muthukumi wa ngwatanio)

Muimi wa TIST, Mr. Dickson Kamau, ula w nthini wa kakundi ka Mazingira Herbal Small Group ya ngwatanio ya Salama nthini wa Nyahururu. Kakundi kaa kalikile nthini wa TIST mai wa katano 2008 kena memba 6 aka na aume eli.

Kwa yu kikundi kii kya Dickson nikivandite miti mbee wa 2000 vala kilungu kya 90% ni miti ya kiene. Dickson asakuie kuvanda miti ya kiene itina wa kumanyiw'a ni TIST iulu wa vaita wa miti ino.

Easya " Nambiie uvanda miti ya kiene kuma mwaka wa 2009 na kwa kwisila momanyisyo ma TIST ninamanya mawalany'o maseo ma uvandi wa miti na iulu wa kivuio na undu itonya kumwa kivuioni na kuvandwa kithekani na undu wa kusuvia miti yakwa". vaa Dickson ena mithemba kauta ya miti ta Prunus Africana(484), Red Cedar (404), Warbugia Ugandansis (331) na Olea Africana (557).

Umunthi Dickson easya kana niwambiie umanya iulu wa vaita wa miti ta ndawa. " Ndyeesi kana miti ino ndivanda kana niyendekete muno nundu wa kwithiwa yi ndawa. umunthi andu aingi mokaa kwaka mayenda nimatetheesye kwa kumane natu, makonde/makole na mii. Ve muiiti utumiaa

ndawa sya miti ta ino unookie kwakwa ayenda nimutee".

Dickson ena walany'o wa kuvengea myatu nthini wa miti yake nikana iendee na kumune vaita munene mbeange. Ingi nukwenda kuendee na uvanda miti kithekani kyake munamuno miti ya mitunda kisioni kya muunda wake kila kitiele. Kwayu nuseuvitye kivuio kya iembe na ivakato/ikondovea. Kando na kukwata vaita wa mawalany'o maseo ma TIST kakundi ka Dickson nikakwatite ndivi ya miti. "twina utanu kwithiwa twalikile nthini wa TIST"



Dickson Kamau in his indigenous tree grove.

Unou wa Muthanga

Kwata vaita w'otho kuma kithekani kyaku.

Muthanga nikyau?

Muthanga nikaseemu ka yiulu ka nthi. Kethiawa na kiw'u, nzeve, unou, na uthwii wa nthi.

Muthanga useuvaw'a ata?

Mavia mathiana nimo maseuvasya muthanga ula wendekaa ni miti kumea na kwikala. Ingi miti/mimea nisyokaa ikongeleelwa muthangani kuseuvya unouc wa muthanga. Oundu ivia yiendee na kuthiwa now'o mitiyongelekete na unou wa muthanga kwaila nukana kiw'u kingi kithiwe kitonya ukwatwa ni muthanga na kuendeesya miti/mimea kumea na kwiana.

Niki unou wa muthanga wa vata?

Unou wa muthanga (kaingi usevitw'e kaingi kuma kwoani kwa miti/matu) ila yumasya unou mwingi naw'o uayoswa ni miti ingi nikana yiane. Ingi unou uyu nutetheesya tusamu tula twikalaa muthangani ta yiumbi, mithowe, ngongoo, ing'au, kukwata liu nayo iitetheesya muthanga kukwata nzeve nakiw'u kwikalaa muthangani.

Nikyau kiamuaa muthemba wa muthanga?

- Nzeve: uvyuvu na uthithu wa vandu na kiw'u nisyo itetheesya ivia kuthiwa yila yiseuvasya muthanga.
- Organisms: tusamu ta bacteria na fungi vamwe na mithowe, syingolondo na tusamu tula tungi twikalaa muthangani nitetheesya muno kuvulany'a muthanga na ingi kutuma matialyo ma mimea na matu moa na kuseuvya nzeve ya nitrogen ila yikiawa muthangani ni bacteria yitawa rhizobium.
- Utheeu wa vandu: (topograpohy) ethiwa vandu ni vatheeu niw'o muthanga wavo ukuawa na mituki na kutheew'a syandani.
- Muthemba we via: Undu ivia yila yithiikite yiilye.
- Mwikalo wa mundu: undu twatumia muthanga na kuusuvia nikuutumuma unou wa muthanga ueleeka.

Ingi muthanga ula winaw'o uamuawa ni kithangathi, mututu na yumba yila yiuseuvitye. Ve ivisa yi ithangu yila yiatie yiuwony'a uaaniku wa muthanga. Uvinyu wa muthanga na undu uaanikite nuamuaa undu mii

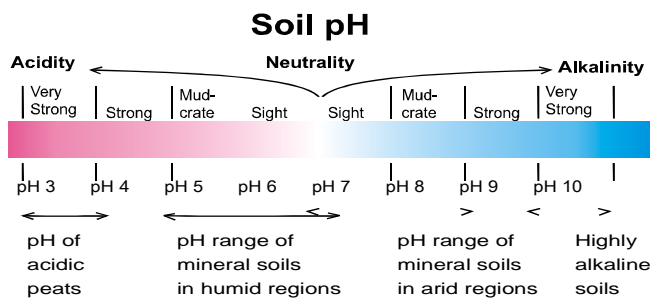


ya muti ikulika muthangani na undu kiw'u kitonya kwikala muthangani.

Niki asiti kana PH ya vata?

Muthanga kwithiwa wina asiti mbingi kana wi alkali kii niamuaa undu miti ukumya unou muthangani na ni tusamu twau kana bacteria itonya kwikala muthangani usu. Kaingi monou maingi ma muthanga nimethiawa matonya uvikia mimea/miti malika kiw'uni yila memuthangani wina asiti mbingi kwi ula wikatikati kana muthithu ute asiti.

Onakau muthanga wina aciti mbingi bacteria na mithowe mingi nditonya kwikala muthangani usu kwoou kwoa kwa matu/mavuti kutwika vuu uyithia kwi nthi na kwoou kusisiia kwiana kwa miti. Kaingi muthanga museo waile ithiwa na PH ya 5.5 kana 7.5 na wimwiu kwa langi.



Muthanga munou niwiva?

Muthanga munou nula wina nutrients syonthe ilasyikwendeka kwa muti kumea na kwikala.

- Nutrients sya mbee: Nitrogen, Phosphorus na Potassium.
- Nutrients ya keli: Sulphur, Magnesium, Calcium
- Ila syendekaa niini: Iron, Manganese, Boron, Chlorine, Zinc, Copper, Molybdenum na Nickel

PH ya muthanga Nzia sya kwongela unou wa muthanga.

- Ongele Nitrogen kwanzia ya vuu wa ngilini na Phosphorus kwa ivia ya Phosphate).
- Kolany'a vuu na maumao ma indo ula withiwa wi museo waindwa kwi wumite indoni na nokwithiwa wina tusamu twingi twa pathogens. vuu uyu useuvaa waindwa vandu va ivinda ya mai ili.
- Ongela vuu kwa nzia ino yivaa nthi.
- Tata utumie nzima ya kusuvia undu uvundiitw'e nii TIST.
- Kukuany'a mimea.
- Kuvandanisya.
- Kuvanda mitii na liu.
- Kuvanda osyindu sya uwwika ta nthooko, na mboso.
- Kutia muunda kwa ivinda.
- Kutumia mavuti kuvwika.
- Kutumia maima ma nima ya kusuvia.
- Kuvanda miti kusiiia muthanga kikuwa kana kwisa mitau, fanya juu Kuvandanisya utumia Nzuu, Dolichos Lablab, Macuna Pruriens, Crotalaria, Canavalia.

Ongela muu ula withiawa na calcium, potassium carbonate Ongela lime ethiwa niwisi muthanga waku wina asiti mbingi.

Ti useo kwongela minerals mbiongi eka ila syinthini wa vuu wa yiima utathimite muthanga ukamanya ni mineral yiva itevo na ikwendeka.

Ve ivinda yithiawa ukethia no wongelile vuu wa ndukani yaani vatalisa. Tumia kwiana na uelesyo wa ala masevisye kwianana na kisio kyaku na eka maovisa ma nima ala me kisioni kyaku mautae iulu wa w'o.

Nitrogen	Phosphorus (P ₂ O ₅)	Potassium (K ₂ O)
<ul style="list-style-type: none"> • Leguminous crops that are used as green manures or as mulch provide between 20 to 80 kg N / acre which can be used by subsequent crops. • Blood meal / feather meal 12-15% N. They are applied directly to the crops. • Uriness from all species contain pure urea (up to 1% N). It is not a stupid idea to urinate on the compost heap! • Poultry manure 8-20 kg N/t • Pig manure 3-5 kg N/t • Goat / Sheep manure 2-4 kg N/t • Cattle manures 2-3 kg N/t • Compost * 1 kg N/t • Manure teas and plant teas provide easily available nitrogen and can be used as lop dressing or foliar feeds 	<ul style="list-style-type: none"> • Rock Phosphate 20-33% • Bone Meals 12-25% • Poultry manure 10-25 kg N/t • Pig manure 3-6 kg N/t • Goat / Sheep manure 2-5 kg N/t • Cattle manures 2-3 kg N/t • Compost * 4 kg N/t 	<ul style="list-style-type: none"> • Wood Ash 3-7% • Goat / Sheep manure 12 kg N/t • Cattle manures 5-12 kg N/t • Poultry manure 5-12 kg N/t • Compost * 6 kg N/t • Pig manure 3-7 kg N/t • Urines: 1-3 kg N/t
<p>Content of purely vegetative compost. If compost is prepared with livestock manures, rock phosphate and wood ash, the product will have higher nutrient contents.</p> <p>Nutrient contents of manures and composts are highly dependent on handling and storage and on feed quality!</p>		

Kuseuvya vuu wa yiima Vuu wa yiima niwakuseuvya vate kemikoo na nutetheesya mimea kwiana. Withiawa wi museo nundu utumiaa syindu sya kwimesya itena kemikoo na ndwanangaa mimea na mawithyululuko. vuu uyu nilaisi kuseuvya na ndwingalama nene ta wakuu na nimuseo mbee kwa kwongela unou wa mithanga.

Nitrogen Phosphorus (P O) Potassium (K O) 2 5 2

Nikyau kitonya utumiwa kuseuvya vuu wa yiima?

- Makusa/mavuti ma matialyo ma liu kuma muundani kana matu, usese, kya kya ngombe, maumao ma indo, matialyo ma liu wa andu, matunda, muu, mboka, mathngangi matilange na ingi mbingi.
- Ndukatumie nyama, maia, mauta, syuma kana



plastic. Nzia nzeo sya kuseuvya vuu wa yiima

- Inza yiima vandu vena muunyi
- Vwika na matu ma maiii
- Ngithya na kiw'u yila kute kwiu
- Siia mbua ndikakue unou.
- Atiia matambya aya $\frac{1}{3}$ ya ngilini ethiwa ni matu, nyeki, matunda, yiia kana miti $\frac{1}{3}$ Matu momu kana ma langi wa muthanga (brown) ta mavemba, makusa, mutu wa musumeno etc $\frac{1}{3}$ syindu ngito ta ngava ndilange Ikiithya watumia kiko kya miti/mimea itanamba usyaa Nzeve niyendekaa kuseuvya vuu kwoou ikiithya niwavilany'a nisa na nduvinyiie muno vena nzeve.

Ikala uinginya, uvwikite na kueka vandu va myai kauta nikana yooe na ilikana nesa Wwoona yambiia uyunga muno veonany'a wikiite kiw'u kingi kana matu ma ngilini nimmo maingi kwoou ongela syindumbumu ta matu, mavemba, makusa na uivulany'a. Tata withiwe na syindu sya uvulany'a na kueuvya vuu tayali mwai ta ili kana itatu mbee wa mbua kwambiia nikana utumie ivindani ya mbanda. Vuu uyu waile ithiwa uli muthanga(brown) na ulekanitye wavya. No usunge vuu uyu kumywa ikuli ila itaneevya na uitungia yiimani iendee uvyaa.

Ikundi imwe sya TIST syithiitwe iitumia nzia ino yivaa nthi.

Kuseuvya vuu wa yiima nundu kwasyo yithiitwe yi nzeo useuvya vuu wa yiima kwa ikundi imwe sya TIST:-

- 1) Kusakua kisio kya matambya 4 x 4m na kwisa yiima
- 2) Enga kisio
- 3) Inza yiima uthathau wa 3-4m na 1.5uliku
- 4) Kolany'a matialyo ma mavemba, muvya, mavoso na uitilanga tulungu tuniini
- 5) Ikiia yiimani itumie uliku wa 0.5m
- 6) Ikiia muu wa lita itano
- 7) Ongela kyaa kya indo ethiwa kivo kya uliku wa 30cm.
- 8) Ongela matu na makusa uliku ungi wa 0.5m
- 9) Ikiia muu ungi wa lita itano.
- 10) Ongela matu na makusa withie yiima notayausua.
- 11) Ususya yiima na muthanga.
- 12) Uyusuya yiima ikia muti muasa kati withie utinite yiimani ungu.
- 13) Eka yiima yiu yiyiue vandu va myai itatu kana mithenya miongo kenda.
- 14) Ivindani yii yonthe osaa kiw'u kila kina kiko uketa vo ngelekany'o kila wavua nakyo kana kuthambya miio. Ethiwa wina maumao ma indo no wite vo.
- 15) Tata navinya ungithye yima yii kila mithenya kwa nzia ila utonya.
- 16) Itina wa mithenya miongo keenda vuu wiithiwa wi tayali. Tumia muti uyu wikati ta kithimi kya uvyuvu. Vuu wasuva ukeethiwa wimuvyu na nowone muti uuyu waumya uitoa.

TIST: Mavokoto/Makolovea nimatonya ukunenga ueti museo.

Uvoo uuni kuma kwa The Organic Farmer (www.theorganicfarmer.org/profile 2) na Jurgen griesbach, 2005:

Mavakato ala mameaa Kenya . ICREF (World Agroforestry Centre), Nairobi, Kenya.

Makolovea ni Itutnda yivata muno Kenya kwa utandithya wa kenya na nthi sya nza.

Ve mithemba itatu ya makolovea ila yikaa nesa isioni kivathukany'o. Sisyaa ni muthemba wiva wikaa nesa kisionikyaku. Uitumia mbindi kana miti misikany'e kuma ikoloveani sya kisio kiu na ingi kuma vandu vangi syikwika nesanga nundu miti ila imeteete kisioni kiu niyikaa nesa muno kwi muti wa kuete.

Undu wa useuvya mbeu.

Mbindi nikolanaw'a kuma itini ila itena uwau na nzeo. Mbindi ithi no siindwe ndawani kuola fungi na ivaandwa kivuioni kana mikeveni ona kana mathanguni ma nailoni mena maima. Muunyi

niwavata kwa kumea. Mamina umea mena uasa wa 20cm kana mena matu eli meanu nesa niw'o makuawa na kutwawa kuvandwa vala maile. ingi kusingawa nikwikawa itinia wa myai thathatu. Makolovea ma usingany'a nimasyaa tene (itina wa myaka 3-4 itina wa kuvanda kithekani vala yaile) kwi ala mataasinganw'a. Itina wa kusinganya nutwaa muundani itina wa myai itatu kana ina.

Kuvanda miti na kwikinyia kwayo.

Muthanga nonginya withiwe wi muliku, munou na wina nzeve nesa/ulekanitye. Makolovea manyendete muthanga uteutwaa kiw'u na mayumiasya munyu kana kiw'u kina asiti. Ivinda iseo ya uvanda mikolovea ni mbua iyambiia na uyiikiithyaa yina utaaniu wa matambya 6 kana ikumi kwina na unou wa muthanga, nzeve na muthemba. Maima ma kuvanda nimethiawa na uliku wa viti ili na uthathau o wa viti ili. Ethiwa yiima niyooma isanga muthanga ulekany'e nikana kiw'u kitonye uthi. Muthanga ula waumya



uyisa maima aya no utumie kuvulanya na vuu uvanda miti ino. vanda ute kwana nga mii ya miti ino na uliku oula wiinaw'o kivuioni. seuvya katindio ungu wa kamuti utumia muthanga nikana withie ona wangithye kiw'u nikiutuumana. Itina wa kuvanda ngithya. tumia lita 5-20 kwianana na undu muti wiana. Nouwike ungu wa muti uuyyu na mavuti kiw'u kieke uny'aa na mituki. ethiwa kuna mbua nonginya ungithye kwa ivinda na uisuvia indo kana nyamu sya kitheka kwanga miti ino.

Kungithya Miti ya matunda.

Kungithye ni kuseo kwia nana na muti undu wianite. mbee mwai yambee wavanda, na itina mwaka wambee mbee wa muti uyu utanamba kwikinya. Miti niyaile usiw'a kaingi na kungithw'a na kusiw'a kana niyithiwa na wonany'o wa kwenda kiw'u. Ikolovea nisyithiwa na mwii muasa wa kiw'u kwianana na nzeve ya kisio munamuno yila kwina munyao niwaile ungithya. Yila miti yina malaa, matunda kwikika na kwina miti ino niyendaa kiw'u kianu.

Mbolea /Vuu.

Muti wa kicolovea niwendaa kwikala uyikiwa vuu ta wa kilo 5 kuvika 20 kwa kila muti kila mwaka. Syisya nitrogen yongelaa matu no ti matunda na ingi mii ya kivokoto nimenanite na munyu. Phosphorus na potassium nisyavata kwa muti kuima ula ukusyaa matunda.

Mitutu na mowau al; a makwataa ikolovea.

Kusiia kwithiwa kwa vata muno. Ni useo kusisya vandu vanou, ikiithya utaniu mwailu wivo, vanda mivai ila miseo na kisio kyaku, ndukaeye yiia (imia) ndukekie vuu mwingi. Na ingi mitutu l thina munene kwa makolovea nthini wa Kenya. tumia syindu sya neem kuiita matunda maku na kuaa tumitutu.

Mowau aya nomethiwe muisyo kwa mikolovea yaku Kwoa kwa mii (Phytophthora fungus disease) Miti yithiwa na usyao munini na matu mate maingi na mauluku mavovu. Ngava nisyumaa. mii niyoaa na muti uyuma. miti ila yina uwau uyu niyaile ukuwa na kwanangwa. Kiw'u kiyu niw'o muiito na ndawa sya fungicide kuiita mbeu kwoondu wa kusiia uwau uyu. Ve ndawa ili undu wa uwau uyu ila ni:- Ridomil na Aliette

Anthracnose: Matunda/Makolovea kumesya ikonde ya muthanga, kuma, kwitika matunda memanini na kwa itunda iviku ona uwau withiwa wivithite two nekaa muvaka yikew'e niw'o uwonaa. Ingi vaa ndawa ya uwau uu ni Cooper based fungicides nitumiwa kuiita Anthracnose.

Cercospora Fruit Sport. Kaa ni kasio kaniini ka yelo kakwataa itunda kana matu utethia no matonatone. itina nimekalaa muthanga na mayatuka na makatuma mowau angi makwata itunda yiu. Uwau uyu onaw'o uitawa na Copper based fungicide.

Kuvaluka kwa matunda: uu ti uwa na niundu withiwa na mithemba ingi ya miiti ya mitunda. Miti nivalukasya matunda ala ikwiw;a itetonya kua mavike memanii na meananga weethia meana itumbi.

Kuketha makolovea

Miti ya usikanya yambiia usya yina myaka 3 kana 4 itina wa kuvandwa.

Ve mawonany'o muti uyu kana makolovea ni maviku na nimekwenda kwiw'a

- Ala maiu nimavinduaa langu kuma ngilini makaia kana makekala puple
- Ala ma ngilini tukome tula tumakwatiie twikalaa yelo na ikonye yiieka umetameta kana muthya ikekala ta wina nganga.
- Mithemba ingi niyikalaa ta yeeuva
- Matunda ala mathambalalaa maindwa kiw'uni methiwa me maviku.

Ndunyu/Soko.

Kwata makolovea nesa usuviite! Soko sya nza ta European market syithiwa na ulumu muvyu undu wa useo wa itunda yila mekwenda. ula ni vinya kwa aimi anini kuvikia. Soko sya vaa kenya iithina muno nundu makolovea kaingi makothaa uvika othe iimwe kwoou aimi uyithia maina kwata vaita nesa mata. Ni undu muto kwa imi kwia makolovea kwa ivinda iasa. Kwoou ala maimaa na kuvanda makato/makolovea kwa undu wa utandithya nimaile ukwatanw'a na aimi anini kwoondu wa soko wina vaita kwa muimi.

Mithemba ya mikolovea ila yi kenya.

1. **Hass and Fuertes.** Mithemba ino ili nitumikaa kwa kusikany'a nundu yithiwa na mauta maingi.
2. **Puebla:** Niyendekente nbi aimi aingi nundu ndiwaangaa na ndithiwa na ndii
3. **Singapore:** Kicolovea muthemba uu wianaa mituki na uvikiaa kusyaa wina myai 14 kana 15 na withiwa na uasa wa viti ili
4. **G5 na G6:** Mithemba ino ili nimiseo nundu niyikaa nesa isioni syothe na niyendekete ni aimi nundu ona nisinganaw'a na mivai ingi na ikeka nesa.

Aimi mekulw'a maue mbeu kwa nduka ila mbitikilya.

Mazingira Bora



TIST

The International Small Group & Tree Planting Program
www.tist.org

Kipsigis Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Some of the members of Karima Ka Mbica Child Cluster. They are leading other community members in protecting and conserving a nearby Water Catchment Area.

Inside:

Kelunoik che kinyoru ye kirib oinosiek ak kemin ketikab kipkaa che nomegei ak beek.
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Karima kambicha TIST Cluster: Kigerib kotametusiek chebo beek ak kigenyorunen borotet en mengotenyon. *Page 2*

Mazingira Herbal group ko boiboenchin kelunoikab TIST en boisiet ne kararan. *Page 3*

Tinye imbarengu borotet en okwoindo. *Page 3*

TIST: Konu avacado melekwek. *Page 5*



Kelunoik che kinyoru ye kirib oinosiek ak kemin ketikab kipkaa che nomegei ak beek.

Boiboen kurubisiek chemengechen agobo TIST ye kigonam konet biik korib kotametusiakab beek komenchi ketik chebo kigaa. Kigolewen temik korib ngegusiakab onosiek ko magitem asi komuch koter ngungunyek komasut beek. En inguni komiten temik chechang che isibi koboronet ne kararn nebo TIST en minetab ketik en ngengusiak. Kiboibo mising en temik che kiimuch korib onosiek amun yoton ko ole miten sobosiekab biik tugul.

Nee komonutiyet nebo kelunoik ye kimin ketikab kipkaa en tobonik ab onosiek?

- Ketichu kotoret ngungunyek ak maranetab beek.
- Ketichu kotoret kotilil beek en onosiek che mengechen ak en silangok.
- Tigiti gab ketichuton ko nome ngungunyek komoib beek.
- Ketichuton ko tynye boisiet neo mising en kotililetab koristo.
- Tere beek koma iyeso koba bolik en kasarta nebo kemeutan anan betut neo asista.
- Tere kogochin Emet itondo ne kararan, nyorunen torik omituwogik, kutik ak tiyongik. Toreti mengotosiekab chemenye yoton.

Amun nee asi kerib ngegusiakab beek?

- Timuwek ak ketik igosib ngengusiak ko toreti ngungunyek konyor okwoindo ak konyor Emet itondo en betusiak tugul.
- Timwek ak ketik koribe beek komonyor miondab kowek.
- Nyorunen inchiarenik iyotenyuan beek che kororonen che monyobirotin ak tiyony agetugul ne ne menyee Beek.

Nee borotengu? Nee kotigonet ne iyoe en chitab kokwengu agobo ngegusiak?

- Ligu chito neribe ngenusiak.
- Kinyorunen borotet ne tesat ye kirib ngegusiak en boisiyonik kiyok.
- Keisten chepkogutgei (blugam) en oinosiek kiyok che kitinye.
- Koribok ak kogororonegitun beek en oinosiek tugul cheech ak chemengechen.
- Kitigon mengik che negitin ak oinosiek, ngengusiak korib komie asi komuch koiti biik chemenye legemosiek beek che kororon.

Asi koiti agichek kiribok imbarenik kwak kotoretok komoibet ngungunyek ye mine ketik.

Karima kambicha TIST Cluster: Kigerib kotametusiak chebo beek ak kigenyorunen borotet en mengotenyon.

mwoe John Kimathi.

Eche anyon biikab kirima kambicha kiginome Kilasta en arawetab sisit 2014 kimiten kurubisiek 28 chemengechen. En iguni ketiye ketik 35,000 ago 25,000 ko iitotin.

Yen ketestai en TIST ko ki kenyorunen ngomnotet neo ak ole kimuchi keribten mengotenyon. En konegit kotoo mengik ak membaek koyoti tuga ole kutunen beek. Koiti anyun kobosok beek got komatagonyor biik che legemet .

Kii koyumak temik tugul ak kongalal agobo ribetab beek en tonochinetab kontoikab kilasta-Robert mbaya, Daniel kigunda ak Josephine nyoroka ko ngolochin biik kotes minetab ketik chesirei 1,000 chebo kipkaa. En niton komoyome kitiyo baten nyolchech kerib asitun konyor logokiyok ko kararan ak lbinta ne nyone.



Mazingira Herbal group ko boiboenchin kelunoikab TIST en boisiet ne kararan.

mwoe Peter mithiru.

Mr Dickson kamau ko agenge en temik chebo mazingira nebo salama kilasta en Nyahururu. Kitoo konomi TIST en 2008 komiten Boisiek oeng ak Chebiyosok angwan.

En niguni kurubitab Dickson ko tnye ketik 2000 ago en chuton tugul ko 90% ko kipгаа. Kilewel ye kingonyor konetisiet ak kongen amunee.

Kii nam kobiti ketik en kabeti nenyin chebo kipгаа Tendonok (404) warbugia Ugandansis (331) ak Saptonok (557).

En ngalalenyin komwoe kole kigolam konetgei agobo kerichek koyob ketigik amun kitiye maget. En niguni kobwochin biik chechang

komoche toretet en ketichutonkou sogek. Berik ak tigitik. Tnye kora tetutiet ko sangan segemik asi konyorunen chepkondok ak ketikab logoek kou Avocado, maembe chemiten kapbeti en inguni.

En betusichu konyorunen kurubitab Dickson melekwek en ketikwak, kiboibo en agobo TIST.



Dickson Kamau in his indigenous tree grove.

Tnye imbarengu borotet en okwoindo.

Ngungunyek ko nee?

Ngungunyek komiten baragutab Nguwondet ole nyorchin timwek tugul sobet amun miten beek, koristo ak omituwogik.

Kitoutogei ano ngununyek?

Tougei ye boroksei koik ak kotuyogei ak munyuk en kasartab Robta anan en betusiek chemiten burgeiyet neo en Emet ko nyorunen minutik kogimegitun. Ye ibutin ngungunyek minutik kotestai koyomoge tugul, kobit kogonorak beek en oritinyun kosigi minutik koegitu.

Amu nee kobo komonut omituwogik en ngungunyek?

Bo komonut amun ye ibutin nguwoy minutiyet age tugul ak konyor lunet koik omituwogikab minutik alak che rutu. Tesin kotesak kutik en ngungunyek ak kotuiyo ak beek komumutak kouti.

Nee koborunet ne tesei ngungunyek?

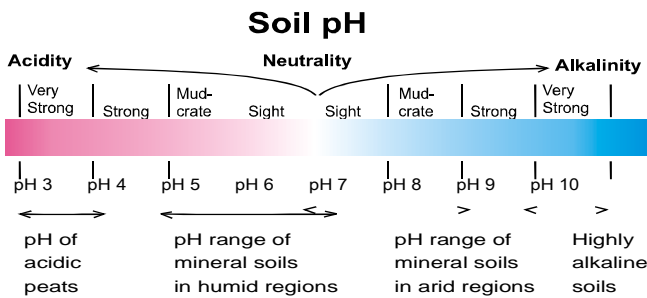
- *Burgeiyet:* En ole omising burgeiyet ak beek kogochi kobor koik.
- *Kutik chesobtos:* Kutik chuton ko cheome minutik en ngungunyek ak enlet kotesin omituwogik konyoy minutik che rutu. Ye testai kobitu kotuyogei ngungunyek kou wegitu en betusiek tugul.
- *Ole uemet:* en ole tulonok konyumnyum amun borosei koik kosir ole ibutat.
- *Tounetab tuguk:* niton konome koik koborose koik che busbus koigei busiek.
- *Bisionikab kimugulmet:* ingerib anan komarib ko tnye weget komnyor ngungunyek oguwoindo.

Koyometab ngungunyek ko bitunen ole kigitounto kongen en tai kou ngainet ak ment. En bichait neisibu koboru. Konu keret ole bentitoo tigiti en ngungunyek ak konoretab beek.



Amune kobo komonut (PH) en ngungunyek?

Niton ko kimnotet netinye ngungunyek kou (acidic anan Alkali) che imuche kowech omituwogik che ome minutik ak nee negimuchi ketesi. Nyumnyumen omituwogik en tigiti kochut. Angot komiten munyuk che chang en ngungunyek komotinye borowendo kuti k chemiten kochangit, kobose nulet en minutik. Ngungunyek



che yomotin kotinye (PH) nebo 5.5 ak 7.5 chuton ko tuwen en keret.

Okwointab ngungunyek ko nee?

Niton ko ngungunyek che titye omituwoging tugul che nyorunen minutik sobet.

- *Omituwoging che tai:* Nitrogen, Phosphorus, Potassium .
- *Chebo oeng:* Sullphur, Magnesium, Calcium.
- *Chemengechen:* Iron, Manganese, Boron, Chlorine, Zinc, Copper, Molybderum ak

Nickle Kokwoutik che kisibi ketesi okwoindo ngungunyek:

- Tesin Nitrogen niton koyob minutik chenyolilen ak Phosphous (Phosphate).
- Tesin kaumanikab tuga ak sogororek ak irur korurio amat iboisien che tuwonen amun tiye (Ammonia) che chang che imuchi kobar minutik ak kongem kutik en ngungunyek.
- Ongeboisien imbaret komagibat.
 - Waletab minutik en mbar anan kemin minutik chebesiyotin kasarta agenge.
 - Keboisien geringonin en minetak minutik.
 - Kemin minutik kou Robwonik ak inchuguk.
 - Kemin kerik asi korib ngungunyek komosut beek.
 - Kiyomen minutik kou DilChos akcanavali.
- Ketesi orek amun titye Calcium ak Potassium.
- Tesin lime agot kochang munyek.
- Mat itesi tuguchu tugl got inai ile nee nemotinye ngungunyek.

Nitrogen	Phosphorus (P ₂ O ₅)	Potassium (K ₂ O)
<ul style="list-style-type: none"> • Leguminous crops that are used as green manures or as mulch provide between 20 to 80 kg N / acre which can be used by subsequent crops. • Blood meal / feather meal 12-15% N. They are applied directly to the crops. • Uriness from all species contain pure urea (up to 1% N). It is not a stupid idea to urinate on the compost heap! • Poultry manure 8-20 kg N/t • Pig manure 3-5 kg N/t • Goat / Sheep manure 2-4 kg N/t • Cattle manures 2-3 kg N/t • Compost * 1 kg N/t • Manure teas and plant teas provide easily available nitrogen and can be used as lop dressing or follar feeds 	<ul style="list-style-type: none"> • Rock Phosphate 20-33% • Bone Meals 12-25% • Poultry manure 10-25 kg N/t • Pig manure 3-6 kg N/t • Goat / Sheep manure 2-5 kg N/t • Cattle manures 2-3 kg N/t • Compost * 4 kg N/t 	<ul style="list-style-type: none"> • Wood Ash 3-7% • Goat / Sheep manure 12 kg N/t • Cattle manures 5-12 kg N/t • Poultry manure 5-12 kg N/t • Compost * 6 kg N/t • Pig manure 3-7 kg N/t • Urines: 1-3 kg N/t
Content of purely vegetative compost. If compost is prepared with livestock manures, rock phosphate and wood ash, the product will have higher nutrient contents. Nutrient contents of manures and composts are highly dependent on handling and storage and on feed quality!		

Keturek:

Keturek ko motinye karamet ago nyumnyumen en chobet ago motinye ngemet en rurutik iyokwoe ngungunyek.

Kitounto ono keturek?

Niton ko koyometab ngetunanikab imbar, sorowekab.

- Negoak ak chebo tiyony nemiten en kaa ak orek.
- Amat iboisien tuguk kou banyek, muwanik anan plastigisiek.

**Getoo keturek:**

- Lewen ole kararan ele miten urowet.
- Tuch ak sogegab sosuriyet anan ko itisiyot.
- Ibisen beek en kasarta neyamat Emet.
- Tekten en Robta asi moibuch beek.
 - Tesin $\frac{1}{3}$ nebo tuguk chenyolilen kou suswek, logoek alak.
 - Tesin $\frac{1}{3}$ nebo tuguk chetolelionen kou sogek cheyomiyotin, murek
 - Tesin $\frac{1}{3}$ nebo temenikab ketik chengech
 - Boisien minutik che tinye lokoek che motinye miyondo.
- Iyum tugul ak iyome amat igony amun mo kingei koristo asi koboisien.
- Tesin beek asi komuch konyor nunet ye kagobata orowek oeng ingol.
- Yeibata nito komuche kogon koristo itesi tuguk chenyolilen kou inguwek niton koboru kole tiye beek chechang en orit. Ye kachobok inemu ak igonor got koit kolset.

Kiyomnda temikab TIST kotoo keturek

1. Lewen ole itounen keturet 4mx4m.
2. Igot tilit yoton.
3. Tem keringet 3-4m ak 1.5m orit.
4. Iyumchin kayumanik tgugul yoton.
5. Rongik kot koit 0.5m.
6. Tesin orek che keburuch ak orek.
7. Neisibu ites kot goit 30cm ngototokab tuga anan kobo ngororek.
8. Tesin sogek kot korigta konyi.
9. Nebo let anyun ite ngungunye kot konyi.
10. Rutin keti ne tenten kuwenetab keringet kot kotiny kel.
11. Igo munyo en kasarta betusiek 90.
12. Tesin beekab orek 5 litres.
13. Tesin sogek ak mobek (0.5m).
14. En kasariton iyumchi beek chon iboisien imweten ingoroik anan ko keun kot.
15. Tumchin beek en betut angetugul yon kobit beek.
16. Ye ibata betusiek 90 ko gorurio keturek boisien ketit asi koborun mat nemi orit, imuch iger kabusetab karisto nebunu keringat.

TIST: Konu avacado melekwek.

As extracted from *The Organic Farmer* (<http://www.theorganicfarmer.org/profile/2>) and Jürgen Griesbach, 2005: *Avocado growing in Kenya*. ICRAF (World Agroforestry Centre), Nairobi, Kenya.

Bokomut avacado en kenya kipoisien en kaa ago kararan en mungaret kiyokto koba bitonin.

Miten anyun ketik smogu chegororon che nomege ak ole menet. Boisien tenterek anan ko avacado ne kiginamsi koyop ketik che kororonen ana ko inyorunen kabetsiek chenegiten en inye. Ole kinyor chin tenterek.

Kinyorunen ketik chekororonen ogo che kigogongio.

Logoek.

Kiiume ak kubit en betit anan ko en muturaisiek ak keur en roboruo asi kogochi kobityo. Yon kagibit en kwony kegonye ye kait kointab 20cm kitut ak kinte mutura kotinye itik oeng. robet kerobe kobo orowek 100. Tebiye kenyisiek [3-4] asi kosich tobtok yekagemin kotagomi kabeti kotore orowek somok kot koit angwan.

**Minetab ketik ak ribet.**

Nyolchin ole miten ngungunyek che kororon che tinye okwoindo.momoche ole menet neu mising, ole tononen beek che tinye munyek chechang. Kararan ingemin en kasarta nebo kanametab robta. En kokwoutik komoche 6cm ak 10cm kotiyenge oleu emet [soin anan embwen]. Keringet koibe 2ft ak 2ft kwo kwony, ker ile keiste mugugugik asi kochomchi tigitik koba orit ketesin keture asi komuchi ketit konyor omitwogik en oret ne nyumnyum.

Ye kaimin ingonyor beek. Ingonyor 5-20 litres chebo beek kotiny e gei kiit neten ketit. Ye kemin ketit iur kel asi kour tigitik ak kogochi beek koteben keringet nebo let ko ngerib komaus tuga anan ko tiony.

Ka nagetab beek.

Bogomonut mising en keti beek en kasarta ne eetu ak kasarta ne tegose ketit. Rigin anyun ketit asi iguye sobenyin ak kinemoche en kasarta nenin.

Kotontoleiwek.

Ketit nebo avocado komoche mising konyor kotontoleiwek en abagora. En kenyit komuche konyor ketit agenge 5-20kg. Nitrogen kogochin koet ketit ak sogek .Tigitik anyun kotinye kolewen igochang munyuk en ngungunyek.

Susurik ak mionuek.

En teretab susurik komoche imbaret ne akwai igochin kokowoutik cheyome, rib komanam timto imbar amat in de keturek chechang kosir, ak konyor beek. Motinye ketitab avocado emenyon kewelnatet.

Mionuek che isubi ko chayach.

Nunetatab tigitik; inyoru kotinye ketit sogek che tuten che motinye iton. Temenik kololiotin, ye testai koyome en let koyam ketit ne tinye miondo kengusu en imbar. Miten anyun kerichek che iyonotin che kimuche keriben miondo-ridomil anan ko alietler

Anthravnose.

Inom e soge k kotuwegitun ak konyor chen igosenik. Logoitat ne m ingin komuche kotormosgei ko yon koet logoyat kotebie agoi korur, kitere anyun copper base fungicide.

Cercospora fruit spot.

Mongui kotolelionit logoiyyat ak sogek en kosernonit ak koter niton koyochin susurikn kochut lo goiyat kiteren kora copper based fungicide .

Fruit drop.

Niton ko momiondo baten bitu en logoek chechang amun moyome omitwogik koriben miten .

Keset.

Avocado ne kiginam si kosib korure en kasartab kenysisiek 3-4 yon kagemin.

- Miten koborunoik cheiboru yon koet; miten walet en logoek magotet konyalit kot tuiit
- Nyone komegotinye logoiyat iton
- Inge torchi bek logoiyat ko moinisi

Ndonyo; Temik che mengechen komoitin amun tinye olik cheole mogutik chechang mising, moitintos kururiyo tugul en kasarta ne agenge;ko moitin temik konyor anan kowal koik tuguk alak/

Ketik che nootin.

1. Hass ak fuartes- togunotin anan nootin amun tinye muwanik che chang/
2. Duebla; Keti komotinye usisiek ago monomin mindo/
3. Singapore; Kararan amun chogu en etune konge kotinye orowek 14-15.
4. G5 ak g6; Keti kochang en ole miten robta ak ole momiten kinomchitos ak ketik alak, asi konyor logoek chegororon

Temik ocheng ole omuche onyorunen ketik cheyomokse.