

Mazingira Bora



TIST

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

English Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Ndalani TIST Cluster during their month of December meeting 17/12/2018

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TIST: Seed Storage & Pre-treatment.

When storing seeds:

- Make sure that if you are transporting fruit from the site of seed collection that you keep them dry, shaded and well ventilated so that the seeds inside the fruit do not spoil.
- Transport your fruit and seeds in woven sacks or baskets. Do not transport them in plastic bags or tins that have no ventilation and can cause the moisture to collect and spoil the items.
- Make sure you have sorted the good quality seed first (see unit 2) and that the seed is clean and dry before being stored. Dry seed rustles and cracks when you shake it. Most seeds need to have been dried in the sun for 2-3 days before they are ready.
- Store your seeds in a dry, shaded place. Use storage material such as cloth sacks or clay pots to reduce the chances of mold. Use airtight containers or jars for high-value seeds, filling your containers completely to reduce air space.
- If you do not have enough seed to fill your containers, fill the gaps with material such as charcoal, rice husks, or crumpled newspaper. These will absorb air moisture.
- Use wooden pallets or poles to make sure the seed containers do not touch the ground (this can make them more susceptible to changes in temperature, damp, pests etc.). If you are using sacks or bags, you can hang them.
- Obtain advice from your nearby Small Groups and local extension workers to ask if you need to use a pesticide or fungicide to protect your particular seeds from pests. For example, neem oil or leaves, gliricidia leaves and soap may offer some protection.
- Remember to check your seeds regularly to ensure they are not being damaged.
- Obtain local information on how long your seeds can be stored for. This is dependent on the species. Many species, if stored properly, can be kept for a year or more.
- You can experiment at different time periods to check the germination rate of your seeds. Pick a small sample of seeds (for example, 100), record the number of seeds chosen, sow them and count how many germinate. If you do this every month, for example, you will be able to

see when the seed quality is starting to deteriorate. Share your findings with your Cluster.

- The cooler the storage environment, the longer your seeds can be stored. Ensure the seeds are not exposed to light. If the storage area is too humid the seeds will spoil more quickly.
- Note there is one category of seed called 'recalcitrant seed'. These seeds ideally need to be sown straight away after collection and extraction because they require high moisture content. If they are wrapped in damp cloths they can be stored for a few days up to a week. Recalcitrant seed dies once it is dry. Tree species that are examples of recalcitrant seeds include: *Artocarpus heterophyllus* (jackfruit), *Azadirachta indica* (neem), *Calamus* species (rattans), *Durio zibethinus* (durian), *Eusideroxylon zwageri* (ulin), *Theobroma cacao* (cacao) and many dipterocarps (*Shorea*, *Hopea*, *Palaquium*, etc).
- Finally, when you are transporting your seeds to the nursery, remember to keep them dry and covered.

What kind of pre-treatment might be needed?

- Sow some seeds and see how long they take to germinate. If they take longer than one week, consider pre-treatment. If you are not sure which of the following advice is best, do an experiment and try different pre-treatment techniques and share your findings with your Cluster leader to share the best practices.
- If the seeds have a very small or thin coat, often no treatment will be needed (e.g. *Croton megalocarpus*, *Neem*, *Cassia* species and *Kei apple* can be sown directly into a pot).
- If you have collected fruit, you can soak the fruit for 1-2 days, then get a wire mesh and squeeze the fruit against it to release the seed, using water to wash away the fruit pulp (e.g. for *Syzium cuminii*, *Dovyalis caffra*, *Trichilia emetica*, *Vitellaria paradoxa*, *Prunus Africana*, *Gmelina arborea* (gmelina), *Azadirachta indica* (neem) and *Tamarindus indica* (tamarind)).
- Some fruit just needs the outer layer removed by rubbing together (e.g. *Tectona grandis* (teak)



and Calamus species (rattans)). Some fruits have seeds that need to be pounded. After soaking the fruit for 1-2 days, pound the fruit with a mortar and pestle (e.g. for *Melia volkensii*, *Melia azedarach*, *Sclerocarya birrea*, *Cordia Africana*).

- Some pods need to dry for 3-5 days (in the semi-shade) and then be threshed to extract the seed (e.g. *Leucana* species, *Calliandra calothyrsus*, *Acacia* species, *Sesbania sesban*, *Grevillea robusta*, *Casuarina* species and *Eucalyptus* species).
- Seeds that have thick coats will need some form of pre-treatment. Some need to have their seed coat cracked with a hammer or a stone after drying for 3-5 days to allow water to enter the seed for germination. Seeds should be planted immediately after cracking. Species that may need cracking include *Melia* (mukau), *Podo* species, *Croton megalocarpus*, *Adansonia digitata*, *Swietenia macrophylla*, and *Delonix regia*. For small, hard seeds place

them in a jar lined with sand paper and shake hard enough to scratch the surface.

- Some seeds just require a small cut in the seed coat to help water infiltrate (nicking). Do not cut the part that was attached to the pod or capsule as this part contains the baby plant.
- Some seeds respond well to soaking in hot water (e.g. *Calliandra*, most *Acacias*, *Tamarind*, *Leucaena* and *Albizia*). Put the seeds in a container, boil the water and pour it over the seeds. Allow the water to cool and remove the seeds from the water after they look swollen.
- Some seeds can be soaked in cold water for 12-24 hours (e.g. *Sesbania*, *Tephrosia*, *Dalbergia* species, *Gmelina*, *Gliricidia* and *Acacia augustissima*). Put the seeds in a container and add the cold water (roughly double the volume of the seeds). Remove any seeds that are floating.
- All seeds, once pre-treated, need to be planted straight away.

Nursery Care.

A. Pest control.

Organisms like fungi, bacteria, viruses, nematodes and insects (e.g. ants, termites, aphids) can damage seedlings.

A common nursery disease is called damping off and is caused by fungi. It causes seeds to rot before germination, roots to decay before the shoot appears and the shoot to become thin and collapse.

The typical symptoms are:

- The thinning and death of the stem at ground level
- The subsequent wilting and falling over of the seedling
- The leaves turn yellow
- The seedling eventually dies

Control damping off by:

- Changing seedbed soil every 1-2 years. Loosening the soil also helps.
- Immediately removing affected seedlings and burning them
- Avoiding excessive watering

- Ensuring good drainage
- Providing better aeration
- Weeding effectively and on time
- The soil should not be overly fertile. The proper ratios of the soil should be followed. Reduce nitrogen content by applying less manure.
- There should be enough spacing between seedlings to avoid overcrowding.
- Make sure that the nursery is clean at all times.

Diseases can also be managed by the proper use of chemicals and insecticides. It is best to use natural insecticides as chemical ones can be expensive and may damage the environment (e.g. Application of ash)

- Ensure the seedbed is clean to avoid encouraging pests

B. Root pruning.

Move the seedlings around once a week so that the taproots do not sink into the ground and need to be cut. A healthy taproot helps the trees get water after transplanting.



When the seedlings are growing in the pots after 3-4 months (depending on species and climate) their roots start to grow out of the bottom of the pots. These roots should be cut every 1-2 months with knives. Note that care must be taken when lifting the pots so as not to damage the young roots.

Alternatively, try the raised nursery beds (see Unit 4), which reduce the need for root pruning as the roots drop off naturally.

C Watering, weeding and shading.

- Sprinklers should be attached to the watering cans so as not to cause soil erosion.
- You can also use a pierced tin.
- Avoid too much or too little watering, roughly 20 liters for 1000 seedlings. Too much water can weaken the seedlings and attract pests and fungus. One sign of over-watering is a thin film of algae or green moss on the soil surface.
- Water every morning and evening when possible.
- Sandy soils will need more watering than clay soils.
- Direct the water to the soil, not to the leaves.
- Water slowly to ensure it penetrates the soil.
- Be careful not to damage roots when weeding.
- Do not leave the weeding too late. Weeding is necessary as the weeds increase competition for light, soil, water and nutrients.
- Some seeds require shading – make sure simple shades are constructed.
- During the rainy season, cover the seedlings using dry grasses or hay. Seedlings should be moved away from under trees so water does not drip onto the seedlings and cause damage.
- Fence off the nursery to protect from cattle and playing children.
- Let the seedlings grow to about 30 cm before transplanting. This may take from one month to six months. Also remove the shade during this time.

Best practice to try: Raised pot beds.

At your Cluster meeting, encourage the Small Groups to try raised pot beds and to report back on whether the design makes a difference or not.

A raised bed can easily be made from a wooden frame and wire mesh (see photo). These allow automatic root pruning because when the roots get to the container bottom they naturally drop off (called air root pruning). This means that roots do not get injured through normal root pruning methods. The roots then tend to strengthen without growing further. This produces a healthy root system and the seedling has higher chances to establish faster in the field. It also eliminates the need for labour to do root pruning, a practice that is often forgotten or done too late with serious damage on the roots. Weed control under the raised beds is also easier.

The raised beds might appear to increase the amount of water used in nurseries. However, nursery operators have devised innovations to deal with this constraint. A good innovation observed in Tanzania is digging a trench, placing

planks of wood or wire mesh across it and placing the seedlings on the planks or wire mesh. The seedlings thus appear to be on the ground level but the trench under them provides the space that aids air root pruning. The water is trapped in the trench and will moisturize the seedlings through evaporation and reduce the need for very frequent watering. A polythene sheet can also be placed in the trench to ensure water does not seep into the ground.



Fig 1: Seedlings of various species arranged in stacks on a raised bed, TIST Makomboki Cluster in Murang'a County.



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 taproots, 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.

Anthraxnose: 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 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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Ndalani TIST Cluster wakiwa kwa mkutano wao wa kila mwezi, mwezi wa Decemba tarehe 17/12/2018

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Gwika mbeu na kwithuranira niuntu bwa kuanda.

Gwika Mbeu.

- Menyeera ati kethira nugukamata matunda kuuma antu aria ukuuthurania mbeu, jeke janyaari na antu kurina kirundu na kuwi na ruugo nikenda mpindi iria iri ndene ya ntunda itithuka.
- Kamata itunda riaaku na mpindi iri nkuniene kana gikabune. Ugaikamatira kiratasine kia nailoni gitina antu a gukurukia ruugo na aria gugatuma ruuji ruuthurane amwe na kuthukia ntunda na mbeu iu.
- Menyeera ati ukuathurana mbeu injaga mbele na ati mbeu nitheri na niumi mbele ya gwika. Mpindi injumu niciritaga sauti na kuunika wainania. Mpindi iria nyingi niciendaga kuumua riuene ntuku ijiri gwita ithatu mbele ya cibua cia gwika.
- Ika mbeu yaku antu gukuumo na kurina kirundu. Ikira nkuniene kana nyongune ya muthetu nikenda uniyia kanya ga kuthuuka. Tuumira mikebe itigutonyithia ruugo riria ugwika mbeu ya goro na ujurie mikebe iu buru nikenda uniyia kanya ka ruugo.
- Kethira utina mbeu ing'ani kuujiuria mikebe yaku, ujuriria na gintu ja makara, mati ja mucere kana maratasi ja ngazeti. Bibi bikajukia ruuji ruria ruri ruugone.
- Tuumira mpau kana mbito kumenyeera ati mikebe iu irina mbeu itigutonga nthiguru (guku nigutumaga mbeu ikathukua ni kugaruka kwa murutira, ruuji, na tunyomoo). Kethira uritumira nkunia kana mibuko, curia.
- Uria kirira kuumania na ikundi bingi biria bigukuiritie na ariti ba ngugi ya gutetheria arimi nikenda umenya uria ugutumira dawa cia tunyomoo na cia iria nikenda umenyeera mbeu yaku kuumania na tunyomoo. Mung'uanano, maguta kuumania na muarubaine kana mathangu, mathangu ja muti jugwitwa gliricidia na sabuni imwe nocikue utethio.
- Rikana gutega mbeu yaku o nyuma ya igita ririkai nikenda umenyeera ati itirathuka.
- Cuua umenyo kwegie ni igita ring'ana mbeu yaku iumba wikwa. Bubu bukarigana na muthemba jwacio. Mithemba imingi, igekwa bwega, noikare mwaka kana nkuruki.
- No ugerie gwika igita ria uraja mwanya nikenda utegera ni ririku ritumaga mbeu ikaumanga na mpwi. Jukia mpindi inkai (mung'uanano igana), andika ni ing'ana wathuura, ciumithie na utare ni ing'ana

ikauma. Ukaththia uju o mweri, mung'uanani, ukomba kwona riria uthongi bwa mbeu bukambiria kuthira. Gaana jaria ukoona na cluster yaku.

- O uria antu aria wikite mbeu yaku kurina mpio nou igakara igita riraja nkuruki. Menyeera ati mpindi iu itiki werune. Kethira antu aria ugwika kurina ruugo rurina ruuji rurwingi, mbeu ikathukanga na mpwi nkuruki.
- Rikana ati kurina mithemba imwe ya mbeu ciitagwa 'recalcitrant' mbeu iji niciendaga kuandwa orio ciothurana kuuma mitine na ciaritwa ntundene niuntu niciendaga ruuji rurwingi. Cikaogwa na nguo irina ruuji no cikare ntuku inkai mwanka kiumia kimwe. Mpindi iji nicikujaga ciaga cioma. Mithemba ya miti iria iri muthemba juju jwa mbeu ni amwe na *Artocarpus heterophyllus* (jackfruit), *Azadirachta indica* (muarubaine), *Calamus species* (rattans), *Durio zibethinus* (durian), *Eusideroxylon zwageri* (ulin), *Theobroma cacao* (cacao) na mithemba inyingi ya dipterocarps (*Shorea*, *Hopea*, *Palaquium*, na nkuruki).
- Muthia, ukithamia mbeu yaku wikia munandene rikana guciika itina ruuji na cikunikiri.

Ni uthuraniri bwiku buumba kwendeka?

- Umithia mbeu imwe na woone ni igita ring'ana ikujukia kuuma. Ciajukia nkuruki ya kiumia, tugania kwithuranira.
- Kethira utikumenya bwega ni uthuraniri buriku kiri njira iji ubati gutumira, geria na njira mwanya na ugaana jaria ukoona na mutongerwa wa cluster yaku nikenda ugaana nawe njira iria njega buru.
- Kethira mpindi niinini mono kana irina gikonde gigiceke jaria maingi guti uthuraniri bwendekaga ja mithemba ya *Croton megalocarpus*, muarubaini, *Cassia* na Kei apple no iandwe mikebene o rimwe.
- Kethira nuuthuranitie matunda, no urinde matunda jau ruujini ntuku imwe gwita ijiri, riu ujukie nkunju uinye matunda nacio nikenda urita mbeu ugitumagira ruuji kurita itunda mung'uanano kiri *Syzium cuminii*, *Dovyalis caffra*, *Trichilia emetica*, *Vitellaria paradoxa*, *Prunus Africana*, *Gmelina arborea* (gmelina), *Azadirachta indica* (neem) na *Tamarindus indica* (tamarind).
- Matunda jamwe nijendaga gikonde kia iguru



kiriti na njira ya gukirithania matunda jairi mung'uanano mithemba ya *Tectona grandis* (teak) na *Calamus* (rattans).

- Mithemba imwe ya matunda iri mpindi iria ciendaga gukaburwa nainya. Warikia kurinda ntuku imwe kana ijiri, kabura na muti na ntiri mung'uanano *Melia volkensii*, *Melia azedarach*, *Sclerocarya birrea*, *Cordia Africana*.
- Mithemba ingi niendaga kuumua ntuku ithatu gwita ithano (kirundune kirina riuu ririkai) riu ikaurwa nikenda mbeu iitwa mung'uanano *Leucana*, *Calliandra calothyrsus*, *Acacia*, *Sesbania sesban*, *Grevillea robusta*, *Casuarina* na mithemba ya mibau.
- Mpindi iria ciri makonde jamanene niciendaga muthemba jwa uthuraniri. Imwe niciendaga gikonde gikaringwa na nondo kana iiga nikenda kiunika ciarikia kuumua ntuku ithatu gwita ithani nikenda ruuji rumba gutonya mbeune nikenda iuma. Mbeu nibati kuandwa orio warikia kuuma gikonde. Mithemba iria yendaga kuunwa ni ta *Melia* (mukau), *Podo*, *Croton megalocarpus*, *Adansonia digitata*,

Swietenia macrophylla, *Delonix regia*. Mpindi inini cirina gikonde gikiumu niibati gwikwa mukebene juthiuruki na sand paper ndene na jukainainua nainya, mkanka mbeu ikang'arangwa.

- Mbeu imwe niciendaga kugitwa antu anini gikondene nikenda ruuji rumba gutonya. Ukagita aria mpindi iu iragwatene na gicau niuntu aja niu gukaumira.
- Mpindi imwe niciendaga kurindwa ruujine rwa mwanki ja *Calliandra*, *Acacia* iria nyingi, *Tamarind*, *Leucaena* na *Albizia*. Ikira mbeu mukebene na ucamukie ruuji riu witurire mpindi iu. Eteera ruuji rwore riu wite mpindi ruujine ciakara jaka ciimbi.
- Mpindi imwe no cirindwe ruujine rwa mpio mathaa ikumi na jairi gwita mirongo iiri na janna mung'uanano *Sesbania*, *Tephrosia*, *Dalbergia*, *Gmelina*, *Gliricidia* na *Acacia augustissima*. Ikira mpindi iu mukebene na wongeere ruuji rwa mpio mwanka rukinye maita jairi aria mpindi ikinyi. Rita mpindi iria cikwerera.
- Mpindi cionthe, ciarikia kuthuranirwa, niciendaga kuandwa orio

Kumenyeera minanda.

A. Kuniyia tunyomoo.

Tunyomoo notuthukie miti iria ikuuma. Kurina murimo jumwe juria jwonekaga mono kiri minanda juria juretagwa ni fungi. Nijutumaga mbeu ikaumma mbele ya iuma, miri ikoora mbere ya kimera kiumira na ringi kimera kiu gikuuma gigaceng'a na gikagwa. Murimo juju jwonekaga aria:

- Kimera kiu gikuuma gigaceng'a na gigakua mbele ya kiumira iguru ria muthetu
- Kimera kiu gikuuma kinyaraga na kugua
- Mathangu nijagarukaga jakaa yellow
- Muti nijukuujaga nyuma ya kagita

Murimo juju nojuthirwe na njira ya:

- Kugarura muthetu jwa munanda o mwaka kana o miaka iiri. Kuunanga muthetu kinyaku nigutethagia.
- Gwita kimera kiria kiajitue orio na ugakiithiria.
- Kwebera gwikira ruuji rurwingi nkuruki ya ruria rukwendeka.
- Kumenyeera ati ruuji rutikwigara
- Kumenyeera ati kurina ruugo bwega

- Gukurira iria bwega na kurio
- Muthetu jukethira junori mono. Uungania muthetu na mboleo uria kubati. Nyiyia ni-trogen iria ugwikira na njira ya kunyiyia mboleo.
- Nikubati kwithirwa kurina kanya gakeega gatigati ka miti nikenda itainyane.
- Menyeera ati munanda nijutheri magitene jonthe.

Mirimo no inyiwe na njira ya utumiri bubwega bwa dawa cia tunyomoo. Ni bwega nkuruki gutumira dawa iti cia nduka niuntu cia nduka ciri goro na nocithukie naria gututhiurukite. Mung'uanano;

- Utumiri bwa muju
- Kumenyeera ati munanda nijutheri nikenda jutigakucie tunyomoo.

B. Kuniyia miiri.

Garurira aria o muti juri rimwe o kiumia nikenda miri imiraja itigatonye muthetune mono iija gwitia kugitwa. Muri jumwega nijutethagia miti gucua ruuji jwarikia kuthamirua muundene.

Riria muti juandi mukebene jwakinya mieri



ithatu gwita inna (kuringana na muthemba na rera) miiri yaju niambagiria kuumira nthiguru ya mukebe. Miri iiji nibati kugitwa o mweri jumwe gwitaiiri na gaci. Menyeera riria ugukiiria mukebe utikagatarie miri iu niuntu itikuri.

Antu a kuthithia ou, geria guukiria munanda untu buria bunyagia bata ya kugita miri niundu miri nigujaga iri yongwa.

C. Gwikira ruuji, gukuura iria na kirundu.

- Tuminyi nitubati kwithirwa turina mukebe ya kuminya nikenda tutigatume muthetu jukamatwa.
- No utumire kinya mukebe jurina makutho
- Ebera gwikira ruuji rurukai kana rurwingi mono, ikira miti ngiri ruuji lita mirongo iiri. Ruuji rurwingi niruthiragia imera inya na rugakucia tunyomoo. Gintu kimwe kiria kionanagia ruuji rurwingi ni kuuma kwa imera bibinini bikari ja kimira muthetune.
- Ikira ruuji o ruukiri na ugoro kwombika.
- Muthetu jwa muthanga jukenda ruuji nkuruki ya muthetu jwa clay

- Ikira ruuji muthetune ti mathangune.
- Ikira ruuji mpaari nikenda rutonya muthetune.
- Menyeera utikagatarie miiri riria ugukurira iria.
- Ugeteera mono mbele ya ukuurira iria. Gukurira iria kurina bata niuntu iria karicindanagira weru, ruuji na irio.
- Mbeu imwe niciendaga kirundu – menyeera ati irundu nibithithue.
- Mburene, kunikira mbeu na nyaki injumu. miti iu ikuuma nibati kuthamua kuuma ruungu rwa miti nikenda ruuji rutikagwire mbeu rugitaria imera.
- Irigira munanda nikenda ujumenyeera kuumania na ndithia na twana tuguchetha
- Reka miti iume mwanka uraja bwa centimita mirongo ithatu mbele ya kuthamiria muundene. Bubu no bujukie kuuma mweri jumwe gwita mieri itantatu. Thoma kwegie kuthamia. Rita kirundu riria ukwenda kuthamia.

Mwitire jumwega juri aubatikugeria: Minanda iukiritue.

Kirimu cemanio jwa cluster yaku, ikira ikundi bibini niinyakugeria minanda iukiritue na kugaa na nabangi ba rikia kugeria kwegiekethira njira iji ni kureta mwanya kana ari.

Minanda iukiritue no ithithue na njira imbuthu kuumania na guakaruta rana mpau na waya (tega mbichene). Njira iji ni tikagiria miirikwigitairi yongwa niuntu ya kinya aria muthia jwa mukebe jurini unikaga yongwa. Gukuni kuuga miriitigita ragukuruki rakugitwa. Miriri uniambagia kurika itikurea kairi. Untububuni butumaga miri ya mutii kagia inya naikoomba kugwatanga ya thamirua muundene. Kairi ni buebagia kwendekagwa antu ba kugitamiri, untu buria burangairia kana bukathithua buchere rina kwoumirii kagitara. Iria kinya rioniriu mbaga kuritangwa.

Mina ndaiu kiritue ika ragate kayenda garu ujirurwi nginkuruki, indi-ri, amenyeeri ba minanda ni bathithitie njira ya gukaba na nauntu bubu. Njira imwe nionetwe nthiguru ya Tanzania, aria mutaro

jwinjagwa, miti ikarikirwa kana wayaku jugita nia na miti ikarikirwa mpaune kana wayeneiu. Miti iui umithi tueigaka ratekairi aria muthe tuju kinyi indium taroju kamia kanya karia ga kwendeka ni kenda miri iigita yongwa. Ruujini rugwata guamu taro nena ruga kinyira miti iuriria ruguka matwa niriua na bata yagwikira ruuji jamaingi ikanyia. Kiratasi kiana iloninogi ikwemuta ronenike ndaru ujiru tira tonye nthimu thetune.



Fig 1: Seedlings of various species arranged in stacks on a raised bed, TIST Makomboki Cluster in Murang'a County.



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 iijiri 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 bungu 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 ni umaga 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 niciaraga maciara jamakai na irina mathangu jamakai na ikari jaka yajitue ikiendaga kunyara. Biang'i nibiithagua ni riuu na bigakua. Miri no yore na muti junthe jugakua 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.

Anthraxnose: Matunda nijagijaga macunci ja rangi ya brown jamoomu. Matunda jamaanake nojagwe, indi kiri jaria jagukura kura, murimo juju nijwicithaga mwaka gitunda gigakura na gigagunda. 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 jutiumba 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 kumania 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:** Mithemba juju nijutumagirwa ni arimi babaingi kuandiraingi nontu itina mirri ndene na itigwatagwa ni mirimo
3. **Singapore:** Juju ni mithemba 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 kumania na aumithia baria baijikenena bena baruga.

Mazingira Bora



TIST

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

Kikuyu Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Ndalani TIST Cluster wakiwa kwa mkutano wao wa kila mwezi, mwezi wa Decemba tarehe 17/12/2018

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Uigi mwega wa mbegu na guthondeka.

Uigi wa mbegu.

- Tigirira ati angikorwo niurathamia matunda kuma kuria uronganiria niwagiriirwo ni kwamba kumomithia na kumaiga kiiruruini na makorwo na riera ria kuigana na ndukamathukie.
- Kuaa matunda maku na makonia ma gutumwo kana ikabu. Ndumamakuue na makonia ma plastic kana mikebe iria itari na kundu gwa kuingiriria riera na gutuma magie na ugunyu muingi na mathuke.
- Tigiriira niwacagura matunda maria mega mbere na makorwo mari matheru na makomithio mbere ya gukuuo. Umithia matunda na miatuka riria ukuinainia. Mbegu nyingi citibataraga kumithio riuaini gwa kahinda ka 2-days mbere ya gukorwo cirri njega..
- Iga mbegu cirri nyumu na cirri hehu. Huthira indo njega cia kuiga ta itambaya kana nyungu cia ndoro niguo unyihie kuguma. Huthira indo citangiingiria riera kana mikebe ya kuiga mbegu, na uihurie mikebe biu niguo gutikagie na mwanya wa riera.
- Angikorwo nduri na mbegu njiganu cia kuihuria mukebe, huthira indo ingi ta makara, mahuti ma mucere kanamaratathi ma ngathiti niguo cihote kunina ugunyu.
- Huthira turubau kuigirira niguo gutigirira mikebe ndiikarite thi niguo citikanyitwo ni tutambi kana mirimu na ugaruruku wa riera. Angikorwo urahuthira makonia noumacurie iguru.
- Geria gwetha utaari kuma kuri ikundi iria cirri kwanyu niguo umenye kana niukuhuthira dawa cia kuingata tutambi niguo ugitire mbegu ciaku. Kwa muhiano, maguta kana mahuti ma neem, mahuti ma gliricidia na thabuni nocihuthikekugitira
- Ririkana kurora mbegu ciaku maita maingi niguo gutigirira citirathukio.
- Geria gwetha ugoro wa kuria uri wigii kahinda karia mbegu cingiigwo. Uu nikuringana na muthemba wa mbegu. Mithemba miingi ingiigwo wega niikaraga miaka miingi.
- Nougerie kurora mahinda maingi niguo umenye cimeraga na njira iriku. Cagura mbegu cia kugeria ta 100, andika muigana uria woya,

handa na ucitare na wone nicigana cikumera na ungika uu o mweri kwa muhiano niukwona riria na uria mbegu ciaku cingimera na uheane ugoro uyu thiini wa cluster yanyu.

- O uria haria uigite mbegu hari hahehu noguo mbegu ciaku ciguikara na utigirire mbegu ciaku citinanyitwo ni riuu. Angikorwo kuria uigite nikugunyu niciguthuka naihenya.
- Ririkana kuri na mithemba iiri ya mbegu, “re-calcitrant seed”. Mbegu ici ciagiriirwo ni kuhandwo marimaini thutha wa kunganio tondu cibataraga ugunyu muingi. Cingikunjwo na gikuo kigunyu nocikare ta wiki kana mieri.
- Recalcitrant cikuaga riria cioma. Mithemba ya miti iria ni ya recalcitrant ni *Artocarpus heterophyllus* (jackfruit), *Azadirachta indica* (neem), *Calamus species* (rattans), *Durio zibethinus* (durian), *Eusideroxylon zwageri* (ulin), *Theobroma cacao* (cacao) and many dipterocarps (*Shorea*, *Hopea*, *Palaquium*, etc).
- Muthia, riria urakuua mbegu nginya nathariini ririkana guciiga cirri ngunike wega.

Ni njira iriku cia guthondeka mbegu ciagiriire?

- Amba uhande mbegu imwe niguo wone kahinda karia cikwoya kumera. Angikorwo nicikwoya kahinda kanene niwagiriirwo ni gucithondeka. Angikorwo nduri na uuma ni njira iriku njega geria njira ngurani na wone niiriku njega ya guthondeka na uheane ugoro ucio kuri cluster yanyu.
- Angikorwo mbegu cirri nangothi huthu nikuuga ndurabataraga guthondeka kwa muhiano *Croton megalocarpus*, neem *Cassia* na Kei apple nocihandwo imwe kwa imwe marimaini.
- Angikorwo niunganitie mbegu, nourinde maaiini gwa kahinda ka 1-2 days thutha ucoke wethe waya ya gicungina wanike mbegu ho na uhinye niguo ciume wega ucoke uhuthire maai gucithambia ta *Syzium cuminii*, *Dovyalis caffra*, *Trichilia emetica*, *Vitellaria paradoxa*, *Prunus Africana*, *Gmelina arborea* (gmelina), *Azadirachta indica* (neem) and *Tamarindus indica* (tamarind).
- Matunda mangi mabataraga o gukumuthwo niguo mambegu ciume ta *Tectona grandis* (teak) and *Calamus species* (rattans).



- Mangi nimakoragwo na ngothi ibataraga kunurwo thutha wa kurinda maai-ini gwa kahinda ka 1-2 days, uraga makoni na ndiri ta *Melia volkensii*, *Melia azedarach*, *Sclerocarya birrea*, *Cordia Africana*.
- Makoni mamwe nimagiriirwo ni kumithio 3-5 days kiiruruini na ningi marutanio niguu mbegu ciume ta *Leucana species*, *Calliandra calothyrsus*, *Acacia species*, *Sesbania sesban*, *Grevillea robusta*, *Casuarina species* and *Eucalyptus species*.
- Mbegu iria cirri namakoni momu niciagiriirwo guthondekwo. Imwe ciagiriirwo kuragwo na nyundo kana ihiga thutha wa kurindwo maai-ini thiku 3-5 niguu maai maingire wega na cihote kumera wega. Mbegu ciagiriirwo nikuhandwo imwe kwa imwe irimaini thutha wa kuragwo na mithemba iria yagiriirwo ni gwikwo uguo ni (mukau), *Podo species*, *Croton megalocarpus*, *Adansonia digitata*, *Swietenia macrophylla*, *Delonix regia*. Niundu wa mbegu iria nyumu na ni nini, ciikire mukebeini na uthuke nginya cikue.
- Mbegu ingi cibataraga o gutinio hanini. Ndugatinie mwena uria uri na kamera tondu hau niho mbegu imeragira.
- Mbegu ingi nicikoragwo cirri njega riria warinda maaiini mahiu ta *Calliandra*, most *Acacias*, *Tamarind*, *Leucaena* and *Albizia*. Ikira mbegu mukebeini, therukia maai na uitiririe mbeguini. Eterera maai mahore na urute mbegu thutha wa kuimba.
- Mbegu ingi nociikirwo maaiini mahehu mathaa 12-24 ta *Sesbania*, *Tephrosia*, *Dalbergia species*, *Gmelina*, *Gliricidia* and *Acacia augustissima*. Ikira mbegu mukebeini na wikire maai mahehu na wongerere mangi tamo ucoke wehuti mbegu iria cikureera.
- Mbegu ciothe, riria ciathondekwo ciagiriirwo ni kuhandwo orio.

Umenyereri wa Nursery.

A. Kugitira tutambi.

Indo ta fungi, bacteria, viruses, nematodes na tutambi(muthua, thuthi na ingi) nocithukie mimera. Murimu uria uikaine muno wa nathari ni damping off na urehagwo ni fungi. Utumaga mbegu ciume mbere ya kumera, miri ibuthe mbere ya kumera na mimera ikorwo iri miceke na ikoma. Dalili ni;

- Gucekeha na gukua kwa mumera
- Kuhoha na kugua kwa mumera
- Mahuti gucenjia rangi
- Mimera gukua.

Kugiririria murimu uyu.

- Gucenjia tiiri wa nathari thutha wa miaka 1-2. Kuhuthia tiiri noguteithie.
- Kwehuthia mimera iria ihotetwo na kumicina
- Ndukahe mimera maai maingi makiria
- Tigirira maai nimarathertera.
- Gutigirira riera ni riingi
- Kurimira maita maingi
- Tiiri ndwagiriirwo gukorwo uri na unoru makiria. Uigananau wa tiiri na unoru niwagiriirwo ni kurumirirwo. Nyihia nitrogen na gwikira thumu

- Tigirira utaganu ni muiganu mugundaini
- Tigirira nathari ni theru hingo ciothe

Mirimu noihotwo na kuhuthira dawa iria ciagiriire nadawa cia tutambi. Niwega kuhuthira dawa cia kiimereracia tutambi tondu cia duka cirri goro na nocithukie maria maturigicirrie.

B. Guceeha miri.

Garura mimera rimwe hari wiki niguu muri wa itimu ndukaingire muno thin a niyagiriirwo ni gutinio. Muri mwega wa itimu uteithagia kugucia maai.

Riria mimera irakura thutha wa mieri 3-4 9kuringana na muthemba wa miti na riera) miri yayo yambagiriria gukura kuma nathi ya nathari. Miri ino yagiriirwo nigutinio o thutha wa mieri 1-2 na kahiu. Ririkana umenyereri niwa bata riria uroya mikebe ya miti niguu ndugathukie miri.

Njira ingi, oya nathari na igurunjira iria igiragiriria miri gutontya tiiriini na kumitina gugakorwo kuri kuhuthu.

**C. Kuhe maai, kurimira na kuhe kiiruru**

- Tunyamu twa kuhe maai twagiriirwo ni kunyitithanio na ndoo ya kuhe maai niguu tiiri ndugakuu ni maai.
- Nouhuthire mukebe muture marima
- Menyerera ndukahe maai maingi kana manini, makiria 20lts har mimera 1000. Ungihe maai maingi niukunina mimera hinya na uguciririe tutambi na fungus. Dalili imwe ya gukwonia ati niurahe maai maingi ni mareru.
- He maai o rucini na hwaiini kungihoteka.
- Tiiri uri na muthanga muingi wagiriirwo niguitirio maai maingi.
- Ikira maai mumeraini na ti mahutiini
- Itiriria maai kahora niguu maingire tiiriini wega.

- Menyerera ndugathukie miri riria urarimira.
- Ndukarimire riria mahinda mathire muno, kurimira k=ni kwa bata tondu riia niricindanagira maai na riuu na mimera yaku.
- Mimera ingi niibataraga kiiruru – tigrira niwekira kiiruru na mahuti
- Hingo ya mbura, humbira mimera na mahuti ma miti kana nyeki. Mimera niyagiriirwo kwehutio kuma rungu rwa miti niguu miti ya kuma mahutiini ma miti ndigathukie mimera yaku.
- Irigira nathari yaku niguu mimera ndigathukio ni mahiu kana ciana cigithaka.
- Reke mimera ikure nginya 30cm mbere ya guthamia. Njira ino noyoe kuma mieri 1-6. Thoma uhoro wa guthamia mimera. Na ningi wehutie kiiruru kahiondaine gaka.

Maundu mega ma kugeria: nathari njoe naiguru.

Hingo ya mucemano wanyu wa cluster, hinyiriria ikundi iria ingi magerie kuhuthira nathari njoe naiguru na meka uguo moke mauge kana kurari na ugaruruku.

Nathari njoe naiguru nocithondekwo na mbau hamwe na waya(uhoro ucio nouwone mbicaini) njira ino iteithagiriria riria uraceha miri ya mimera tondu yumiraga nathi. Uu nikuga ati mimi ndithukangagio riria uguceha. Miri ningi niigiaga na hinya muno riria irakura. Mimri niigiaga hinya na ikahe mimera uraihu uria wagiriire riria iri mugundaini. Ningi niinyihagia wira mugundaini muno wira wa guceha miri uria maita maingi uriganagira kana ukarutwo ucereirwo na kwa uguo ugatuma miri ithukangio. Kurimira na kwehutia riia nigukoragwo kuri kuhuthu riria urahuthira njira ino.

Nathari iria ciotwo naiguru nicionekaga ta cihuthagira maai maigi. No ona kuri ouguo, aria mahuthagira njira ino nimahotete kugia na njira ingi cia kunyihia uhuthiri wa maai. Njira njega yonekire

Tanzania ni kwenja mutaro na kwara miti ho na kuigirira waya na ugacoka ukaigirira mimera yaku iguru. Mimera niyonekaga iri miigaaniru na thi no mitaro iria iri rungu rwayo niimiheaga haundu unghota gucehera miri yayi. Maai nimahotaga guikara mitaroini ino na ikahe mimera ugunyu uria wagiriire na kunyihia uhei wa maai wa narua. Iratathi ria nylon norihuthike niguu maai mahote guikara makiria mitaroini iyo.



Fig 1: Seedlings of various species arranged in stacks on a raised bed, TIST Makomboki Cluster in Murang'a County.



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 kwegu 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 ciakinyia 20cm uraihu na ciri na mahuti mana niguo cimunyagwo na cikahandwo mikebe-ini.

Guciarithania nogwikwo thuha wa kahinda ta ka mieri 6. Miti iria miciarihanie niikaraga iri minini na ikambiriria kuruta kiro tene(ta 3-4 years theta wa kuhanda 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 nigukorw 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 kuhanda 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 niguo 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 niguo 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 niibataraga mai maingi na muno kimera kia riuu. Riria iraruta kiro, matunda niwega ithondekwo niguo irute matunda mega.

Kuhe fertilizer.

Niguo 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 niguo 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 niguo muti ugie na maciaro maingi. Kuri na dawa mithemba 2 iria niya murimu uyu. Ridomil na Aliette.

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

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.

Friut 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 kuiiririra.
- Matunda kuhana yellow, ngothi guthenga.
- Kuhana ta maeruha.
- Matunda maria maraareramaai-ini nimo makuru.

Thoko.

Menyerera makorobia na umenyereeri 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 nimagiriirwo kunyitithanio na thoko njega cia makorobia.

Mithemba iria yonekanaga ya makorobia.

1. **Hass and Fuertes:** mithemba ino ihuthagiro guciarithania makorobia maria mangi. Nimakoragwo na maguta maingi muno.
2. **Puebla:** mahuthikaga guciarithania mwena 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 niguo kumiagirithia.

Arimi nimarahinyiririo magure mbegu kuma kuri aria metikiritio.

Mazingira Bora



TIST

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

Kiswahili Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Ndalani TIST Cluster wakiwa kwa mkutano wao wa kila mwezi, mwezi wa Decemba tarehe 17/12/2018

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Kuhifadhi na kutibu mbegu kabla ya kupanda.

Kuhifadhi mbegu.

- Hakikisha ikiwa unahamisha matunda kutoka pahali pa kukusanya mbegu uyaweke yakiwa pakavu, yamefunikwa na kufikiwa na hewa vilivyo ili mbegu zilizo ndani ya matunda ziziharibike.
- Beba matunda na mbegu zako zikiwa katika magunia au vikapu. Usizibebe katika makaratasi ya plastiki au mikebe isiyo na hewa na ambayo inaweza kufanya unyevu kukusanya na kuharibu mbegu hizi.
- Hakikisha umechagua mbegu nzuri zaidi kwanza na kuwa mbegu hiyo ni safi na kavu unapohifadhi. Mbegu kavu hupiga kelele na kuvunjika unapotikiza. Mbegu nyingi huhitaji kukaushwa juani kwa muda wa siku mbili kufika tatu kabla ya kuwa tayari.
- Hifadhi mbegu yako pahali pakavu na penye kivuli. Tumia kifaa cha kuhifadhi kama gunia au chungu cha udongo ili kupunguza uwezekano wa mbegu kuharibika. Tumia mikebe isiyoruhusu hewa kuingia au kutoka unapohifadhi mbegu zenye thamani ya juu, na ujaze mikebe yako kabisa ili kupunguza pahali pa hewa.
- Ikiwa hauna mbegu tosha kujaza mikebe yako, jaza ukitumia kitu kama makaa, maganda ya mchele au magazeti yaliyokunjana. Haya yatanyonya unyevu ulio katika hewa.
- Tumia mbao au fito kuhakikisha mikebe haiguzi chini (jambo hili laweza kuzifanya mbegu kushambuliwa na mabadiliko ya hewa, unyevu, wadudu na kadhalika kwa urahisi. Iwapo unatumia magunia au mifuko, waweza kuining'iniza.
- Uliza mawaidha kutoka kwa vikundi jirani au wafanyikazi wa kilimo kujua ikiwa unahitaji matumizi ya dawa za wadudu kulinda mbegu zako kutokana na wadudu. Kwa mfano. Mafuta au majani ya muarubaini, majani ya gliricidia na sabuni zaweza kukupa ulinzi.
- Kumbuka kuangalia mbegu zako kila baada ya siku chache kuhakikisha hazijaharibika.
- Tafuta ujuzi kuhusu muda mbegu yako yaweza hifadhika. Muda huu hulingana na aina. Aina nyingi, zikihifadhiwa vizuri zaweza kukaa mwaka au zaidi.
- Waweza jaribu muda wenye upana mbali mbali kujua ni mbegu ngapi zinaota. Chukua mbegu chache (kwa mfano, mia moja), andika nambari uliochagua, zioneshe halafu uhesabu nambari iliyoota. Ukifanya jambo hili kila mwezi, kwa mfano, utaweza kujua ni lini

thamani ya mbegu yako inanza kudhoofika. Gawana matokeo yako na cluster yako.

- Jinsi pahali pa kuhifadhi kupo baridi ndivyo muda ambao mbegu yako yaweza kuhifadhiwa huongezeka. Hakikisha mbegu yako haijawekwa palipo na mwangaza. Ikiwa pahali pa kuhifadhi pana unyevu mwingi mbegu itaharibika kwa haraka zaidi.
- Jua kuwa kuna kikundi kimoja cha mbegu kinachoitwa "mbegu kaidi". Mbegu hizi kwa kawaida huhitaji kuoteshwa mara moja baada ya kukusanywa na kutolewa kwa tunda kwani huwa zinahitaji unyevu mwingi sana. Zikifungwa kwa nguo zenye unyevu, zaweza kuhifadhiwa siku chache ata kufika wiki moja. Mbegu hizi hufa zinapokauka. Aina za miti zilizo mfano wenye mbegu hizi ni pamoja na: *Artocarpus heterophyllus* (jackfruit), *Azadirachta indica* (neem), *Calamus* (rattans), *Durio zibethinus* (durian), *Eusideroxylon zwageri* (ulin), *Theobroma cacao* (cacao) na aina nyingi za aina zinazoitwa 'dipterocarps' (*Shorea*, *Hopea*, *Palaquium*, na kadhalika).
- Hatimaye, unapohamisha mbegu kuzipeleka kitaluni, kumbuka kuziweka zikiwa kavu na zimefunikwa.

Ni matibabu gani yaweza kuhitajika kabla ya kupanda mbegu?

- Otesha baadhi ya mbegu ili huoneni muda gani zinachukua kuota. Iwapo zitachukua saidi ya wiki fikiria kuzitibu.
- Ikiwa hauna uhakika ni mawaidha gani hapa ni bora zaidi, jaribu njia mbali mbali za kutibu na ugawane matokeo yako na kiongozi wa cluster yako kuhusu njia bora zaidi.
- Ikiwa mbegu ni ndogo sana au ina ganda nyembamba mara nyingi haihitaji matibabu yoyote kwa mfano aina za *Croton megalocarpus*, *Neem*, *Cassia* na *Kei apple* zaweza kuoteshwa moja kwa moja mikebeni.
- Ikiwa umekusanya matunda, unaweza kuyalowesha majini kwa muda wa siku moja au mbili, halafu uchukue waya na kuitumia kufinya tunda na kutoa sehemu majimaji ili kutoa mbegu ukitumia maji kuosha hayo mabaki ya tunda kwa mfano katika mbegu za *Syzium cuminii*, *Dovyalis caffra*, *Trichilia emetica*, *Vitellaria paradoxa*, *Prunus Africana*, *Gmelina arborea* (gmelina), *Azadirachta indica* (neem) na *Tamarindus indica* (tamarind).
- Baadhi ya matunda huhitaji tu maganda ya juu kabisa kutolewa kwa kuyagwaruzana kwa



mfano matunda ya *Tectona grandis* (teak) na *Calamus species* (rattans).

- Baadhi ya matunda huwa na mbegu inayoitaji kugonwa kwa nguvu. Baada ya kulowesha tunda katika maji kwa muda wa siku moja au mbili, bonda tunda kwa mchi na chokaa kwa mfano matunda ya *Melia volkensii*, *Melia azedarach*, *Sclerocarya birrea*, *Cordia Africana*.
- Maganda mengine huhitaji kukaushwa kwa siku tatu kufika tano (chini ya jua lenye kivuli) halafu kufinya kwa kutumia waya ili kutoa mbegu kwa mfano maganda ya *Leucana*, *Calliandra calothyrsus*, *Acacia*, *Sesbania sesban*, *Grevillea robusta*, *Casuarina* na mikaratusi.
- Mbegu zilizo na maganda manono huhitaji matibabu ya aina maalum. Baadhi huhitaji maganda yake kuvunjwa kwa kutumia nyundo au jiwe baada ya kukaushwa ka siku tatu kufika tano ili kuruhusu maji kuingia ili mbegu iweze kuota. Mbegu zafaa kupanda mara moja baada ya kuvunja maganda. Aina ambazo huhitaji kuvunjwa ni kama *Melia* (mukau), *Podo*, *Croton megalocarpus*,

Adansonia digitata, *Swietenia macrophylla*, *Delonix regia*. mbegu zilizo ndogo na ngumu ziwekwe katika mkebe uliowekwa karatasi ya mchanga ndani na mkebe utikizwe kwa nguvu hadi ganda likwaruzwe.

- Baadhi ya mbegu huhitaji kukatwa kidogo tu ili kusaidia maji kuingia. Usikate ambapo mbegu ilishikana na ganda kwani sehemu hii ndio iliyo na mmea utakaokua.
- Baadhi ya mbegu hutibika vizuri zinapoloweshwa kwa maji moto kwa mfano *Calliandra*, most *Acacias*, *Tamarind*, *Leucaena* na *Albizia*. Weka mbegu katika mkebe, chemsha maji na uzimwagilie mbegu. Ruhusu maji yapoe halafu utoe mbegu kutoka kwa maji baada yakuona kuwa zimefura.
- Baadhi ya mbegu zaweza kuloweshwa kwa maji baridi kwa masaa kumi na mawili kufika ishirini na manne kwa mfano *Sesbania*, *Tephrosia*, *Dalbergia*, *Gmelina*, *Gliricidia* na *Acacia augustissima*. Weka mbegu katika mkebe na uongeze maji baridi (mara mbili mbegu zilipofika kwa mkebe). Toa mbegu zinazoelea.
- Mbegu zote, baada ya kutibiwa, zahitaji kupandwa mara moja.

Utunzaji wa vitalu.

A. Kudhibiti wadudu.

Viumbe hai kama fungi, bakteria, virusi, minyoo na wadudu (kwa mfano mchwa, vikugu) waweza kudhuru miche.

Ugonjwa aina moja unaopatikana sana katika vitalu huitwa 'damping off' na husababishwa na fungi. Ugonjwa huu husababisha mbegu kuoza kabla ya kuota, mizizi kuoza kabla ya mche kutokezea na mche kuwa mwembambe na kuvunjika. Dalili za kawaida za ugonjwa huu ni:

- Shina hupunguza ukubwa wake na kufa linapofikia ardhi
- Mche kunyauka nakuanguka
- Majani yanageuka manjano.
- Mche unakufa mwishowe.

Dhibiti ugonjwa huu kwa:

- Kubadilisha udongo ulio kitaluni kila mwaka au miaka miwili. Kutenganisha udongo pia husaidi.
- Kutoa miche iliyoathirika na kuchoma mara moja.
- Kuepuka kumwagia maji zaidi ya yanayotakikana.

- Kuhakikisha maji hayafuriki.
- Kuhakikisha hewa inafikia miti vizuri
- Kutoa magugu vizuri na kwa wakati mzuri
- Udongo usiwe na rutuba nyingi sana. Fuatilia viwango vya kuchanganya vinavyofaa. Punguza kiwango cha naitorjeni kwa kupunguza mbolea.
- Kunafaa kuwa na nafasi tosha kati ya miche ili kuepuka mfinyano.
- Hakikisha kitalu kipo safi kila wakati.

Magonjwa yaweza kudhibitiwa kwa utumizi unaofaa wa kemikali na dawa za wadudu. Ni bora zaidi kutumia dawa zilizo za kiasili kwani za kemikali ni ghali na zaweza kudhuru mazingira kwa mfano;

- Matumizi ya jivu
- Kuhakikisha kitalu kipo safi ili kuzuia kuwahimiza wadudu kuja.

B. Kupogoa mizizi.

Hamisha miche mara moja kila wiki ili mizizi mirefu isije ikaingia ardhini na kuhitaji kukatwa. Mizizi mirefu husaidia miti kutafuta maji baada ya kuihamishia shambani.



Miche inapoanza kumea katika mkebe baada ya miezi mitatu au mine (kulingana na aina na tabia nchi) mizizi huanza kukua na kutokea chini ya mkebe. Mizizi hii yafaa kukatwa kila miezi miwili au mmoja kwa kisu. Kumbuka kuwa mwangalifu unapoinua mkebe usije ukadhuru mizizi iliyo change.

Badala ya haya waweza kujaribu kitalu kilichoinuliwa ambacho hupunguza haja ya kupogoa mizizi kwani mizizi hujikata yenyewe.

C. Kunyunyizia maji, kutoa magugu na kivuli.

- Kinyunyizi lazima kishikanishwa na mkebe ya kunyunyizia maji ili kisije kikasababisha mmomonyoko wa udongo.
- Waweza kutumia mkebe ulio na mashimo.
- Jiepushe na kunyunyizia maji mengi au kidogo, nyunyiza lita ishirini kwa miche elfu moja. Maji zaidi ya yanayohitajika hufanya miche kuwa nyoofu na kuvuta wadudu na fungi. Dalili moja ya maji zaidi ya yanayohitajika ni kuwepo kwa safu

- nyembamba ya mwani jua ya udongo.
- Nyunyizia kila asubuhi na jioni iwezekanapo.
- Udongo wenye mchanga utahitaji maji zaidi ya udongo unaoshikana.
- Mwaga maji udongoni, si kwa majani
- Nyunyizia pole pole ili maji yaingie udongoni.
- Kuwa mwangalifu usidhuru mizizi unapotoa magugu.
- Usiache magugu kwa muda mrefu. Kutoa magugu ni muhimu kwani magugu humea na kushindania mwangaza, maji na virutubisho.
- Baadhi ya mbegu huhitaji kivuli – hakikisha umetengeneza kivuli.
- Wakati wa mvua, funikia miche ukitumia nyasi kavu. Miche yafaa kutolewa chini ya miti ili maji yasiangukie miche na kuidhuru.
- Tengeneza ua ukizunguka kitalu ili kulinda kutokana na mifugo na watoto wanaocheza.
- Lache miche imee hadi centimita thelathini kabla ya kuihamisha shambani. Hili laweza kuchukua mwezi mmoja au ata hadi miezi sita. Angalia maelezo kuhusu kuhamisha miche. Pia toa kivuli wakati huu.

Mbinu bora yakujaribu: Vitalu vilivyoinuliwa.

Katika mkutano wa cluster ya kowatie nguvu vikundi vidogo kujaribu vitalu vilivyoinuliwa na kuripoti ikiwa mbinu hii inaleta tofauti au la.

Kitalu kilichoinuliwa chaweza kufanywa kwa urahisi kwa kutumia mbao na waya (Onapicha). Jambo hili linaruhusu mizizi kujipogoa yenyewe kwani inapofikia mwisho wa mkebe inaanguka yenyewe. Hii ina maanisha mizizi haitadhuriwa kupitia njia zakawaida za kupogoa.

Mizizi ndipo inaendelea kuwa na nguvu zaidi bila kuendelea kukua. Jambo hili linakupa mfumo wa mizizi wenye afya na mche una nafasi bora yakujijimarisha ikiamishwa shambani. Jambo hili pia linamaliza haja ya wafanyikazi ambao wangepogoa, jambo ambalo husahaulika mara nyingi au kuachwa hadili na chelewa sana na kudhuru mizizi. Kutoa magugu ni rahisi sana pia chini ya vitalu hivi.

Vitalu hivi vilivyoinuliwa hutumia maji zaidi. Hata hivyo watunzaji wa minanda wametengeneza njia mbalimbali za kukumbana na jambo hili. Njia

moja nzuri iliyoonekana Tanzania nikuchimba mtaro, mbao za miti au waya yaweza kuwekelewa juu ikivuka mtaro na miche kuwekwa juu yake. Miche inaoneka na kuwa mahali pamoja na ardhi mahali pengine la kini mtaro unaipa nafasi ya kujipogoa. Maji yaliyoshikwa katika mtaro huipa miche unyevu yanapobebwa najoto kutoka kwa jua na hupunguza haja ya maji kuwekwa kila baada ya wakati. Karatasi ya plastiki yaweza kuwekwa katika mtaro ili kuhakikisha maji hayaingii ardhini.



Fig 1: Seedlings of various species arranged in stacks on a raised bed, TIST Makomboki Cluster in Murang'a County.



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 kufunikia 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 inaponyesha 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 huoza na miti yote inakufa bila kukomaa. Miti iliyoahirika yafaa kung'olewa na kuharibiwa. Maji ya moto na dawa ya wadudu ikitumika kwa mbegu zinazokuza miche hupendekezwa 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 kurahisishia 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 iliyoandikizwa 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 hivyobasi, 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

Kikamba Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Ndalani TIST Cluster wakiwa kwa mkutano wao wa kila mwezi, mwezi wa Decemba tarehe 17/12/2018

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Kwia Mbeu na undu wa kuiita mbee wa uvanda.

Kwia Mbeu

- Ikiithya ethiwa wiumya matunda kuma kisioni kii kuthi kingi niwamekalya me many'au, memuunyini na vandu vena nzeve nesa nikana ngii ila syi nthini iikanangike.
- Kua matunda maku na kyondo kya ikanga kana ikunia. ndukakue na mathangu ma nailoni maikanyale na ukosa nzeve na mayanangika.
- Ikiithya niwanzakua matunda ala maseo (unit 2) na ni manyau na matheu mbee wa kumaia. Mbindi na ngii mbingi syendaa kwanikwa suani vandu va mithenya ili kana itatu iny'ae nesa.
- Ila mbeu yaku vandu vany'au , ve muunyi na ve nzeve nesa. Tumia makunia ma ikonge, mbisu nikana uole ivuso ya mbeu kuunda. Kunika na nguniko nesa wusuity'e mbeu nesa kuola nzeve nthini wa kikuu, mbisu kana ikunia yila wiite mbeu.
- Ethiwa ndwithiawa na mbeu ya kususya vala ukwenda kwikia ususya na makaa kana makanzeti nikana makanyusaa nzeve ila yina kiw'u.
- Tumia miti kuseuvya makumbi kana utaa wi yiulu kwa kwia mbeu nundu waia nthi mbeu nitonya kuunda kana kwanangwa ni uvyuvu na tusamu kuma muthangani. Ethiwa witumia makunia kana syondu no ususye mitini nyumba.
- Kulya mawoni kivathukany'o kuma kakundini kaku kala ke vakuvi naku kana kwa athukumi ma ndilikasa iulu wa utumia ndawa sya kuaa mitutu na mauwau kusuvia mbeu yaku. Ngelekany'o Matu ma Neem kana mauta, matu ma Gliricidia, savuni nisuvia mbeu.
- Lilikana Kususya mbeu yaku kaingi kuikiithya ti mbanangiku.
- Umbany'a uvoo iulu wa mbeu ino na undu wa kumia kuma kisioni kyaku kulingana na ni muvai wiva nundu kwi imwe itaiawa kwa ivinda iasa.
- No utatithye kusianisya ivinda ya kumea kwa kwosa ngii ta 100 na kwia lekoti ya ivinda yilaiutumia kumea kwa kutala nisiana imeete kwa ivinda yiana ata. Weeka uu kila mwai ukeethiwa utonya umanya kwa ngelekany'o undu siekete kwithiwa na vinya wa kumea na wamanya tavya ala ma ngwatanio yenyu undu usomete iulu wa mbeu isu na kumanya.
- Oundu vala wiite mbeu yaku vathithite now'o

itonya kwikala kwa ivinda iasa. Ikiithya mbeu ndinalika kyenini muno na ethiwa vala wiite vena uthithu muvituku nilaisi mbeu kwanangwa ni mbuka.

- Manaya kana vena mbeu syitawa recalcitrant (ila syi vinya kuvinduwa). Mbeu sya muthemba uyu nila itendaa kwiwa syendaa ukethwa ivanditwe nundu syendaa wiu mwingi. Kwa kwia kwa ivinda inini ta kyumwa waile ulinga na makula meu. Mbeu muthemba uu utavinduwa nikusaa yany'aa. Mithemba ya miti ila mbeu yasyo iilye uu nita:- Artocarpus Heterophyllus (Jackfruit), Azadirachta Indica (Neem), Calamus Species (Rattans), Durio zibethinus (Durian), Eusideroxylon zwageri (Ulin), Theobrona caci (Cacao) na ingi ta Dipterocarps (Shorea, Hopea, paolaquiquium etc)
- Na muthya, yia uukua mbeu kuma kivuioni lilikana kumya na kuvwika.

Ni Uiiti wau utonya kwendeka mbee wa mbeu kuvandwa?

- Vand mbeu imwe na uisisya syikua ivinda yiana ata kumea. Ethiwa syikua ivinda iasa kwi kyumwa kimwe nuseo kwamba kuiita mbee wa kuvanda.
- Ethiwa ndwina muikiio na mawoni ala unengetwe iulu wa mbeu ino ni useo kwamba kutatithya kwa nzia kivathukanyoo na uitavya amemba ma ngwatanio yenyu undu wonete itina wa kutumia nzia isu ethiwa ni nzeo.
- Ethiwa mbeu ii ni tungili tuniini kana twiona ikonde yumu ni useo kwamba kuiita ngelekany'o ya mivai ya ngii ila yithiwa na ikonde yumu nita Croton Megalocarpus, Neem, Cassia Species na kei appel ila syaile amaba uvandwa mikeveni.
- Ethiwa ukolanitye matunda amba uinde vandu va mithenya ili kana umwe, osa kisungi kya waya uvinyianisye na kusunga utiwe na iongii na kiw'u na nyama sya itunda iisungwa sume. Mithemba ya miti ila yikawa uu nita Syzium cuminii, Dovyalis Cffra, Trichilia Emitica, Vitellaria Paradoxa, Prunus Africana, Gmelina Arborea (gmelina), Azadirachta indica (neem) na Tamarindus Indica (Tamarind).
- Matunda amwe nimendaa kwamba kumwa kikonde kya nza na kutitianwa vamwe



ngelekany'o *Tectona grandis* (Teak) na *Calmus species* (Rattans).

- Matunda angi methiawa na ngii ila syendaa uthiwa. Itina wa kuinda itunda vandu va muthenya kana mithenya ili, kima itunda na ndii na mwithi mithemba ino nita *Melia volkensii*, *Melia Azedarach*, *Sclerocarya birrea*, *Cordia Africana*.
- Mikea imwe niyendaa kwanikwa suani kwa mithenya 3kana 5(vandu vatena sua nyingi) na itina kutuanguwa kumya mbindi/ngii. negelekany'o ni *Laucana Species*, *Calliandra calothyrsus*, *Acacia species*, *Sesbania Sesban*, *Grevillea robusta*, *Casuarina Species* na *Eucalyptus species*.
- Mbeu imwe syithiawa na ikonde yumu na syendaa kwamba kuitwa. Imwe nisyendaa ona ikonde yasyo kwamba kwatuwa na yundo kana ivia itina wa kwanikwa vandu va mithenya 3 - 5 nikana kiw'u kilike na kutuma imea. Mbindi ii nisyendaa uvandwa mituki undu vatonyeka itina wa kwatuwa ila nita *Melia(mukau)*, *podo species*, *Croton*

megalocarpus, *Adansnia digitata*, *Swietenia macrophylla*, *Delonix regia*. kwa ngii iola ninin na syendaa kwatuwa ikia mukeveni wina nguniko na uyikia kithangathi na uikusakusya kwa vinya nikana syatuke.

- Mbindi imwe nisyendaa utilwa o vanini kutitheesya kiw'u kulika. Ndukatile muno ndukatile munguthe.
- Mbeu imwe nisyikaa nesa kwa kuindwa kiw'uni kimuutia kana kivyuu ila nita:- *Calliandra*, *most acacias*, *Tamarind*, *Leucaena* na *Albizia*. ikia mbeu mukeveni, na uyitiia kiw'u kitheukite. Eteela kiw'u kivoe na uyumya mbey ila ukwithia syaimba.
- Mbeu imwe syendaa kuindwa kiw'uni o kithithy kwa masaa ta 12-24 ila nita *Sesbania*, *Tephrosia*, *Dalbergia Species*, *Gmelina*, *Gliricidia* na *Acacia augustissima*. Ikia mbeu mukeveni ongela kiw'u kithithu kila kyaile ithiwa kundu kwili kwa imbindi, umya ila itonya kwithiwa ithambalalite.
- Mbeu yoothe yamina uitiwa niyaile utwawa muundani kana kivuioni na kuvandwa.

Kusuvia Kivuo.

A. Kusuvia uwau na miimu

Tusamu ta fungi, bacterial, virus, mithowe na tusamu ta (Nduti, Muthwa, syingolondo) nitonya kwananga tumime.

Mowau amwe makwataa mbeu yi kivuioni nita uthithu wina uundu ula uetae fungi. li nitumaa mimea yoa mbee wa itanamea kana mii ikoa mbee wa munguthe kumila na ethiwa mumea wii unambiia umea uimosi na ukw'a.

Mawonany'o amwe ma mowau aya nita

- Kwosa kwa muthamba vaaya muthangani
- Kuvova na kuvaluka kwa kamumea
- Matu kutwika yelo
- Kukwa kwa kamumea

Undu utonya usiia uundu:-

- Kusesya muthanga wa kivuo kila itina wa mwaka kana miaka ili kila kietae kulekana kwa muthanga.
- Kuvetanga tumime tula twakwatwa ni uwau uyu na kutuvivya
- Kunginya na kithimo vate kuvitukya kiw'u uingithya.
- Ikiithya kiw'u nikiuthi kinatumana

- Eka muthanga withiwe ulekanitye nzeve ivite nesa
- Ima nesa na ivindani yila yaile
- Muthanga ndukethiwe wi munou kuvita kiasi. Kithimo kya muthanga kwavuu nikyaile uatiiwa.
- Nivaile ithiwa na utaaniu waile katikati wa mimea
- Ikiithya kivuo nikitheu ivinda yonthe.

Mowau ingi mnomasiwe kwa kutumi ndawa nesa. Ni useo kutumia nzia sya kikamba kwi kutumia ndawa ikwananga mawithyululuko ngelekany'o

- Tumia Muu
- Ikiithya kivuo ni kiime kiina yiia nikana withie mututu ndina liu kwoou ndikuka kuete uwau.

B. Kusea mii

Sokya tumime twaku kwa kyumwa imwe nikana mwii wa kuthi na nthi ndukangwate uendete na nthi na indi nikana usee mii ila yaasava muno . kii kitetheesya miti kukwata kiw'u yathamwa kuma kivuoni na kutwawa muundani.

Yila tumime tuu tuendee kumea itina wa myai 3-4



(kulingana na muvai) mii yatwo niyambiia kumea na kumila ungu mathanguni ala ivanditwe. Mii ino niyaile utilwa kila mwai kuvika myai ili na kavyu. Manya kana niwaile usuvia yila ukukiklya mathangu aya kana mikeve/mbisu ila uviiiite nthini ndukanange tumiti na mii. Ethiwa ti uu tata utumie kivuio kya kitanda (Sisya uniti 4) kila nikiolaa vata wa kusea mii nundu ikitaa uniina.

C. Kungithya, Kuimbia na Kwikia muunyi

- Kikonyo kina mavuthi nikuyalie utumiwa mkungithyani nikana muthanga ndukakuwe
- Ethiwa ti uu no utumie mukeve wina maima kungithya kivuio
- Ndukendeew'e ni kungithya na kiw'u kingi kuvituka kana kungithya na kiw'u kinini muno, tumia ta lita 20 kungithya tumimea ta 1000. Kiw'u kingi nikietae undu ula uetae Fungus na kwongela tusamu tula twanangaa mimea. Wonany'o umwe wa kungithya kuvita kiasi ni kindiiu muthangani.

- Ngithya kila kwakya na mawioo vatonyeka.
- Muthanga wa thanganthi niwendaa kiw'u kingi kwi ilivi.
- Oneleelya kiw'u muthangani no ti matuni
- Ngithya mbola nikana kiw'u kinywe muthangani
- Sisya ndukanange mii yila ukuimbia
- Ndukeseumia yia yikalite, imia oundu yongelekete ute kuekea yikambiie uania kiw'u kyeni, na unou wa muthanga.
- Mbeu imwe nisyendaa kwikiiwa muunyi - kwoo ikia matambya makusyikiia muunyi ethwa ve vata
- Yila kwina munyao vrika muthanga wa kivuio na nyeki na ethiwa ni meu ikia kitaalu kuete muunyi. Ethiwa syi matanguni kana mbisuni/mikeve kua utwa ungu wa muti.
- Ili kivuio mbee wa kukua kuthamya tumimea. nitonya ukua mwai kana myai ili kivuioni. wavikiia uthamya ingi vata muunyi ivindani yii.

Mawiko maseo :Tata Kivuio kyukilite kya kitanda.

Yila mwina umbano wenyu wa mwai wa ngwatanio thuthya tukundi tutate uvanda itandani syi yiulu na kutunga livoti undu monie na kivathukany'o kila kivo kya kivuio kya kitanda na kya nthi. Kivuio kya kitanda no kiseuwwe kuma wayani sisya visa uu wivaa nthi. Kii kitumaa mii iniina yamea kuvituka mathangu, mbisu, Kwoou uyithia nousee vatena nthina. Kii nikwonania kana mii ndiumia uthamya na kwoou mii ila yatiwa nikwataa vinyaukethia ona yathamwa niyakwata namituki. Ingi kivuio kii nikitetheeasya kusea mii ila itumaa imwe iselewa na kwika yiselee na kwananga mii na kwoou kitanda kii uyithia nikyaailya maundu.

Kitanda kii kiyiulu nikyongelaa utumiku wa kiw'u kivuioni. Onakau ala mena ivuio sya muthemba uyu nimamanyite nzia ingi ya usiia wasyo

wa kiw'u. Ngelekany'o ni kwonda tanzania menzite mutau na makekia mitau ya miti na kwalany'a matandaa kitandani kii kya waya ukethia miti ino nota yimuthangani nthi. Kiw'u kii nikikwataw'a nimitau ino ya miti na kuola kiw'u kukuwa ni nzeve kwoou kungithya ti kaingi. Ingi ona ithangu ya nailoni niyikiiawa kusii kiw'u kithi nthi.



Fig 1: Seedlings of various species arranged in stacks on a raised bed, TIST Makomboki Cluster in Murang'a County.



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. Sisy 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 thatatu. 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 uyiikiithyya yina utaaniu wa matambya 6 kana ikumi kwina na unou wa muthnga, 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 uti. 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 nikiutumana. 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 kwikinyia. 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 kwina 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 kikulovea 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 kwithiawa kwa vata muno. Ni useo kusisya vandu vanou, ikiithya utaniu mwailu wivo, vanda mivai ila miseo na kisio kyaku, ndukaeke 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 yithiawa 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 kivyu 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 withiawa wivithite two nekaa muvaka yikew'e niw'o uwonaa. Ingi vaa ndawa ya uwau uu ni Cooper based fungicides nitumiawa 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 withiawa na mithemba ingi ya miiti ya mitunda. Miti nivalukasya matunda ala ikwiw;a itetonya kuea 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 methiawa me maviku.

Ndunyu/Soko.

Kwata makolovea nesa usuviite! Soko sya nza ta European market syithiawa 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 yithiawa na mauta maingi.
2. **Puebla:** Niyendekente nbi aimi aingi nundu ndiwaangaa na ndithiawa na ndii
3. **Singapore:** Kikolovea muthemba uu wianaa mituki na uvikiaa kusyaa wina myai l4 kana l5 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.



Ndalani TIST Cluster wakiwa kwa mkutano wao wa kila mwezi, mwezi wa Decemba tarehe 17/12/2018

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Konoretab keswek ak ribet.

Konoretab kesuek

- Ibuat ine yon imoche iib logoek kongeten olekebuten komising iyamsi
- Koyomio. ko kararan iur ak kosich koristo ne ome asi mowech kesuot en orit.kararan ingeboisien kuniok chemotinye kongik chebo asi konyor logoek ak keswek koristo
- Maiyanat keboisien tukuk kou sebebeisiek anan plastikisiek amun motinye konyik chebo koristo komuche kowechob tuguk.
- Ibwat ile cheta ko chekororonen ko choton chesib kekonori,amun tililen kiyamsi ak kekonor.
- Amun keswek che yomnyotin ko ngebor koboroksei keswek chechang kemoe en betusiek 2-3 en asistab . kotomo kochobok .
- konor anyun keswek en ole tinye urwet ago yamat. Boisien tuguk kou kuniet ne tinye ole chute koristo ak teretab kipkaa asi momunyok. Konoren tuguk che kororonen asi mowechok keswek ak irib komochut koristo.
- Ago kend lolet keswek ago yemanyi imuchi itesi tuguk kou nesek metetekab muchelek ak alak Cheyomyotin niiton kotoreti koyamsi kititindab koristo ne mi orit.
- Ingoteben anyun bogoyot asi mutiny ng'wony keswek amun imuche kowalak konamak anan kochut susurik ak alak tugul che imuch koiti.
- Chang kabwatet en bik alak en kurubit anan ng'omotik asi iteben ngo kimuchi keboisien Kerichek keteren susurik, korokut kou neemol gliricidia leave ak sobunit komuche kotoret.
- Ibwat igergere keswek en abogora asi mowechok, tiny kora ile toss tore betusiek chetian Keswek asi mowechok . niiton kotiyenge koimbot keswek anan korikab keswek amun miiten Chetebie kasarta negoi kou kenyit agenge .
- Imuche iyai korokut en kosorwek che terotin asi iguiye ile ibe keswot agetugul kasarta
- Netyan en rutunet . Inemun keswek 100 ak inde kabeti asi inai ile ata chekorut ak chemorut
- Niiton koboru kimnotet nebo keswek. Obchei ak biik alak en kurubisiekab kilasta.
- Ingotebi keswek ole kaitit asi kokochi kotebi kogagei. Mokimoe keswek en asista agot Konyor ole kaitit missing kowechoksei keswek. Naiy ile miten keswek che kemine kou
- Noton che mokiyoimsie anan kekonor amun moche beek chechang asi korut. Korikab keswechuiton
- Koyomtos en chokinet kou Artocapus, heterophillus (jack fruit) Azadirachuta indica (neem) calamus Rattaus Durio zibethinus (duria) Theobrome (cacao) ak alak che chang .
- Nebo let anyun ibwat ile yon iibe keswek koba kabeti konyolu koyomiotin .

Nee ne kimokinigei asi keteren.

- Miin keswek che ng'eriny asi iker kasarta neibe . Angot koib kasarta nebo wikit keib kasarta Kinya angot ko metinye kayanet ko onchu kosibutik ne tai ko iyai koborunet ak obchei ak Kondoikab kilasta asi onyuru walutik .



- Angot ko keswek che tinye makatet ne nyikis anan ko mengechen ko motinye kinde kerichek kou keleluet neem cassia ak kei apple kimuchi kemin kou noton
- Miten alake che kinuri en beek betusiek (1-2) asi komuch konur magatete asi
- Komong keswot kou kipkarkaryat chepkomon ak saunet.
- Keswek alak kebore asi komong tenderek . alak kindo koteben beek betusiek (1-2)
- Alak ketue ak kenut kou melia volkensis, melia azadarach ak che chang
- Keswek alak kimuchi kiyamsi betusiek (3-5) asi komuch komong tenderek kou sebesebe. Chepitet ak alak che chang
- Logoek che tinye magatete ne nyigis kimuchi kema en asista asi koter magatet anan ketui. Alk en logoek kimuchi ketil asi kobit ole bune beek asi korut keswot ak irb kometil ole rutunen
- Alage koboisien beek che loltos kou calliandra chebitet ak chepkomon ketorchin beek
- Ak kebakach kotgokoititegitun beek kelol. En saisiek 12-24 ko en keswek che kabwa barak ilolu Amun yachen choton
- Keswek tugul che kagetoret konyolu kemin en sait noton.

Ribetab kabeti.

A - teretab susurik.

Susurik kutik ak alak kou toik chepkimoik ak somunyk komuche kowech en kabeti

Miondo ne korom missing en kabeti ko koristo ikochin niiton nunet keswek. Kotomo korut

Tinye koborunet kouni:

- ✓ Sokite keswek ak koyam
- ✓ Chorirendos sokek ak kobutyo
- ✓ Tolelyokitu sokek
- ✓ Nebo le komeyo

Teret ne nyolu

- ✓ Wal kabeti yeibata kenysisiek (1-2)

- ✓ Ketit ne kang'emak itutu
- ✓ Mat inde beek che chang
- ✓ Ker ile kosich ole mondoen beek
- ✓ Ingonyor koristo
- ✓ Sember en abogora
- ✓ Mat konyor ng'ung'unyek anan okwoindo neo.
- ✓ Mat kochilge ketik en kabeti
- ✓ Ingotililit betit en abogora

Mionwek kimuchi keboisien kerichek , missing ko chebo kipkaa amun motinye kowech. Boisien kou orek Rib kabeti asi maimuch kobwa susurik

**B- Toretetab tigitik**

Rib missing kabeti asi maimuch koba tigitik kokoegitun ketile asi konyor ketit itondo Ne kararan. En kasarta nebo orowek (3-4) konam anyun tigitik komong'unen teret . Kimuchi ketil en kila en arowek (1-2) ak rotwet .

Kou noto itech betit ne kanaptaat asi komawechok tigitik .

C-Tumchin beek, sember ak iur

- ✓ Boisien watering can asi mowech kabeti
- ✓ Matinde beek che chang anan ko chetutikin , beek chechang koweche keswek
- ✓ Tumchin en koron ak koskolen

- ✓ Emet netinye ng'ainet komoche beek en abogora kosir menet.s
- ✓ Matinkotiny beek sokek
- ✓ Rib tigitik ye isemberi
- ✓ Sember abogora amun timdo kokochin keik amoegekitun amub moche beek ak asista
- ✓ Keswek alak komoche urwet
- ✓ en kasartab robta ituch keswek ak suswek cheomotin asi moib beek
- ✓ Rib en tuguk alak tugul kou tuga amun imuch kowech
- ✓ Ingonyo ketit agoi 30 cm kotomo iwe imin imuchi kotar arawek (1-6) en kasari iiste urwet en kabeti asi kokochi ketik konyor asista ak kogimegitun

Boisiet ne kararan nebo betusiek che kakiganapta kobwa barak ongeyomten.

En tuiyetab Kilasta ogochigei boisiet en kurubit kotoi kochob betitab ketik ne Kakikanabta konyo barak. En let anyun kogon walutiet ngokararan anan tinye besit.

En betini konyumnyum keboisien ketik kou fremisiek ak segengeit (wire mesh) Ker en bichait. Kararan missing niiton amun yekakorut ketik kobwone tikitik kot konyo konyor kei nebo kiyoten kororochon choton ko tikitik che mengechen (air root) komoimoksei tigitik alak che echen. Ak konam kosich kimnotet ne en kasarta ne kagiim en imbar komoimoksei ketit nyone koetu komie. Bose missing boisit boisiet amun meketile tigitik kou yon komiten en ngwony. Niiton ko boisit ne ui missing amu tam kowechoksei ketik che chang amun kakitil tigitik. En korokutioni konyumnyum missing semberet anan kinem timto en kabeti .

Toku anyun keboisien bek chechang en kabeti ini. Kokisom anyun konomikab boisioni

Iton kotakowal boisioni iton. En emetab Tanzania kotinye keret age amun ichek kekerere Ngwony agote bogoinik ak segengeit (wire mesh) ak kominchi keswek barakunyin . Angantan miten ngwony komiten segengeit netere tigitik komaba koloekitun missing . Ogetim temik tukul asi keswen ngo miten walet ne kararan .



Fig 1: Seedlings of various species arranged in stacks on a raised bed, TIST Makomboki Cluster in Murang'a County.



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 kabetsiesiek 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 kenysisiek [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 avacado 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 ngugunyek.

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

Anthracoze.

Inom e sogek 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 kenyor logoek chegororon

Temik ocheng ole omuche onyorunen ketik cheyomokse.