

Mazingira Bora



TIST

The International Small Group & Tree Planting Program

www.tist.org

English Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Mr. Evans Maneno talking to New England College Students who paid him a courtesy call during their TIST trip last month.

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TIST Continues To Receive Visitors From Across the World.

Once more, TIST received visitors from foreign countries, this time students from New England College (NEC) and Yale University in USA. This was a working trip organized purposely to help improve TIST.

Though they worked together, NEC students primarily focused on talking to some of the TIST famers at the Cluster meetings, hearing their stories in TIST which they will use to market TIST carbon tones in global market as well as for fundraising to get more money to expand TIST. On the other hand, Yale University students focused on a survey that intends to measure the benefits TIST farmers have been receiving out of their participation in TIST.

The students numbering 17 lead by their dean, Martin Kevin and John Cornor arrived in Kenya on the night of 9th March 2015 for a eight day visit ending on 17th March .Also, in this team was Brad Neff, senior manger working with Pacific Gas and Electric company in California, USA.

The team multiplied themselves into three groups, each group visiting a different Cluster. However, on first day, they all visited Mwikuria TIST Small Group in Mwea Cluster. Among the Clusters visited include Kiraro, Kirindini and Kitheo on second day. Third day were Nyweri, Nkando and Mbajone. Fourth day were Miruri iiri, mworoga and Mituntu while on the last day, Monday 16th were

Nyariginu, Burguret and Nturukuma.

On Saturday 14th, the students had a soccer match with Meru University Soccer team as well as Meru's Mahakama FC. On same day Saturday, they briefly toured Lower Imenti Forest, where TIST farmers are planting indigenous trees in the gazetted forest under the TIST/KFS memorandum of understanding (MOU). On Sunday, they took a break.

Besides visiting TIST Clusters, they also had meetings with Meru county Ecosystem Conservator, Mr Evan Maneno at KFS offices in morning hours of Monday 16th. In the evening of the same day, we met Laikipia County Governor, H.E Joshua Irungu.



Soccer match: NEC. Students vs Mahakama FC, Meru. The students had a friendly match with Mahakama FC as well as Meru University Students Soccer club.



Seed Storage & Pre-treatment.

Seed Storage

- 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 which 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 mould. Use air-tight 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 know 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 for. 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 which 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 removing 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 pestle and mortar 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*, *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 remove the seeds from the water after they look swollen.
- Some seeds can be soaked in normal (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 which 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 litres 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 1 month to 6 months. See transplanting notes. 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 which 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, ICRAF demonstration site, Meru, Kenya

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TIST nigwita na mbele kuriungirwa ni ageni kuuma guntu kunthe nthigurune.

TIST niariungirwe kairi ni ageni kuuma nthiguru cia oome, kuuma cukuru igwitwa New England College (NEC) na Yale University iria iri USA. Iji yari ndiunga ya ngugi iria yabangi niuntu bwa gutethia kuthongomia TIST

Kinya kethira nibaitire ngugi amwe, aritwa kuuma NEC bategete mono kwaria na arimi ba TIST babakai ndene ya micemanio ya cluster, kwigua rugono rwao ndene ya TIST ruria bagatumira kwendia caboni inyingi ya TIST ndene ya thoko ya nthiguru yonthe amwe na gucuu mbeba ingi cia kuaramia mubango jwa TIST. Ndengi, aritwa ba cukuru ya Yale University nibategaira kuuria biuria biria bigatethia kuthima baita iria arimi ba TIST bethiritwe bakionaga kuumania na kwithirwa bar indene ya TIST.

Aritwa bau, baria bari ikumi na mugwanjwa

batongeretue ni murungamiri wa aritwa, Martin Kevin na John Cornor nibakinyire Kenya utuku bwa tariki kenda mweri jwa ithatu 2015 ndiunga ya ntuku inyanya iria yathirire tariki ikumi na mugwanja mweri jwa ithatu. Kiri gikundi kiu nikwari kinya na Brad Neff, murungamiri umunene witaga ngugi na kambuni ya Pacific Gas and Electric company naria California, USA.

Gikundi kiu nikiaigaire kia bithatu, o gikundi gikariungira cluster mwanya. Indi ntuku ya mbele, bonthe nibariungire gikundi gikinini kia Mwikuria TIST Small Group ndene ya cluster ya Mwea. Cluster iria bariungire ciari Kiraro, Kirindini na Kitheo ntuku ya ijiri. Ntuku ya ithatu ciari Nyweri, Nkando na Mbajone. Ntuku ya inya Miru iiri, Mworoga na Mituntu na ntuku ya muthia, jumatatu tariki ikumi na ithanthatu Nyariginu, Burguret na



Nturukuma.

Ntuku ya Jumamosi tariki ikumi na inya, aritwa bau nibari na muchetho jwa mubira na gikundi kuuma cukuru ya Meru University amwe na gikundi kingi gigitwa Meru's Mahakama FC. Ntuku o iu, nibariungire mwitu jwa Lower Imenti naria arimi ba TIST bakuanda miti ya gintwire ndene ya mwitu jou jwa thirikari niuntu bwa MOU iria yasainirwe gatigati ga TIST na KFS. Ntuku ya kiumia, nibanogokere.

Amwe na kuriungira cluster cia TIST, nibari kinya na micemanio na Mukuru Evan Maneno uria uri mumenyeeeri wa gukaranira kwa nyomoo na imera bia mithemba mwanya (Ecosystem Conservator) ndene ya county ya Meru naria ofisi cia KFS ruukiri rwa Jumatatu tariki ikumi na ithanthatu. Ugoro bwa ntuku o iu, nitwatirimanire na Governor wa county ya Laikipia Mheshimiwa Joshua Irungu.

Soccer match: NEC. Students vs Mahakama FC, Meru. The students had a friendly match with Mahakama FC as well as Meru University Students Soccer club.



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.
 - Cuaa umenyo kwegie ni igita ring'ana mbeu yaku iumba wikwa. Bubu bukaringana 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 ciothuranua 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 mutongeria 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 mukebene 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 riu 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 nitrogen iria ugwikira na njira ya kuniyia 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 gaciu. Menyeera riria ugukiiria mukebe utikagitarie miri iu niuntu itikuri.

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

C. Gwikira ruuji, gukuura iria na kirundu.

- Tuminyi nitubati kwithirwa turina mikebe 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 utikagitarie 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 nibithithitue.
- 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 kumania 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 niriu na bata yagwikira ruuji jamaingi ikanyia. Kiratasi kiana iloninogi ikwemuta ronenike ndaru ujiru tira tonye nthimu thetune.



Mbicha ya mbele: Miti iumithitue ya mithemba imingi ibangi na mila ini kirimu nanda juuki ritue, antu aria ICRAF iona na gia njira cia urimi, Meru, Kenya.

Mazingira Bora



TIST

The International Small Group & Tree Planting Program
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Kikuyu Version

An Environmental, Sustainable
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Mr. Evans Maneno talking to New England College Students who paid him a courtesy call during their TIST trip last month.

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TIST guthii na mbere na kwamukira ageni kuma miena ngurani thi yote.

Oringi, TIST niiramukirire ageni kuma mabururi ma nanja, riita riri arutwo kuma New England College (NEC) na Yale University kuma USA. Riri riari iceera ria uruti wa wira riria riathondeketwo ni na kuharirio ni niguo gugacirithia TIST.

Ona gutuika nimarutithanirie wira, arutwo a NEC muno makiria marongoreirie kwaria na arimi a TIST thiini wa micemanio ya TIST, guthikiriria ng'ano ciao thiini wa TIST iria magucoka mathii makendie TIST thiini wa thoko ya carbon ya kimabururi na ningi gucangathia mbecha cia kwaramia TIST. Na ningi, arutwo a Yale university muno marongoreirie gwika uthuthuria uria wari githimi kia mawega maria arimi a TIST monete

kumana na gukorwo mari thiini wa TIST.

Arutwo aria makinyite 17 matomgoretio ni dean, Martin Kevin na John Cornor makinyire Kenya utuku wa 9th March 2015 niundu wa iceera ria thiku 8 riria riathirire 17th March. Na ningi, thiini wa timu ino kwari na Brad Neff, murugamiriri munene uria urutaga wira na Pacific Gas nad Electric Company thiini wa California, USA.

Timu ici niciegayanirie kuri ikungi 3 o gikunf=di gigiceerera cluster ngurani. No ona kuri ouguo, muthenya wa mbere othe macerteere gikundi kia Mwikuria thiini wa Mwea. Thiini wa cluster iria ciaceereirwo ni Kiraro, Kirindini na Kitheo muthenya wa keeri. Muthenya wa gatatu ciari Nyweri, Nkando na Mbajone. Muthenya wa



kana ni Miruri iiri, Mwaroga na mituntu naguo wa muthia ni Monday 16th ciari Nyaringinu, Bugureti na Nturukuma.

Kuri Saturday 14th arutwo mari na mubira wa maguru na timu ya mubira wa maguru ya Meru University hamwe na Meru Mahakama FC. Na o muthenya o ucio, nimacereire na njira nguhi mutitu wa Lower Imenti kuria arimi a TIST mahandite miti ya ki-nduire mutituini wa thirikari rungu rwa mutaratara wa TIST/KFS uiguithanioini (MOU) kuri Sunday nimahurukire.

Thengia ya guceerera cluster cia TIST, nimagiire na mucemanio na Meru County Ecosystem Conservator, Mr. Evan Maneno thiini wa ofisi cia KFS mathaa ma ruciini ra Monday ya 16th. Na hwaiini o muthenya ucio, nitwacemanirie na governor wa Laikipia HE Joshua Irungu.

Soccer match: NEC. Students vs Mahakama FC, Meru. The students had a friendly match with Mahakama FC as well as Meru University Students Soccer club.



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 uhoru wa kuria uri wigii kahinda karia mbegu cingiigwo. Uu nikuringana na muthemba wa mbegu. Mithemba miingi ingiigwo wega niikaraga miaka miingi.
- Nougérie kurora mahinda maingi niguo umenye cimera 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 uhoru 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 nikugunyua niciguthuka naihenya.
- Ririkana kuri na mithemba iiri ya mbegu, “recalcitrant seed”. Mbegu ici ciagiriirwo ni kuhandwo marimaini thutha wa kunganio tondu cibataraga ugunyu muingi. Cingikunjwo na gikuo kigunyua 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 niguu 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 uhoru ucio kuri cluster yanyu.
- Angikorwo mbegu cirri nangothi huthu nikuuga ndurabatara 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 uhihinye niguu 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 niguu 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.

- Gucejia 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 maturigiciirie.

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 niguitiririo 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 – tigirira niwekira kiiruru na mahuti
- Hingo ya mbura, humbira mimera na mahuti ma miti kana nyeki. Mimera niyagiriirwo kwehuthio 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 wehuthie kiiruru kahiondaini gaka.



Maundu mega ma kugeria: nathari njoe naiguru.

Hingo ya mucemano wanyu wa cluster, hinyiriria ikundi iria ingi magerie kuhuthira nathati 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.



Fig1: Mimera ya mithemba ngurani ibangitwo iguru ria nathari noe naiguru, ICRAF demonstration site, Meru, Kenya

Mazingira Bora



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Mr. Evans Maneno talking to New England College Students who paid him a courtesy call during their TIST trip last month.

Inside:

TIST yazidi kupata wageni kutoka pande zote za dunia. Ukurasa 2

Kuhifadhi na kutibu mbegu kabla ya kupanda. Ukurasa 3

Utunzaji wa vitalu. Ukurasa 5

Mbinu bora yakujaribu: Vitaluvilivyoinuliwa. Page 6



TIST yazidi kupata wageni kutoka pande zote za dunia.

Mara nyingine, TIST ilipata wageni kutoka nchi za mbali, mara hii wanafunzi kutoka vyuo vikuu vya New England (NEC) na Yale kule Amerika. Haya yalikuwa matembezi ya kikazi yaliyopangwa ili kuboresha TIST.

Ingawa walifanya kazi pamoja, wanafunzi kutoka NEC walikuwa na lengo maalum la kuongea na baadhi ya wakulima katika TIST katika mikutano ya cluster, kusikiza hadith zao katika TIST ambazo watatumia kutafutia soko tani za kaboni za TIST katika soko la dunia nzima na pia kutafuta pesa ili kuupanua mradi wa TIST. Wanafunzi wa Yale nao walilenga kukusanya data itakayotumika kupima faida ambazo wakulima wamekuwa wakipata kutokana na kujihusisha na TIST.

Wanafunzi hao waliokuwa kumi na saba na walioongozwa na kiongozi wao, Martin Kevin na

John Cornor walifika Kenya usiku wa Machi tisa 2015 wakiwa matembezi ya siku nane ambazo ziliisha tarehe kumi na saba Machi. Pia, katika kikundi hicho alikuwa Brad Neff, msimamizi mkuu anayefanya kazi na kampuni inayoitwa Pacific Gas and Electric company kule California, USA.

Timu hiyo ilijigawa zikawa tatu, kila kikundi kikitembelea cluster tofauti. Hata hivyo, siku ya kwanza, wote walitembelea kikundi cha Mwikuri TIST Small Group katika cluster ya Mwea. Cluster walizotembelea zilikuwa Kiraro, Kirindini na Kitheo siku ya pili. Siku ya tatu Nyweri, Nkando na Mbajone. Siku ya nne Miru iiri, Mworoga na Mituntu na siku ya mwisho Jumatatu tarehe kumi na sita Nyariginu, Burguret na Nturukuma.

Jumamosi tarehe kumi na nne, wanafunzi hao walikuwa na mchezo wa kandanda na timu ya chuo



kikuu cha Meru na pia timu inayoitwa Meru Mahakama FC. Siku hiyo hiyo, walitembelea kwa ufupi msitu wa Lower Imenti ambapo wakulima katika TIST wanapanda miti ya kiasili katika msitu wa serikari chini ya mkataba wa maelewano kati ya TIST na KFS. Siku ya Jumapili walipumzika.

Pamoja na kutembelea cluster za TIST, pia walikuwa na mikutano na Bwana Evan Maneno ambaye ni Msimamizi wa kuhakikisha kutunzwa kwa bionuwai katika jimbo la Meru (Ecosystem Conservator) katika ofisi za KFS masaa ya asubuhi Jumatatu tarehe kumi na sita. Jioni ya siku hiyo hiyo, tulikutana na Gavana wa jimbo la Laikipia Mheshimiwa Joshua Irungu.

Soccer match: NEC. Students vs Mahakama FC, Meru. The students had a friendly match with Mahakama FC as well as Meru University Students Soccer club.



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 inaanza 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 mkebeni.
- 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 mikebe baada ya miezi mitatu au mine (kulingana na aina na tabia nchi) mizizi huanza kukua na kutokea chini ya mikebe. Mizizi hii yafaa kukatwa kila miezi miwili au mmoja kwa kisu. Kumbuka kuwa mwangalifu unapoinua mikebe 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 mikebe 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 yakujiiimarisha ikihamishiwa 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.



Picha 1: Miche ya aina nyingi ikiwa imepangwa katika kitalu kilichoinuliwa, mahali pa maonyesho pa ICRAF, Meru, Kenya

Mazingira Bora



TIST

The International Small Group & Tree Planting Program

www.tist.org

Kikamba Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Mr. Evans Maneno aineenania na amanyiw'a ma New England College alamavikie kumuthokea mwai muthelu mokite walany'oni wa TIST.

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TIST Kuendeea ukwata aeni kuma nthi kivathukany'o.

Kwa ivinda yingi TIST ninakwatie aeni kuma nthi sya muingo ala kwa ivinda yii ni amanyiw'a kuma New Englnd College (NEC) na Yale University ya USA. Ndembea ino yoombanitw'e kwa kieleelo kya utetneesya kwayiya TIST.

Onakau nimathukumie vamwe amanyiw'a ma NEC maina mwolooto wa kukomana na kuneenania na aimi ma TIST ivindani ya mbumbano sya ikundi, kwithukiisya ngewa nthini wa Tist ila iutetheesya kwa uta Tist sokoni wa nzeve itavisaa wa nthi yothe na ingi kutetheesya kumya muvothi wa mbesa sya uthathasya TIST. Ngalikoni ila ingi amanyiw'a kuma Yale university meethiwe mayika savei ya undu aimi ma TIST makwataa vaita kwa

kwithiwa me thini wa TIST.

Amanyiw'a aa ala mai 17 matongoew'e ni dean woo Martin Kevin na John Cornor nimavikie Kenya utukuni wa 9/03/2015 kwa thoka ya mithenya nyaanya ila yathiiwe uthela 17/03/2015. Kikundini kii vai na Brad Neff ula ni manager uthukumaa na Pacific gas and Electric compnay California, USA. Timu ino niyaaniw'e ikundi itatu kila imwe ithokea kikundi na ngwatanio kivathukanny'o. onakau muthenya wa mbee nimavikie ngwatanioni ya Mwea kikundi kitawa Mwikuria. Kati wa ngwatanio ila syathokeiwe ni aeni aya ni Kiraro, Kirindini na Kitheo muthenya wa keli. Muthenya wa katatu mavikie Nyweri, Nkando na Mbajone. Muthenya wa kana nimaendie ngwatanioni ithi Miruri iiri,

Mworoga na Mituntu vala muthenya wa muthya ula ni matuku 16/3/2015 maendie Nyariginu, Burguret na Nturukuma.

Wathathatu wa matuku 14/03/2015 amanyiw'a aya nimathaukie muvila wa maau na amanyiw'a ma Meru University Soccer team na Meru's Mahakama FC. Muthenya ousu wa thathatu nimavikie mutituni wa lowe lmenti vala aimi ma Tist mavandite miti ya kiene ungu wa walany'o na Mou ya TIST/KFS. W a k y u m w a nimathyumuie.

Itina wa kwithiwa matembeie miundani ya aimi ma TIST nimwee thiiwe na ivinda ya kumabna na Meru County Ecosystem Conservator Mr.Evan Maneno ovisini wa KFS masani ma kwakya matuku

16/03/2015 na muthenya ousu nimakomanie na Governor wa Laikipia County H.E Joshua Irungu.



Ithau ya muvila wa maau:Amanyiw'a ma NEC VS Mahakama FC, Meru. Amanyiw'a aya nimeethiwe na ithau ya unyanya na Mahakama FC na Meru University Student Soccer Club.



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 ususy 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 Kusisya 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 ngwatatio 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 mbeeu 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 yithiawa 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 kutuangwa 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:- Calliandwa, 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 uitwa 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 kutuviva
- 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

kitetheasya 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 uviiite nthini ndukanange tumiti na mii. Ethywa ti uu tata utumie kivuo kya kitanda (Sisya uniti 4) kila nikiolaa vata wa kusea mii nundu ikitaa uniina.

C. Kungithya, Kuimia na Kwikia muunyi

- Kikonyo kina mavuthi nikuyalie utumiwa mkungithyani nikana muthanga ndukakuwe
- Ethywa ti uu no utumie mukeve wina maima kungithya kivuo
- Ndukendeew'e ni kungithya na kiw'u kingi kuvituka kana kungithya na kiw'u kinini muno, tumia ta lita 20 kungithya tumime 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 ukuimia
- Ndukeseumia yiia yikalite, imia oundu yongelekete ute kuekeea yikambiie uania kiw'u kyeni, na unou wa muthanga.
- Mbeu imwe nisyendaa kwikiwa muunyi - kwoo ikia matambya makusyikiia muunyi ethwa ve vata
- Yila kwina munyao vwika muthanga wa kivuo na nyeki na ethiwa ni meu ikia kitaalu kuete muunyi. Ethywa syi matanguni kana mbisuni/mikeve kua utwa ungu wa muti.
- Ili kivuo mbee wa kukua kuthamya tumime. nitonya ukua mwai kana myai ili kivuioni. wavikiia uthamya ingi vata muunyi ivindani yii.



Mawiko maseo :Tata Kivuoio 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 kivuoio kya kitanda na kya nthi. Kivuoio kya kitanda no kiseuvwe 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 uithamya na kwoou mii ila yatiwa nikwataa vinyaukethia ona yathamwa niyakwata namituki. Ingi kivuoio 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 usia 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 kusia kiw'u kithi nthi.



Fig. 1: Mithemba kivathukany'o ya mimea ya miti ivuitwe kitandani, wonanio waICRAF, Meru, Kenya.

Mazingira Bora



TIST

The International Small Group & Tree Planting Program

www.tist.org

Kipsigis Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Mr. Evans Maneno talking to New England College Students who paid him a courtesy call during their TIST trip last month.

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Tesetai toek koitin TIST koyob kebeberuek chebo nguwoy.

En abogora ko tesetai toek korutechin TIST koyob emotinuek chebo nguwoy. En kasari komiten kipsomaninik koyob New England College (NEC) ak yale university nebo USA. Niton ko tetet asi komuch koganabta TIST.

Ingandan boisie tugul enkibagenge, kisomoninikap nec kotinye toginet koyor ngalalet ak temikap TIST en tuiyosek en kilsta asi koyor yamet asi komuch kochengi ndonyo nebo koristo ak komuch kotoret chepgondok asigotestai TIST. En kebeberta age kipsomaninikap yale kotinye

kosegei mising agobo keluloik chenyoru temikab TIST en boisiyonikwak.

Koitetab kipsomaninik 17 kotolonchin dean martin kevin ak John Connor ko kiitu 9.3.15 kemoi en rutetab betusiek sisit. En kibagengeinon brad neff ko senior manger neboisie ak pacific gas ak Electric Company en Canifornia USA.

Kipcheyak koyob somogu kirutoinichuton en betutab tai koba tungul kilasta agenge nebo mwikuria en mwea.kitestai koba kiraro,kirindini ak kitheo betutab oeng. Betutab somok ko

nyweri, nkando ak nbajone. Betutab anguwan ko miruriliri,mworoga ak mituntu. Nebo let koba ngariginu . Burguret ak nturukuma.

En jumomos kayai ureriet ak kipsomaninikab meru university ak chebo Meru Mahakama FC. En betunoton kora korutechi Lower lmenti Forest ole kimichi temikab TIST ketikab kipgaa ole kiiyonchin TIST ak KFS en Jumombili konyor komunget. Kitestai kiprutoinik korutechi County nebo Meru ecosytem conservator, Mr. Evan Manena en ofisinyin en saisiekab karon en betkuwen konyor Laikipian County Governor H.E Joshua Irungu



Soccer match: NEC. Students vs Mahakama FC, Meru. The students had a friendly match with Mahakama FC as well as Meru University Students Soccer club.



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 mokiomsie 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 kagetolet 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,semer 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 koweckoksei 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. Koboru agobo korikab ketik che terchin che kaginde en barakutab betit ICRAF en oleo kibortoen en meru.