Nganoini TIST Cluster after having their monthly meeting in May 2018.

Inside:

Seed Storage & Pre-treatment. Page 2

Nursery Care. Page 4

Best practice to try: Raised pot beds. Page 5

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, 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 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. A 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 and 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, and 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.
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.
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 evaporate 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.

Katerera TIST Cluster in Uganda trained on raised nursery bed.

Agroforestry refers to growing trees and shrubs together with agricultural crops or livestock. The overall aim of agroforestry is to increase the productivity of the land through the use of trees. Trees have many benefits for the farmer:

- Building material
- Fuel wood
- Fruits and other food
- Fodder
- Soil stabilization
- Soil fertility
- Moisture retention
- Wind shelter
- Erosion control, especially by rivers
- Medicines
- Shade

Agroforestry practices: There are many different techniques and new methods are being discovered all the time. Some techniques are successful in one place, while not so useful in other areas. The following are some common methods of agro-forestry:

1. **Hedges:** This involves selecting a tree species which can be placed in a line and which has benefits for the land. Hedges require little space, control erosion, and can produce leaves for fodder or mulch. An example of hedging is to plant a row of trees around the field boundary. Recommended spacing is around 2m – 3m, with the best design including a mixture of tall and short trees.

2. **Alley cropping:** This involves establishing trees at varied spacing 2m and above, in rows along fields. There may be a tree row, then two or three rows of crops, then another tree row, then crops etc. An example of this is planting alternating rows of maize with Leucaena, or coffee and bananas. The most suitable trees are leguminous ones (ones that fix nitrogen for the soil). Spacing between rows of trees should be at least 5m. The tree rows need to be weeded and pruned regularly. The trees cannot grow too tall otherwise they will compete with the crops for soil nutrients and light. The pruned leaves can be added to the soil to improve the soil fertility.

3. **Windbreak:** This is planting wide strips of trees to provide a windbreak, which protects crops from the oncoming wind. You begin by planting large trees in the center, smaller trees for the next two rows and low shrubs, then bushes and grasses on the outside. The advantage of windbreaks is that the farmer does not have to sacrifice an entire plot of land for trees. It only takes a strip of land, and the benefits can improve yields by 30% in some areas. Please note that poorly planned windbreaks can damage crops more, because it can channel the wind through gaps. Find someone experienced in this to help you design your windbreak.

4. **Fallow cropping:** This is where farmers stop growing crops on a piece of land and let trees take over to help restore soil fertility.

5. **Inter-cropping:** This involves wide and even spacing of trees among food crops. Good trees are those that have light canopies and fix nitrogen.

6. **Grazing improvement:** You accomplish this by managing trees on grazing land to help provide wood and fodder.

7. **Woodlots:** Small woodlots can be grown on unused or unproductive land, e.g. woodlots planted on stony outcrops or in gullies. Woodlots can also be planted on cropland to serve as a windbreak, or they can be planted on fallow land. Please note that TIST trees have to be correctly spaced in order to grow fully and remain in the ground long-term. Some of the above agro-forestry methods are best practices for agriculture, but may not qualify for TIST tree payments.
Nganoini TIST Cluster baada ya mkutano wao wa kila mwezi, mwezi wa tano 2018.

**Inside:**

- Gwika mbeu na kwithuranira niuntu bwa kuanda.  *Page 2*

- Kumenyeera minanda.  *Page 4*

- Mwitire jumwega juri aubatikugeria: Minanda iukiritue.  *Page 5*

- **TIST:** Mitire iria miega buru riria ukuandaniria imera na miti na kinya gwika ndithia.  *Page 6*
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 gurukuria ruugo na aria gugatuma ruuji ruuthurane amwe na kuthukia ntunda na mbeu inu.


- Ika mbeu yaku antu gukuumo na kurina kirundu. Ikira nkuniene kana nyongune ya muthetu nikenda unyiyia kanya ga kuthuuka. Tuumira mikebe itigutonyithia ruugo riria ugwikya mbeu ya goro na ujurie mikebe inu buru nikenda unyiyia kanya ka ruugo.

- Kethira utina mbeu ing’ani kujiuria mikebe yaku, ujuriria na gintu ja makara, mati ja mucere kana maratasi ja ngazeti. Bibi bikajukia ruuji ruria ruugone.

- Tuumira mpau kana mbito kumenyeera ati mikebe inu irina mbeu itigutonga nthiguru (guku nigutumaga mbeu ikathukua ni kugaruka kwa murutira, ruuji, na tunyomoo). Kethira uritumira nkunia kana mibuko, curia.

- Uriia kirira kuumania na ikundi bingi biria bigukuirirrie na ariti ba ngugi ya gutetheria arimi nikenda umenya uriia uguutumira dawa cia tunyomoo na cia iria nikenda umenyeera mbeu yaku kuumania na tunyomoo.

- Rikana gutega mbeu yaku o nyuma ya igita biririkai nikenda umenyeera ati itirathuka.

- Cuua 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 uthera ni ririka ritumaga mbeu ikaumanga na mpwi. Jukia mpindi inkai (mung’uanano igana), andika ni ing’ana wathuura, ciumithie na utare ni ing’ana ikauma. Ukatathia ujo o mweri, mung’uanani, ukomba kwona riria uthongi bwa mbeu bukambilira kuthira. Gaana jaria ukooona na cluster yaku.

- O uria antu aria wikite mbeu yaku kurina mpio nou igakara igita biriraja nkuruki. Menyeera ati mpindi inu itiki werune. Kethira antu aria ugwikya kurina ruugo turina ruuji ruurwingi, mbeu ikathukanga na mpwi nkuruki.

- Rikana ati kurina mithemba imwe ya mbeu ciitagwa ‘recalcitrant’ mbeu inu niciendaga kuandwa orio cothuranua kuuma mitine na ciaritwa ntundene niuntu niciendaga ruuji ruurwingi. Cikaogwa na nguo irina ruuji no ciikare ntuku inkai mwanka kiiumia kimwe. Mpindi inu niciikujaga ciaa ciaa. 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 gicizeke 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 paraodia, Prunus Africana, Gmelina arborea (gmelina), Azadirachta indica (neem) na Tamarindus indica (tamarind).

- Matunda jamwe njendaga 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 guburwana nainya. Warikia kurinda ntuku imwe kana iji, 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 riua ririkai) riu ikauruwa nikenda mbeu itwa mung’uanano Leucana, Calliandra calothyrsus, Acacia, Sesbania sesban, Grevillea robusta, Casuarina na mithemba ya mibau.


- 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
A. Kunyiyia tunyomoo.

Tunyomoo notuthukie miti iria ikuuma. Kurina murimo jumwe juria juretagwa ni fungu. Nijutumaga mbeu ikuuma 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 njigarukaga 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 kiri kiajitee orio na ugakiithiria.
- Kwebera gwikira ruuji runrungi nkuruki ya ruria rukwendeka.
- Kumeneera ati ruuji rutukwikigara
- Kumeneera ati kurina ruugo bwega
- Gukurira iria bwega na kurio
- Nikubati kwithirwa kurina kinya gakeega gatigati ka miti nikenda itainyane.
- Menyeera ati munanda nijuthere 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 nociithukie naria gututhiurukite. Mung’uanano;
- Utumiri bwa muju
- Kumeneera ati munanda nijutheri nikenda jutigakucie tunyomoo.

B. Kunyiyia miiri.

Garurira aria o muti juri rimwe o kiumia nikenda miri imiraja itigatonye muthetune mono iija gwitia kugitwa. Muri jumwega nigutethagia miti gucua ruuji jwarijika kuthamiria muundene.

Riria muti juandi mukebene jakwayina mieri ithatu gwita inna (kuringana na muthemba na rera) miiri yaju niambagiria kuumira nthiguru ya mukebe. Miri iji nibati kugitwa o mweri jumwe gwitairi na gacii. Menyeeera riria ukugikira mukebe utikagitariye miri iu niuntu itikuri.

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

C. Gwikira ruuji, gukuura iria na kirundu.

- Tuminyi nitubati kwithirwa turina mikebe ya kuminya nikenda tutigatume muthetu jukamatwa.
- No utumire kiny a mukebe jurina makutho
- Ebera gwikira ruuji rurukai kana runrungi mono, ikira miti ngiri ruuji lita mirongo iri. Ruuji runrungi nirururira imera inya ina na rugakucia tunyomoo. Gintu kimwe kiri kionana ruuji runrungi ni kiumia kwa imera bibinini bikari ja kimera muthetune.
- Ikira ruuji o ruukiri na ugoro kwombika.
- Muthetu jwa muthanga jukenda ruuji nkuruki ya muthetu jwa clay
- Ikira ruuji muthetune ti muthangune.
- Ikira ruuji mpaari nikenda rutonya muthetune.
- Menyeera utikagitariye miiri riria uggukurira iria.
- Ugeteera mono mbele ya ukuurira iria. Gukurira iria kurina bata niuntu iria karcindanagira weru, ruuji na irio.
- Mbeu imwe niciendaga kirundu — menyeera ati irundu nibithithitue.
- Mburene, kunikira mbeu na nyaki injumu. Miti iu ikuuma nibati kuthamua kuumia ruungu rwa miti nikenda ruuji rutikagwire mbeu rugitaria imera.
- Irigira munanda nikenda ujumenyeera kuumia na ndithia na twana tuguchetha
Kimeru Version

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.


Mina ndaiu kiritue ika ragate kayenda garu ujirurwi nginkuruki, indiri, amenyeeri ba minanda ni bathithitie njira ya gukaba na nauntu bubu. Njira imwe nonetwe 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 kinya indium taroju kamia kanya karia ga kwendeka ni kenda miri iigita yongwa. Ruujini rugwata guamu tario nena ruga kinya miti iuriria ruguka matwa niriu na bata yagwikira ruuji jamaingi ikanyia. Kiratasi kiana iloninogi ikwemuta ronenike ndaru ujuru tira tonye nthimu thetune.

Katerera TIST Cluster in Uganda trained on raised nursery bed.
KIMERU VERSION

TIST: Mitire iria miega buru riria ukuwandaniria imera na miti na kinya gwika ndithia.

A groforestry ni uandaniri miti na ithaka amwe na imera bia irio kana ndithia. Kuungania guku kwendagwa nikenda maciara ja muunda jaingia gukurukira utumiri bwa miti. Mitiri baina inyingi kiri murimi:

- Mpao cia guaka
- Nkuu
- Matunda na irio bingi
- Irin bia ndithia
- Kurikia muthetu
- Kunoria muthetu
- Gwika ruuiji muthetune
- Gukunikira imera kuumania na ruugo
- Kinyiyia gukamatwa kwa muthetu, mono ni nduuji
- Ndawa
- Kirundu

Mitire iria miega buru riria ukuwanga miti, ithaka, ndithia na imera: Kurina njira inyingi mwananya ni njira injeru iria ikumenyekana igita rionthe. Njira imwe ni injegu ndure mwe imwe inidi cititumirika ntire engi. Aja ni mitire imwe iria hitumikaga mono:


Miti iria miega buru ni iria ikagira nitrogen muthetune. Milaini ya miti itaranie ni mita ithano. Milaini ya miti nibati kurimirwa na kugitiwa m'hangu o nhuma ya o igita. Miti itibati kunenea mono nontu igacindanira irio na wera na imera.

Mithangu jaria jagitwaa no jonjerwe muthetune kujuniora.

Miti iria igitagwa biang’i na muthangu ikagara ta kithaka itibua kuriiria ni TIST niunumu itijukia ruugo ruturutuku ruurwingi, indi ikathongomia muunda jwa imera na ie murimi baina inga inyingi. Ndene ya ntuura injumu, iji ti njira injega kana gutarania gukunene nkuruki gukendeka nikenda itacindanire irio na ruuji mono.


Cuaa muntu uandite kairi agutethie kubangira miti yaku ya kunyiyia ruugo.


6. Kuthongomia urithi: Utithagia uju na njira ya kubangania miti ndene ya muunda jwa kuriithia nikenda yoongera mpaao na irio bia ndithia.

7. Kuanda miti imingi amwe: Milaini ya miti no iandwe ndene ya muunda jutigutumirwa mung’uanano milaini ya miti iandu antu kurina maiga kana migurune. Miti no iandwe kinya mununde ya irio nikenda iniyi ruugo kana ikaawanda muundene kenda iujura ku icokia umoru bwa muthetuu. Itu menya ati miti ya TIST no mwaka itaranie uria ibati nikenda ikura buru na ikara muthetune igita riraja. Njira imwe cia kunania urimi na miti ni mitire imiega nkuruki kiri urimi, indi miti ii itiumba kuriwa ni TIST.

KIMERU VERSION

TIST: Mitire iria miega buru riria ukuwandaniria imera na miti na kinya gwika ndithia.

A groforestry ni uandaniri miti na ithaka amwe na imera bia irio kana ndithia. Kuungania guku kwendagwa nikenda maciara ja muunda jaingia gukurukira utumiri bwa miti. Mitiri baina inyingi kiri murimi:

- Mpao cia guaka
- Nkuu
- Matunda na irio bingi
- Irin bia ndithia
- Kurikia muthetu
- Kunoria muthetu
- Gwika ruuiji muthetune
- Gukunikira imera kuumania na ruugo
- Kinyiyia gukamatwa kwa muthetu, mono ni nduuji
- Ndawa
- Kirundu

Mitire iria miega buru riria ukuwanga miti, ithaka, ndithia na imera: Kurina njira inyingi mwananya ni njira injeru iria ikumenyekana igita rionthe. Njira imwe ni injegu ndure mwe imwe inidi cititumirika ntire engi. Aja ni mitire imwe iria hitumikaga mono:


Miti iria miega buru ni iria ikagira nitrogen muthetune. Milaini ya miti itaranie ni mita ithano. Milaini ya miti nibati kurimirwa na kugitiwa m'hangu o nhuma ya o igita. Miti itibati kunenea mono nontu igacindanira irio na wera na imera.
Nganoini TIST Cluster baada ya mkutano wao wa kila mwezi, mwezi wa tano 2018.

**Inside:**

- **Uigi mwega wa mbegu na guthondeka.** Page 2
- **Umenyereri wa Nursery.** Page 4
- **Maundu mega ma kugeria: nathari njoe naiguru.** Page 5
- **TIST: Mitaratara miega ya kugeria kuhanda miti hamwe na irio cia mugunda.** Page 6
Uigi mwega wa mbegu na guthondeka.

Uigi wa mbegu.

- Tigiriira ati angikorwo niurathamia matunda kuma kuria uronganiria niwagiriirwo ni kwamba kumomithia na kumaiga kiiruruini na makorwo na riera ria kuigana na ndukamathukie.

- Kuua matunda maku na makonja ma gutumwo kana ikabu. Ndumamakuue na makonja ma plastic kana mikebe iria itari na kundu gwa kuwingiriria 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 riuaiini 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 kugumia. 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 indi 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 umeny kana niukuhuthira dawa cia kuingata tutambi niguo ugitire mbegu ciaku. Kwa muhiano, maguta kana mahuti ma neem, mahuti ma gliricidia na thabuni nochuthikekugitira

- Rigikana kurora mbegu ciaku maita maingi niguo ugitirira citirathukio.

- Geria gwetha uhoro 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 umeny cimeraga na njira iriku. Cagura mbegu cia kugeria ta 100, andika muigana uria woya, handa na ucitare na wone nicigana cikumera na ungika uo mweri kwa muhiano niukwona riria na uria mbegu ciaku cingimera na uhane uhoru uyu thiini wa cluster yanyu.

- O uria haria uigite mbegu hari hahehu noguo mbegu ciaku ciguikara na utigirire mbegu ciaku cinginaitwo ni ria. Angikorwo kuria uigite nikugunyu nicuguthuka 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 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
• 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 uhoro 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.

• Matunda mangi mabataraga o gukumuthwo niguo mambege ciume ta Tectona grandis (teak) and Calamus species (rattans).

• Mangi nimakoragwo na NGO thi cia guthondeka 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 nguo 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 niguo maai maingire wega na cihote kumera wega. Mbegu ciagiriirwo nikuhandwo imwe kwa imwe irimaini thutha wa kuragwo na mithemba iria yagiriirwo ni gwik wweguo 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 tu Calliandra, most Acacias, Tamarind, Leucaena and Albizia. Ikira mbegu mukebeini, therukia maai na uitiririe mbeguini. Eterera maai mahore na urute mbegu thtuhta wa kuimba.

• Mbegu ingi nociikirwo maaiini mahehu matha 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.
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 micheke 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 thtutha wa miaka 1-2. Kuhuthia tiiri noguteithie.
- Kwehutia mimera iria ihotetwo na kumicina
- Ndukahe mimera maai maingi makiria
- Tigirira maai mimarathertera.
- Gutigirira riera ni riingi
- Kurimira maai 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 nguuo 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 muthembwa 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 nguuo ndugathukie miri.

Njira ingi, oya nathari na igurunjira iria igiragiriria miri gutonya tiiriini na kumitinia gugakorwo kuri kuhuthu.

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

- Tunyamu twa kuhe maai twagiriirwo ni kunyitithanio na ndoo ya kuhe maai nguuo tiiri ndugakuuo ni maai.
- Nouhuthire mukebe muture marima
- Menyerera ndukahe maai maingi kana manini, makiria 20lts har mimera 1000. Ungihe maai maingi niukunina mimera hinya na ugciririe tutambi na fungus. Dalili imwe ya gukwonia ati niureka maai maingi ni mareru.
- He maai o rucini na hawaii kungihoteka.
- Tiiri uri na muthanga muingi wagiriirwo niguwidiririo maai maingi.
- Ikira maai mumeraini na ti mahutiini
- Itiriria maai kahora nguuo maingire tiiriini wega.
- Menyerera ndugathukie miri riria urarimira.
- Ndukarimire ripia mahinda mathire muno, kurimira k=ni kwa bata tondu riia niricindanagira maai na riua na mimera yak. "Mimera ini ngiya niibataraga kiiiruru – tigirira niwakira kiiiruru na mahuti
- Hingo ya mbura, humbira miri na mahuti ma miti kana nyeki. Mimera niyagiriirwo kwehutio kuma rungu rwa miti nguuo miti ya kuma mahutiini ma miti ndugathukie mimera yaku.
- Iriria nathari yaku nguuo mimera ndigathukio ni mahui kana ciana cighathaka.
Maundu mega ma kugeria: nathari njoe naiguru.

Hinga ya mucemanio wayu wa cluster, hinyiria ikundi iria ingi magerie kuhuthira nathati njoe naiguru na meka uguo moke mauge kana kurari na ugaruruku.


Nathari iria ciotwo naiguru nicionekaga ta cihuthagira maa 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 mito ho na kuigirira waya na ugacoka ukaigirira mimera yaku iguru. Mimera niyonekaga iri miigaanira na thi no mitaro iria iri rungu rwayo niimiheaga haundu unghota gucehera miri yayi. Maa nimahotaga guikara mitaroini ino na ikahye mimera ugunyu uria wagiriire na kunyihia uhe wa maai wa narua. Iratathi ria nylon norihuthike niguo maai mahote guikara makiria mitaroini iyo.

Katerera TIST Cluster in Uganda trained on raised nursery bed.
A groforestry yugite kuhanda irio cia mugunda hamwe na miti na kuriithia mahiu. Gitumi kinene kia rimi uyu ni kwongerera maciaro ma mugunda kuhitukira huthiri wa miti. Miti nikoragwo na mawega ta maya kuri murimi:

- indo cia gwaka.
- Ngu.
- Matunda na irio ingi.
- Irí o cia mahiu
- kwagirithia tiiri.
- Kunoria tiiri
- kuiga ugunyu wa tiiri.
- Kunyihia ruhuho.
- Kugitira tiiri kumana na gukuuo ni maa.
- Dawa.
- Kiiruru

Mitaratara ya urimi uyu: nikuri njira nyingi na ingi njere nicirahondekwo mahinda mothe. Njira ingi nicikoragwo cihotekete kundu kumwe na cikarema kundu kungi. Ici ni imwe cia njira iria cihuthikaga makiria kuri agro-forestry:


Miti iria ičeheutwo ikahana githaka ndingitarwo ni tisT tondu ndiragucia carbongo no niuguteithia mugunda na njira ingi nyingi. Kuria gukoragwo kuri kumu, ino noikorwo itari njira njego ya kurora uhoro uyu kana handu hanene gaagati ka miti na irio nikagiririrwo gukorwo kari kanene niguo citigacindanire unoru na utheri.


Caria mudu uri na umenyo muigana niguo akubangithie.


5. Inter-cropping: uu ni gutagania miti irio-ini. Miti iria miega ni irio miraihu na irutaga nitrogen.


7. Woodlots: tumiti tunini notukurio kuria gutarirangwo kana kuria kuhinju, muhiano, tumiti tutu nituhandagwo kuria kuri na mahiga kana mitaro ya maai. Tumiti tutu notuhandwo ona mugunda turi twa kunyihia ruhuho. Ripikanu ati miti ya TIST nomuhaka itangio wega niguo ikure na ikare gwa kahinda kanene, no ti miti yothe itikirikiga hari marihi ma TIST.
Nganoini TIST Cluster baada ya mkutano wao wa kila mwezi, mwezi wa tano 2018.

**Inside:**

- Kuhifadhi na kutibu mbegu kabla ya kupanda. *Uk. 2*
- Utunzaji wa vitalu. *Uk. 4*
- Mbinu bora yakujaribu: Vitalu vilivyoinuliwa. *Uk. 5*
- TIST: Njia bora zaidi katika kilimo mseto. *Uk. 6*
KISWAHILI VERSION

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 isiyio na hewa na ambayo inaweza kufanya unyevu kukusanya na kuharibu mbegu hizi.

- Hakikisha umechagia mbegu nzuri zaidi kwanza na kuwa mbegu hii ya hiyo ni safi na kavu unapohifadhi. Mbegu kavu hupige kelele na kuvunjika unapotikiza. Mbegu nyingi huitaji kukaushwa juani kwa muda wa siku mbili kufika tatu kabla ya kuwa tayari.

- Hifadhi mbegu yako pahali pakavu na penye kivuli. Tumia kifaa cha kuhifadhia kama gunia au chungu cha udongo ili kupunguza uwezeke na mbegu kuharibika. Tumia mikebe isiyoruhusu hewa kuingia au kutoka unapohifadhi mbegu zeye 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 kuhakikikisha mikebe haiguzi chini (jambo hili la weza kuzifan ya mbegu kushambuliwa na mbadiliko ya hewa, unyevu, wadudu na kadhalika kwa urahisi. Iwapo unatumia magunia au mifuko, waweze kuhifadhika siku chache ati mbegu hizi hufa zinapokauka.

- Uliza mawaidha kutoka kwa vikundi jirani au wafanyikazi wa kilimo kujua ikiwa unahitaji matumizi ya dawa za wadudu kulinda mbegu zako kutokeke na wadudu. Kwa mfano. Mafuta au majani ya muarubaini, majani ya gliricidia na sabuni zaweza kufu popa ulinzi.

- Kumbuka kuangalia mbegu zako kilika baa yake siku chache kuhakikisha haziharibika.

- Tafuta ujuzi kuhusu muda mbegu yako yaweza hifadhika. Muda huu hulingana na aina. Aina nyingi, zikihifadhiwa vizuri zaweza kuchukua mawadi au nazo.


- Jua kuwa kuna kikundi kimoja cha mbegu kinachoitwa "mbegu kidii". Mbegu hizi kwa kawaida huitaji kukosha karibu mara moja baada ya kukusanya na kutolewa kwa tunda kwani huwa zinahitaji unyevu mwingi sana. Zikifungwa kwa nguo zeneza unyevu, waweze kuhifadhika siku chache ata kufika wiki moja. Mbegu hizi thuza 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 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 kouta. Iwapo zitachukua saidi ya wiki fikiria kuzitibuka.

- Ikiwa hauna uhakika ni mawaidha gani hapa ni bora zaidi, jaribu njia mbali mbali za kutibuka na ugawane matookeo yako na kiongozi wa cluster yako kama kuhusu njia bora zaidi.

- Ikiwa mbegu ni ndogo sana au ina ganda nyembamba mara nyingi haini hahitaji matibabu yoyote kwa mfnano aina za Croton megalocarpus, Neem, Cassia na Kei apple zaweza kuoteshwa moja kwa moja mikebeni.

- Ikiwa umekusan ya matunda, unaweza kuoteshwa majini kwa muda wa siku moja au mbili, halafu uchukue waya na kutumia kufuluka tunda na kutoa sehemu majimaji ili kutoa mbegu ukitumia maji katika maji hayo mbaki ya tunda kwa mfnano 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 hahitaji tu maganda ya juu kabisa kutolewa kwa kuyagwaruzana kwa mfnano matunda ya Tectona grandis (teak) na Calamus species (rattans).

- Baadhi ya matunda hahitaji tu maganda ya juu kabisa kutolewa kwa kuyagwaruzana kwa mfnano matunda ya Tectona grandis (teak) na Calamus species (rattans).

- Maganda mengine hahitaji kukaushwa kwa siku tatu kufika tano (chini ya juu lenye kivuli) halafu kufinya kwa kutumia waya ili kutoa mbegu kwa mfnano maganda ya Leucana, Calliandra calothyrsus, Acacia, Sesbania sesban, Grevillea robusta, Casuarina na mikaratusi.


- Baadhi ya mbegu hahitaji kukatwa kidogo tu ili kuexploze maji kuogea. Usikate ambapo mbegu ilishikana na ganda sehemu hii ndio iliyo na mmea utakaokua.

- Baadhi ya mbegu hutibika vizuri zinapoweshwa kwa maji moto kwa mfnano Calliandra, most Acacias, Tamarind, Leucaena na Albizia. Weka mbegu katika mkebe, chemsha maji na mchekelea mkebe. Ruhusu maji yapo halafu uchukue katika mkebe kwa maji baada yakuona kwita mkebe.

- Baadhi ya mbegu za weza kutibwa kwa maji baridi kwa siku tatu kufika tano (chini ya juu lenye kivuli) halafu kufinya kwa kutumia waya ili kutoa mbegu kwa mfnano maganda ya Leucana, Calliandra calothyrsus, Acacia, Sesbania sesban, Grevillea robusta, Casuarina na mikaratusi.

- Mbegu zote, baada ya kutibiwa, zahitaji kupandwa mara moja.
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 mbeu kuza kabla ya kwota, mizizi kuza kabla ya mche kutokezea na mche kuwa mwambambe 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 wakea mazuri.
- Udongo uwiwe na rutuba nyungi sana. Fuatilia viwango vya kuchangan ya vina vyofaa. Punguza kiwango cha naitorjeni kwa kupunguza.
- Kunafaa kuwa na nafasi tosha kati ya miche ili kuepuka mfinyano.
- Hakikisha kitalu kipo safi kila wakea.

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

- Matumizi ya jivu
- Kuhakikisha kitalu kipo safi ili kuzuia kuwa mwezi mmoja au ata hadi miche sita.

B. Kupogoa mizizi.  
Hamisha miche mara moja kila wiki ili mizizi mirefu isije ikaingia ardhi 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 kuku na kutokee chini ya mikebe. Mizizi hii yafaa kukatwa kila miezi miwili au mmoja kwa kisu. Kumbuka kuwa mwangalifu unapoinua mikebe usije ukadhuru mizizi ilio change.

Badala ya haya waweza kujaribu kitalu kilichonuliwa 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 mmonomyoko wa udongo.
- Waweza kutumia miche ulio na mashimo.
- Jiepushe na kunyunyizia maji mengi au kidogo, nyunyizi lita ishirini kwa miche elfu moja. Maji zaidi ya yana yohitajika ni kuwepo kwa safu nyembamba ya mwani juu ya udongo.
- Nyunyizi kila asubuhi na jioni iwezekanapo.
- Udongo wenyenye machiga utahitaji maji zaidi ya udongo unaoshikana.
- Mwaga maji udongooni, si kwa majani
- Nyunyizia pole pole ili maji yaimpingie udongoni.
- Kuwa mwangalifu usidhuru mizizi unapotoa magugu.
- Usiache magugu kwa muda mrefu. Kutoa magugu ni muhimu kwani miche uwanahitaji miche na kumvua.
- Baadhia mbeu huitaji kivuli – hakikisha umetengeneza kivuli.
- Wakati wa mvua, funikia miche ukingutumia nyasi kavu. Miche yafaa kutolewa chini ya miche ili maji yasiunguka miche na kuvunjika.
- Tengeneza wa ukizunguza kitalu ili kulingana kutoka na ufuguo na watoto wanaocheza.
- Lache miche imee hadi centimita seisathathini kabla ya kuihamisha shambani. Hili la waweza kuchukua mwezi mmoja au ata hadi miche sita.

Pia toa kivuli wakati huu.
Kilimo mseto ni kupanda miti mikubwa na mifupi pamoja na mimea na mifugo. Mchanganyiko huu unahitajika ili kuongeza uzalishaji kupitia matumizi ya miti. Miti ina faida nyingi kwa mkulima:

- Vifaa vya ujenzi
- Kuni
- Matunda na chakula kinginecho
- Lishe kwa mifugo
- Kushikilia udongo
- Kurutubisha udongo
- Kuweka maji udongoni kwa muda mrefu
- Kupunguza upepo
- Kupunguza mmomononyoko wa udongo, sana mwa maji
- Dawa
- Kivuli

Mazoezi katika kilimo mseto: Kuna mbinu nyingi tofauti na njia mp ya zinazogunduliwa kila wakati. Mbinu zingine zinafanikia mahali pamoja lakini hazitumiki mahali penginepo. Zifuatazo ni baadhi ya njia zinazotumika sanasana katika kilimo mseto:

1. **Uzio**: Hili linajumuisha kuchagua aina ya mti itakayopandwa kwa mistari na ulio na faida katika shamba hilo. Uzio unahitajia nafasi kidogo, unazuia mmomononyoko wa udongo na unatengeneza majani ya lishe ya mifugo au ya kufunika mchanga. Mfano wa uzio ni kupanda miti kwa mistari ikizunguka shamba. Mfano wa uzio unahitajia nafasi kwa shamba la kulima ili kusaidi kurudisha rutuba ya udongo.

2. **Upanzi wa mseto**: Hili linajumuisha kupanda miti kwa nafasi ya mita mbili au zaidi kwa mistari ikipita shambani. Kwaweza kuwa na mstari wa miti, halafu mistari miwili au mitatu ya mbeu, halafu mstari wa miti, halafu mbeu ya kuzia katika mbeu.

3. **Kuzuia upepo**: Hili linajumuisha kupanda miti kwa mstari ili kupunguza upepo, jambo ambalo linafanya miti uma faida kwa mistari, halafu mbeu ya kuzia atakavyo upepo, halafu mbeu ya kuzia kusaidi majani na kuunganishwa miti na mbeu ya kuzia upepo.

4. **Kupumzisha shamba**: Hapa mkulima anaachatho shamba ili kusaidi kurudisha rutuba ya mbeu.

5. **Kupanda zaidi ya mmea mmoja**: Hili linajumuisha kupanda miti iliyo kwa ume mbeu mbili ya shamba ili kusaidi majani na kuunganishwa miti na mbeu ya kuzia upepo.

6. **Kuboresha ulishaji wa mifugo**: Unafikia hili kwa kupanda miti kwa mbeu ya kuzia upepo ili kusaidia kupanda mbao na chakula cha mbeu.

Nganini TIST Cluster baada ya mkutano wao wa kila mwezi, mwezi wa tano 2018.

Inside:

Kwia Mbeu na undu wa kuita mbee wa uvanda. Page 2

Kusuvia Kivuio. Page 4

Mawiko maseo : Tata Kivuio kyukilite kya kitanda. Page 5

Uthukumi museo wa TIST kwa kuendeesya uvandi wa miti vamwe na liu na kuithya indo. Page 6
Kwia Mbeu na undu wa kuiita mbee wa uvanda.

Kwia Mbeu

- Ikiiithya ethiwa wiumya matunda kuma kisioni kii kuthi kingi niwamekalaya me many’au, memuunyini na vandu vena nzeve nesa nikana ngii ila syi nthini iiikanangike.

- Kua matunda maku na kyondo kya ikanga kana ikunia. Ndakakue na mathangu ma nailoni maikanyale na ukosa nzeve na mayanangika.

- Ikiiithya niwanzakua matunda ala maseo (unit 2) na ni manyau na matheu mbee wa kumaia. Mbindi na ngii mbingi syendaa kwunikwa suani vandu va mithenyi ili kana itatu iny’ae nesa.

- La mbeu yaku vandu vany’au , ve muunyi na ve nzeve nesa. Tumia makunia ma ikonge, mbisu nikana uole ivuso ya mbeu kuunda. Kunika na ngunikolo 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 makanzetii nikana makanyusaa nzeve ila yina kiw’u.


- Kulya mawoni kivathukanyo kuma kakundini kaku kala ke vakuuvi naku kana kwa athukumi ma ndilikasa iulu wa utumia ndawa sya kuaa mitutu na mawuwa kusuvia mbeu yaku. Ngelekanyo mawo na Neem kana Mautu, mawo 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 mukuyi wiva nundu kwi imwe itaiawa kwa ivinda iasa.

- No utatithye kusianisya ivinda ya kumea kwa kwosa ngii ta 100 na kwia lekoti ya ivinda yilaikutumia kumea kwa kutala nisiana imeete kwa ivinda yiana ata. Weeka uu kila mwai ukeethiwa utonya umanya kwa ngelekanyo’o undu siekete kwithiwa na vinya wa kumea na wamanya tavya ala ma ngwatanio yenye undu usomete iulu wa mbeu isu na kumanya.

- Oundu vala wiite mbeu yaku vathithite now’o itonya kwikala kwa ivinda iasa. Ikiiithya mbeu ndinalika kyenini muno na ethiwa vala wiite vena utiithiwa mubvita nilaisi mbeu kwanangwa ni mbuka.


- Mbeu muthemba uu utavinduwa nikusaa yany’aa. Muthemba ya mith ila mbeu yaso iiluye uu nita:- Arocarpus Heterophyllus (Jackfruit), Azadirachta Indica (Neem), Calamus Species (Rattans), Durio zibethinus (Durian), Eusideroxylon zwageri (Ulin), Theobriona caici (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 mbeu wa mbeu kuvandwa?**

- Vand mbeu imwe na uisisya syikua ivinda yiana ata kumea. Ethiwa syikua ivinda iasa kwi kyumwa kimwe nuseo kwamba kuiita mbeu wa kuvanda.

- Ethiwa ndwina muukiio na mawoni ala unengetwe iulu wa mbeeu ino ni useo kwamba kutatithya kwa nzia kivathukanyoo na uitaya 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 uvunyianisye 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 mithiawa na ngii ila syendaa utiwa. Itina wa kuinda itunda vandu va muthenya kana mithenyi ili, kima itunda na ndii na mwitii mithemba ino nita Melia volkensii, Melia Azedarach, Sclerocarya birrea, Cordia Africana.

- Mikea imwe niyendaa kwanikwa suani kwa mithenyia 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 syithiwa na ikonde yumu na syendaa kwamba kuiitwa. Imwe nisyendaa ona ikonde yasyo kwamba kwatuwa na yundo kana itina wa kwaniwata vandu va mithenyia 3 - 5 nikana kiw’u kilike na kutuma imea. Mbindi ii nisyendaa uivandwa 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 ngunikiso ba yikibia 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 kivyu ila nita:- Calliandra, most acasias, Tamarind, Leucaena na Albizia. ikia mbeu mukeveni, na uyitiia kiw’u kithiukite. Eteela kiw’u kivoe na uyunya mbey ila ukwithia syaimeba.

- 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 ethiwa kundu kwili kwa imbindi, umya ila itonya kwithiwa ithambalalite.

- Mbeu yoothe yamina uitinga niyayele utwawa muundani kana kivuioni na kuvandwa.
A. Kusuvia uwau na miimu
Tusamu ta fungi, baterial, 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 mbeeo wa itanamea kana mii ikoa mbeeo wa munguthe kumila na ethiwa mumea wi unambiya uma uimosa na ukwa’.

Mawony’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 kivuio kila itina wa mwaka kana miaka ili kila kietae kulekania kwa muthanga.
- Kuvetanga tumimea tula twakwatwa ni uwau uyu na kutuviyia
- Kunginya na kithimo vate kuvitukya kiw’u uingithya.
- Ikiithya kiw’u nikiuthi kinatuumana
- Eka muthanga withiwe ulekanitye nzeve ivite nesa
- Ima nesa na ivindani yila yaile
- Muthanga ndukethiwe wi munou kuvita kiasi. Kithimo kya muthanga kwavuu nikyaile uatiwa.
- Nivaile ithiwa na utaaniu waile katikati wa mimea
- Ikiithya kivuio 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 kivuio ni kiime kiina yiia nikana withie mututu ndina liu kwooo ndikuka kuete uwau.

B. Kusea mii
Sokya tumimea twaku kwa kyumwa imwe nikana mwii wa kuthi na nthi ndukangwate uendete na nthi na indi nikana usee mii ila yaasava muno . kii kitetheeasya miti kukwata kiw’u yathamwa kuma kivuoni na kutwawa muundani.

Yila tumimea tuu tuendee kumea itina wa myai 3-4 (kulingana na muvai) mii yatwo niyambiya kumea na kumila ungu mathanguni ala ivanditwe. Mii ino niyaile utiwa kila mwai kuvika myai ili na kavyu. Manya kana niwaiele usuvia yila ukukiknya mathangu aya kana mikewe/mbiso ila uviite ntiini ndukanange tumiti na mii. Ethiwa ti uu tata utumie kivuio kya kitanda (Sisya uniti 4) kila nikiaolaa vata wa kusea mii nundu ikitaa uniiina.

C. Kungithya, Kuimia na Kwikia muunyi
- Kikonyo kina mavuthi nikuvalie utumwa mkungithyani nikana muthanga ndukakwuye
- Ethiwa ti uu no utumie mukeve wina maima kungithya kivuio
- Ndukendeew’e ni kungithya na kiw’u kingi kuvituuka 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 kindii muthangani.
- Ngithya kilwa kayaka na mawioo vatonyeka.
- Muthanga wa thanganthi niwendaa kiw’u kingi kwi ili.
- Oneleelya kiw’u muthangani no ti matuni
- Ngithya mbola nikana kiw’u kinywe muthangani
- Sisya ndukanange mii yila ukuimia
- Ndukesemumia yiia yakalite, imia oondu yongelekete ute kuekkaa yikambii uanina kiw’u kyeni, na unou wa muthanga.
- Mbeu imwe nisyendaa kwikiiwa muuny - kwoo ikia matambya makusyikii muuny ethwa ve vata
- Yila kwina munyao whuka muthanga wa kivuio na nyeki na ethiwa ni meu ikia kitaalu kuete muuny. Ethiwa syi matanguni kana mbisuni/mikeve kua utwa ungu wa muti.
- Lia kivuio mbeeo wa kuku kuthamya tumimea. nitonya ukua mwai kana myai ili kivuioni. wavikia utamia ingi vata muunyi ivindani yi.
Yila mwina umbano wenyu wa mwai
wa ngwatanio thuthya tukundi tutate
uvanda itandani syi yiu lu na kutunga

livoti undu monie na kivathukany’o kila
kivo kya kivuio kya kitanda na kya nthi.
Kivuio kya kitanda no kiseuwe 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
kivuio kii nikitetheeasya kusea mii ila
itumaa imwe iselewa na kwika yiselee
na kwananga mii na kwoou kitanda kii
uyithia nika sailya maundu.

Kitanda kii kiyiulu nkyongelaa
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
nikkwataw’a nimitau ino ya miti na
kuola kiw’u kukuwa ni nzeve kwoou

Katerera TIST Cluster in Uganda trained on raised nursery bed.
Uthukumi museo wa TIST kwa kuendeesya uvisi wa miti yawamwe na liu na kuthya indo.

Mitzi yi vaita mwungi kwa muimii:
- Mitzi ya kwaka
- Ngu
- Matunda na liu
- Uithyo/Liu wa indi
- Kulumya muthanga
- Kuteenouwa muthanga
- Kusiia kimeku kukuwa
- Kusiia nyeve
- Kusiia kukuwa kwa muthanga nyuumoni sya mbusi
- Ndawa
- Muunyi

Nzia sysa kuvanda miti yawamwe na liu na ndithya
Kwi nzia mbingi sya kuvanda miti yawamwe na liu na ndithya, vala nzia imwe ni nizo kwa isio imwe indi ti kwa ingi. Vaa ve imwe kati wa nzia sya uimi yuyu.

1. Nima ya Wiio.
Ino ni nzia imwe ila mundu usakuaa mutemba wa miti ila ukuvanda ta wiio iatianie lainini umwe na ila yithiawa na vaite kwa muthanga. Wiio wendaa mwanha muni na nusiai kukuwa kwa muthanga, matu ma wiio niitumia ta liu wa indi kana kwikia muunyi ungu wa liu. Kwa ng’elekanyo’o munto ni uvanda muti mutemba muna ta wiio muvakanikia. Utaniuru ula waile kwa miti ya wiio ni nizambya eli kana atatu. Wanake museo niula uvelanitiye miti imwe minene na ingi minini.

Ino ni nzia imwe vala miti ivandawa iatianie lainini indi iyikia liu katikati. Kwa ng’elekanyo’o nizamuva laini umwe wa miti yuyikia laini itatu kana ina sya liu (mimeta ta mbembeta). Ngelekyayi nezoe ni leucaena na mbemba, Kaawa na Malu. Mitiki misese kaiinga ya uvisi waa ila nzi indi itu ngengae muthanga njeve kana unou wa nitrogen. Utanuuru wa miti ya kati kasi wa liu waile ithiwa unyuva mumambya atano (5m). Myanya ila ya kati kasi ni miti ino nikwaile ikala kwi kuime na kukathe kila ivinda na miti ino kusewa. Mitii ta ino ndyaile kuekwa ikaasaya munto nuno ya neneva muno niyambia kuminia mimeta/ liu unou wa muthanga na kumivvika kyeni kya sua.

Matu ala masewa kuma mitini ino nomatumike kwa kuete unou kisioni kiu.
Kaingi miti ya uvisi waa ila liu ndithiya na vaite kwa uumi ni TIST nundu niitumia ikaasaya muno yithiawa ta ikuthu na kwoow nditonya utalika ivinda ya kuta njeve itavisasa onakau nisimdeo kwa muimii nundu ninoosya muthanga na kutuma ethiwa na usyayo mwungi. Ingii isiioni ila nyumu miti ino niyendaa utanuwi’a munango nikana ni kathane kiu’u na liu kuma muthangani na miti liu.

Mito ino ivandawo uteeni ngaliko ila njeve yisila na ivandawa mbea miti ila minene yi katikati, ikakaatiwa ni miti mininangii laini ili ila iatiie, ikuthu na indi nyeki. Vaita wa kusiia njeve ni kana munto ndendaa kisio kinene indi no kasio kanini ka kuhika na nitonya kutee wolweleku wa ngetha wa kilungu kya 30% isiioni imwe. Manyana kana miti ya kusiia njeve yavandwa nai nietae wasuyo ethiwa njeve yeek’angali imwe. Mantha munto wina utuikia wa kuvanda miti ino ya kusiia njeve.

Vaa ni vala muimii ukeka kuvanda liu kisioni kina na kueka miti inee nikana atunje unou wa muthanga.

5. Nima ya Kuvulanya mati na miti.
Ino ni kuvulanya mati na miti. Lino yithiawa na myanya yianene ya miti na liu. Mitiki misese ni ila yithiawa itena mune ni ngelekyayi njeve yavandwa nai nietae wasywa ethiwa njeve yek’angali imwe. Mantha munto wina utuikia wa kuvanda miti ino ya kusiia njeve.

Nzia ino ivikia kwa kuvanda miti ni kisio kila indo iyuk kuvandwa ndikwa nga ni liu wa indi.

7. Mitii ya kuvandwa yawamwe ta kamutitu.
Kamutitu kanini nivandwa kundu kula itheka itena w’umi nesa kwa ng’elekanyo’nza kwa kwi mavia na matw’iku. Tumiti tuvandwe ta miti ya kusiia njeve kana kuvandwa kithihiwe kiteukumikia. Kwaanda liliikana miti ya TIST nonginya ivandwa na utanuuru ila waile na kwikala vo kwa ivinda iasa nikana iete unzeo ulu uvaniiwe.

Liliikana nzia imwe sya umi wa miti nizoe kwa miti indi ititonya kuvandwa yawamwe ithiwa na dvi kwa TIST.
Nganoini TIST Cluster baada ya mkutano wao wa kila mwezi, mwezi wa tano 2018.

**Inside:**

- **Konoretab keswek ak ribet.** Page 2
- **Ribetab kabeti.** Page 4
- **Boisiet ne kararan nebo betusiek che kakiganapta kobwa barak ongeyomten.** Page 5
- **TIST: Practise ne kararannebo Agroforestry.** Page 6
Konoretab kesuek

- Ibuat ine yon imoche iib logoek koneten olekebuten komising iyamsi

- Koyomio. ko kararan iur ak kosich koristo ne ome asi mowe chesuet en orit.kararan ingeboisien kuniok chemotinye kongik chebo asi konyor logoek ak keswek koristo

- Maiyanat keboisien tukuk kou sebebeisiek anan plastikisiek amun motinyye 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 mowe chok 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 koit.

- Chang kabwetet 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 igergeres keswek en abogora asi mowe chok, tiny kora ile toss tore betusiek chetian Keswek asi mowe chok. niiton koiyenje 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. Naïy ile miten keswek che kemine kou

- Noton che mokiyomsie 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 onyoru 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 kagoret konyolu kemin en sait noton.
A - teretab susurik.
Susurik kutik ak alak kou toik chepkimoik ak somunyik 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 kenyisiek (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 kokoejitun 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 moweche kabeti
✓ Matinde beek che chang anan ko chetutikin , beek chechang kowech keswek
✓ Tumchin en koron ak koskolen
✓ Emet netinye ng’aonet 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 roba 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 arowek (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 barakunyn.

Katerera TIST Cluster in Uganda trained on raised nursery bed.
Groforestryko mine tab ketik ak osnoshekak minutik alak che kiome anan ko chebo tuga. Maana nebo agroforestry ko ketes ruret ab imbarenik kobune minet ‘ab ketik Ketik kotinye manufaa chechang’ en temindet:

- Tuguk ‘ab tegset.
- Kwenik
- Logoek ak omitwogik alak
- Omitwogik ‘ab tuga
- Toret ‘ng’ung’unyek.
- Toldolinde ng’ung’unyek.
- Ribe bek chemiten koristo.
- Tre koriswek.
- Ribe ng’ung’unyek komoib bek sanasana oinoshek.
- Kerichek.
- Urwek.

Practices neboAgroforestry: Kogochang’a oratinwek chekimuche keyaen agroforestry ago teseta kobitu chechang’ kila en kila. Oratinwek alak komuche kobore en komoswek alak ago mobore en komoswek alak. Che isubu ko otratinwek che nootin:


Ketek che kiiburyo kou timin ko momogotin enTIST payments ang’amun mogonu carbon chematin, Alakini toreti imbaret agokon manufaa alak chechang’. En komoswek cheyomyoil, komoiuchie kogaran orantion anan ketese lochindab ketik ak minutik alak asikoma bornch omitwogik chemiten en ng’ung’unyek ak asista.


Imuche icheng’ chi netinye naet en komositon kotorotin.

4. Fallow cropping: En oraniton koyoche koboagosibach imbaret temeindet komagimin asi korut ichegen ketek agowek toltolindab imbaret.

5. Inter-cropping (minet ak minutik alak): En orani koyoche kogochi spacing ketek temeindet en kwenititab minutik. Ketek che korroron kochon tiney canopies ago icheri nitrogen.
