

Mazingira Bora



TIST

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

English Version

An Environmental, Sustainable
Development and Community Forestry
Program.



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

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Seed Storage & Pre-treatment.

When storing seeds

- Make sure that if you are transporting fruit from the site of seed collection that you keep them dry, shaded and well ventilated so that the seeds inside the fruit do not spoil.
 - Transport your fruit and seeds in woven sacks or baskets. Do not transport them in plastic bags or tins, 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.



Nursery Care.

A. Pest control

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

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

The typical symptoms are:

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

Control damping off by:

- Changing seedbed soil every 1-2 years. Loosening the soil also helps.
- Immediately removing affected seedlings and burning them.
- Avoiding excessive watering.
- Ensuring good drainage.
- Providing better aeration.
- Weeding effectively and on time.
- The soil should not be overly fertile. The proper ratios of the soil should be followed. Reduce nitrogen content by applying less manure.
- There should be enough spacing between seedlings to avoid overcrowding.
- Make sure that the nursery is clean at all times.

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

- Application of ash.
- Ensure the seedbed is clean to avoid encouraging pests

B. Root pruning

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

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

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

C. Watering, weeding and shading

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



Best practice to try: Raised pot beds.

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

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

The raised beds might appear to increase the amount of water used in nurseries. However, nursery operators have devised innovations to deal with this constraint. A good innovation observed in Tanzania is digging a trench, placing planks of wood or wire mesh across it and placing the seedlings on the planks or wire mesh. The seedlings thus appear to be on the ground level but the trench under them provides the space, 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.



Katerera TIST Cluster in Uganda trained on raised nursery bed.



TIST: Best Practices in Practicing Agroforestry.

Agro forestry refers to growing trees and shrubs together with agricultural crops or livestock. The overall aim of agro forestry 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.

Trees that are pruned to be shrub-like will not be suitable for TIST payments, since they won't sequester much carbon, but they will improve the agricultural land and provide many other benefits to the farmer. In drier areas, this may not be a good approach, or more space between trees and crops may be needed, so that they do not compete too much for nutrients and water.

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.

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Kimereu Version

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

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Gwika mbeu na kwithuranira niuntu bwa kuanda.

Gwika Mbeu.

- Menyeera ati kethira nugukamata matunda kuuma antu aria ukuuthurania mbeu, jeke janyaari na antu kurina kirundu na kuwi na ruugo nikenda mpindi iria iri ndene ya ntunda itithuka.
 - Kamata itunda riaaku na mpindi iri nkuniene kana gikabune. Ugaikamatira kiratasine kia nailoni gitina antu a gukurukia ruugo na aria gugatuma ruuji ruuthurane amwe na kuthukia ntunda na mbeu iu.
 - Menyeera ati ukuathurana mbeu injaga mbele na ati mbeu nitheri na niumi mbele ya gwika. Mpindi injumu niciritaga sauti na kuunika wainaninia. 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 bunyagia 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 nibithithue.
- Mburene, kunikira mbeu na nyaki injumu. miti iu ikuuma nibati kuthamua kuuma ruungu rwa miti nikenda ruuji rutikagwire mbeu rugitaria imera.
- Irigira munanda nikenda ujumenyeera kuumania na ndithia na twana tuguchetha
- Reka miti iume mwanka uraja bwa centimita mirongo ithatu mbele ya kuthamiria muundene. Bubu no bujukie kuuma mweri jumwe gwita mieri itantatu. Thoma kwegie kuthamia. Rita kirundu riria ukwenda kuthamia.



Mwitire jumwega juri aubatikugeria: Minanda iukiritue.

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

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

Mina ndaiu kiritue ika ragate kayenda garu ujirurwi nginkuruki, indiri, 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 kama kanya karia ga kwendeka ni kenda miri iigita yongwa. Ruujini rugwata guamu taro

neni ruga kinyira miti iuriria ruguka matwa niriua na bata yagwikira ruuji jamaingi ikanyia. Kiratasi kiana iloninogi ikwemuta ronenike ndaru ujiru tira tonye nthimu thetune.



Katerera TIST Cluster in Uganda trained on raised nursery bed.



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

Agroforestry ni uandaniri miti na ithaka amwe na imera bia irio kana ndithia. kuungania guku kwendagwa nikenda maciara ja muunda jaingia gukurukira utumiri bwa miti. miti iria baita inyingi kiri murimi:

- Mpao cia guaka
- Nkuu
- Matunda na irio bingi
- Irio bia ndithia
- Kurikia muthetu
- Kunoria muthetu
- Gwika ruuji muthetune
- Gukunikira imera kuumania na ruugo
- Kunyiyia gukamatwa kwa muthetu, mono ni nduuj
- Ndawa
- Kirundu

Mitire iria miega buru riria ukuungania miti, ithaka, ndithia na imera: Kurina njira inyingi mwanya na njira injeru iria ikumenyekana igita rionthe. njira imwe ni injega nturere imwe indi cititumirika nturere ingi. Aja ni mitire imwe iria itumikaga mono:

1. Ndwego: Bubu ni gutaara muthemba jwa muti juria juumba kuandwa na laini na juria jukoongera muunda baita. ndwego nicitumagira kanya kanini, ikanyiyia ukamati bwa muthetu na nojuthithie mabura ja kuriwa ni ndithia kana gukunikira muthetu. Miti niendekaga gutaranua na mita ijiri gwita ithatu. njira iria njega buru ni kuungania miti iminene na iminini.

2. Kuandaniria miti igitenie na iankene na imera: Aja miti iandagwa itarenie mita ijiri kana nkuruki na milaini igitenie muunda. no kwithirwe kurina laini imwe ya miti, riu laini ijiri kana ithatu cia imera, riu laini ingi ya miti, riu imera, o ou.

mung'uanano jwa bubu ni kuanda milaini ya mpempe iankene na ya muti jugwitwa leucaena kana kauwa na marigu.

Miti iria miega buru ni iria ikagira nitrogen muthetune. Milaini ya miti itaranie na mita ithano. milaini ya miti nibati kurimirwa na kugitwa mathangu o nhyuma ya o igita. miti itibati kunenea mono nontu igacindanira irio na weru na imera.

mathangu jaria jagitwaa no jongerwe muthetune kujunoria.

miti iria igitagwa biang'i na mathangu igakara ta kithaka itibua kuriwa ni TIST niuntu itijukia ruugo ruruthuku rurwingi, indi ikathongomia muunda jwa imera na ie murimi baita ingi inyingi. Ndene ya ntuura injumu, iji ti njira injega kana gutarania gukunene nkuruki gukendeka nikenda itacindanire irio na ruuji mono.

3. Kunyiyia ruugo: Guku ni kuanda miti imingi na laini nikenda inyiyia ruugo, untu buria burigagiria imera kuumania na ruugo. uambagia kuanda miti iminene gati gati na iminini milaini iu ithingatite iiri na miti imikui, riu ithaka na nyaki oome buru. wega bwa miti iji ya kunyiyia ruugo ni ati murimi atianda muunda junthe miti. miti ijukagia kamunda kanini na baita ciomba kwongera maciara na gicunci mirongo ithatu kiri igana ndene ya ntuura imwe. Menya ati miti ya kunyiyia ruugo itibangi bwega no ithukie imera nkuruki niuntu no itongerie ruugo gukurukira bianya.

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

4. Kuanda miti icokia unoru bwa muunda: Aja ni aria arimi batigaga kuanda imera muundene na bakareka miti ikajujukia junthe nikenda itetheria gucokia unoru bwa muunda.

5. Kuandaniria: aja miti itarenie nainya na umwe iandagwa amwe na imera bia irio. miti imiega ni iria iti mathangu jamaingi na iria yongagira nitrogen muthetune.

6. Kuthongomia urithi: uthithagia uju na njira ya kubangania miti ndene ya muunda jwa kurithia nikenda yoongera mpao na irio bia ndithia.

7. Kuanda miti imingi amwe: Milaini ya miti no iandwe ndene ya muunda jutigitumirwa mung'uanano milaini ya miti iandi antu kurina maiga kana migurune. miti no iandwe kinya miundene ya irio nikenda inyiyia ruugo kana ikaandwa muundene kenda iujura ku icokia umoru bwa muthetu. Itu menya ati miti ya TIST no mwaka itaranie uria ibati nikenda ikura buru na ikara muthetune igita riraja. Njira imwe cia kungania urimi na miti ni mitire imiega nkuruki kiri urimi, indi miti iji itiumba kuriwa ni TIST.

Mazingira Bora



TIST

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

Kikuyu Version

An Environmental, Sustainable
Development and Community Forestry
Program.



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

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**TIST: Mitaratara miega ya kugeria kuhanda miti hamwe na irio
cia mugunda. Page 6**



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 niguu unyihie kuguma. Huthira indo citangiingiria riera kana mikebe ya kuiga mbegu, na uihurie mikebe biu niguu gutikagie na mwanya wa riera.
- Angikorwo nduri na mbegu njiganu cia kuihuria mukebe, huthira indo ingi ta makara, mahuti ma mucere kanamaratathi ma ngathiti niguu cihote kunina ugunyu.
- Huthira turubau kuigirira niguu gutigirira mikebe ndiikarite thi niguu citikanyitwo ni tutambi kana mirimu na ugaruruku wa riera. Angikorwo urahuthira makonia noumacurie iguru.
- Geria gwetha utaari kuma kuri ikundi iria cirri kwanyu niguu umenye kana niukuhuthira dawa cia kuingata tutambi niguu ugitire mbegu ciaku. Kwa muhiano, maguta kana mahuti ma neem, mahuti ma gliricidia na thabuni nocihuthikekugitira
- Ririkana kurora mbegu ciaku maita maingi niguu 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 niguu 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 cume mbere ya kumera, miri ibuthe mbere ya kumera na mimera ikorwo iri miceke na ikoma. Dalili ni;

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

Kugiririria murimu uyu.

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

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



Katerera TIST Cluster in Uganda trained on raised nursery bed.



TIST: Mitaratara miega ya kugeria kuhanda miti hamwe na irio cia mugunda.

Agroforestry yuugite 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 niikoragwo na mawega ta maya kuri murimi:

- indo cia gwaka.
- Ngu.
- Matunda na irio ingi.
- Irio cia mahiu
- kwagirithia tiiri.
- Kunoria tiiri
- kuiga ugunyu wa tiiri.
- Kunyiha ruhuho.
- Kugitira tiiri kumana na gukuuo ni maai.
- Dawa.
- Kiiruru

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

1. Hedges: njira ino niya guthuura mithemba ya miti iria ingi handwi na muhari na iteithie mugunda. Hedges ibataraga mugunda munini, kugitira tiiri na nourute mahuti ma kurio ni mahiu kana kwara mugunda-ini. Kionereria kiega kia hedging ni kuhanda muhari wa miti muhaka-ini. Utaganu uria witikirikite ni wa 2m-3m. Mubango uria mwega niwa kuhanda utukanitie miti mukuri na miraihu.

2. Alley cropping: ino ni njira ya kuhanda miti thiini wa mugunda na mihari utukanitie na irio. Muhiano mwega ni kuhanda muhari wa mbembe na leucaena kana kahuwa na marigu. Miti ria miga muno niiria yongagirira nitrogen tiiri-ini. Utaganu wa mihari ya miti na irio cia mugunda yagiriirwo gukworwo iri 5m. Mihari ya miti niyagiriirwo ni kurimirwo wega na kwa mahinda. Miti ndingikura wega na iri miraihu tondu niigucindanira unoru wa

tiiri na utheri. Mahuti maria macehwo nomarekio tiiri-ini niguu mongerere unoru.

Miti iria icehetwo ikahana githaka ndingitarwo ni tisT tondu ndiragucia carbongi no niiguteithia mugunda na njira ingi nyingi. Kuria gukoragwo kuri kumu, ino noikorwo itari njira njega ya kurora uhoru uyu kana handu hanene gaagati ka miti na irio nikagiriirwo gukorwo kari kanene niguu citigacindanire unoru na utheri.

3. Windbreaks: nio ni njira ya kuhanda miti mihari-ini niguu inyihie ruhuho na kugitira mimera kumana na ruhuho runene. Wanjagia nakuhanda miti minene gatagati, minini mihari-ini ingi iiri na gathaka kanini, ithaka na nyeki nja. Mawega ma njira ino niati murimi ndabataraga kuuthira mugunda wothe kuhanda miti. Ibataraga o muhari wa mugunda na mawega nomakorwo mongererekete na muigana wa gicunji kia 30% kundu kungi. Ririkana ati ungiaga kubanga wega njira ino nouthukie irio riria ruhuho rwaigirira gatagati-ini.

Caria mudu uri na umenyo muiganu niguu akubangithie.

4. Fallow cropping: ino ni njira iria murimi atigaga kuhanda irio mugunda-ini na akarekereria miti ikure na akanoria mugunda.

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

6. Grazing improvement: noukinyanirie njira ino riria wakuria miti kuria urariithia mahiu niguu guteithiriria kwona ngu na irio cia mahiu.

7. Woodlots: tumiti tunini notukurio kuria gutarimagwo kana kuria kuhinju, muhiano, tumiti tutu nituhandagwo kuria kuri na mahiga kana mitaro ya maai. Tumiti tutu notuhandwo ona mugunda turi twa kunyihia ruhuho. Ririkana ati miti ya TIST nomuhaka itaganio wega niguu ikure na iikare gwa kahinda kanene, no ti miti yothe itikirikaga hari marihi ma TIST.

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

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Kuhifadhi na kutibu mbegu kabla ya kupanda.

Kuhifadhi mbegu.

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



Katerera TIST Cluster in Uganda trained on raised nursery bed.



TIST: Njia bora zaidi katika kilimo mseto.

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 mmomonyoko wa udongo, sana kwa maji
- Dawa
- Kivuli

Mazoezi katika kilimo mseto: Kuna mbinu nyingi tofauti na njia mpya 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 mstari na ulio na faida katika shamba hilo. uzio unahitaji nafasi kidogo, unazuia mmomonyoko wa udongo na unatengeneza majani ya lishe ya mifugo au ya kufunika mchanga. Mfano wa uzio ni kupanda miti kwa mstari ikizunguka shamba. nafasi inayohitajika kati ya miti ni mita mbili au tatu. Njia bora ni kupanda miti mirefu pamoja na mifupi.

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 mimea, halafu mstari wa miti, halafu mimea na kadhalika.

Mfano wa ukulima huu ni kupanda mistari ya mahindi ikipakana na ya *Leucaena* ama kahawa na ndizi.

miti inayofaa zaidi ni miti ya kunde (inayoweka naitrojeni kwenye udongo). nafasi kati ya mistari iwe zaidi ya mita tano. mistari ya miti yafaa kupaliliwa na majani kupunguzwa kila baada ya wakati. Miti isiwe mikubwa ili isishindane kupata lishe na mwangaza na mimea. Majani

yaliyopunguzwa yaweza kuongezwa udogoni ili kurutubisha udongo.

Miti iliyopunguzwa majani na kuwa kama miti ya kichaka haitalipwa na TIST kwa sababu haitaweza kuondoa kaboni, lakini itaboresha shamba la kulima na impe mkulima faida zingine nyingi. katika maeneo kame zaidi, njia hii si nzuri ama nafasi zaidi kati ya miti na mimea itatajikana ili isishindane sana kwa sababu ya lishe na maji.

3. Kuzuia upepo: Hii ni kupanda miti mingi kwa mistari ili kupunguza upepo, jambo ambalo linalinda mimea kutokana na upepo unaokuja. unanza kwa kupanda miti mikubwa kati kati, midogo zaidi kwa mistari miwili inayofuata na miti mifupi zaidi, halafu vichaka na nyasi nje. Faida ya miti hii ni kuwa mkulima hatoi shamba lote lipandwe miti. Kunachukua shamba kidogo na faida zaweza kuongeza mazao kwa asilimia thelathini katika maeneo mengine. Jua kuwa miti iliyopangwa vibaya yaweza kuharibu mimea zaidi kwa sababu inaelekeza upepo kupitia katika mapengo.

Find someone experienced in this to help you design your windbreak. Tafuta aliye na ujuzi akusaidie kupanga miti yako ya kuzuia upepo.

4. Kupumzisha shamba: Hapa mkulima anaacha kulima mimea shambani na kuacha miti ikue ili kusaidi kurudisha rutuba ya udongo.

5. Kupanda zaidi ya mmea mmoja: Hili linahusisha kupanda miti iliyo kwa umbali mmoja pamoja na vyakula. miti mizuri ni ile isiyo na matawi mengi na inayoweka naitrojeni udongoni.

6. Kuboresha ulishaji wa mifugo: Unafikia hili kwa kupanda miti katika shamba la kulisha mifugo ili kusaidia kupata mbao na chakula cha mifugo.

7. Kupanda miti mingi: Miti michache ilipandwa pamoja yaweza kukuzwa katika mashamba yasiyotumika kwa mfano katika maeneo yaliyo na mawe juu au mitaroni. miti hii yaweza pia kupandwa katika mashamba yenye mimea kuzuia upepo, ama ipandwe katika mashamba yaliyopumzishwa. Tafadhali jua kuwa miti ya TIST lazima iwe na nafasi iliyoelekezwa ili kukua hadi inavyofaa na kukaa udongoni kwa muda mrefu. Baadhi ya njia zilizo hapo juu za kilimo mseto ni njia bora zaidi katika ukulima, lakini hazitaweza kulipwa na TIST.

Mazingira Bora



TIST

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

Kikamba Version

An Environmental, Sustainable
Development and Community Forestry
Program.



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

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**Uthukumi museo wa TIST kwa kuendesya uvandi wa miti vamwe
na liu na kuithya indo. Page 6**



Kwia Mbeu na undu wa kuiita mbee wa uvanda.

Kwia Mbeu

- Ikiithya ethiwa wiumya matunda kuma kisioni kii kuthi kingi niwamekalya me many'au, memuunyini na vandu vena nzeve nesa nikana ngii ila syi nthini iikanangike.
- Kua matunda maku na kyondo kya ikanga kana ikunia. ndukakue na mathangu ma nailoni maikanyale na ukosa nzeve na mayanangika.
- Ikiithya niwanzakua matunda ala maseo (unit 2) na ni manyau na matheu mbee wa kumaia. Mbindi na ngii mbingi syendaa kwanikwa suani vandu va mithenya ili kana itatu iny'ae nesa.
- Ila mbeu yaku vandu vany'au , ve muunyi na ve nzeve nesa. Tumia makunia ma ikonge, mbisu nikana uole ivuso ya mbeu kuunda. Kunika na nguniko nesa wusuity'e mbeu nesa kuola nzeve nthini wa kikuu, mbisu kana ikunia yila wiite mbeu.
- Ethiwa ndwithiawa na mbeu ya kususya vala ukwenda kwikia ususya na makaa kana makanzeti nikana makanyusaa nzeve ila yina kiw'u.
- Tumia miti kuseuvya makumbi kana utaa wi yiulu kwa kwia mbeu nundu waia nthi mbeu nitonya kuunda kana kwanangwa ni uvyuvu na tusamu kuma muthangani. Ethiwa witumia makunia kana syondu no ususye mitini nyumba.
- Kulya mawoni kivathukany'o kuma kakundini kaku kala ke vakuvi naku kana kwa athukumi ma ndilikasa iulu wa utumia ndawa sya kuaa mitutu na mauwau kusuvia mbeu yaku. Ngelekany'o Matu ma Neem kana mauta, matu ma Gliricidia, savuni nisuvia mbeu.
- Lilikana 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 ngwatanio yenyu undu usomete iulu wa mbeu isu na kumanya.
- Oundu vala wiite mbeu yaku vathithite now'o itonya kwikala kwa ivinda iasa. Ikiithya mbeu ndinalika kyenini muno na ethiwa vala wiite vena uthithu muvituku nilaisi mbeu kwanangwa ni mbuka.
- Manaya kana vena mbeu syitawa recalcitrant (ila syi vinya kuvinduwa). Mbeu sya muthemba uyu nila itendaa kwiwa syendaa ukethwa ivanditwe nundu syendaa wiu mwingi. Kwa kwia kwa ivinda inini ta kyumwa waile ulinga na makula meu. Mbeu muthemba uu utavinduwa nikusaa yany'aa. Mithemba ya miti ila mbeu yasyo iilye uu nita:- Artocarpus Heterophyllus (Jackfruit), Azadirachta Indica (Neem), Calamus Species (Rattans), Durio zibethinus (Durian), Eusideroxylon zwageri (Ulin), Theobrona caci (Cacao) na ingi ta Dipterocarps (Shorea, Hopea, paolaquiquium etc)
- Na muthya, yia uukua mbeu kuma kivuioni lilikana kumya na kuvwika.

**Ni Uiiti wau utonya kwendeka mbee wa mbeu kuvandwa?**

- Vand mbeu imwe na uisisya syikua ivinda yiana ata kumea. Ethiwa syikua ivinda iasa kwi kyumwa kimwe nuseo kwamba kuiita mbee wa kuvanda.
- Ethiwa ndwina muikiio na mawoni ala unengetwe iulu wa 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, Adansia 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 kukekea yikambiie uania kiw'u kyeni, na unou wa muthanga.
- Mbeu imwe nisyendaa kwikiiwa muunyi - kwoo ikia matambya makusyikiia muunyi ethwa ve vata
- Yila kwina munyao 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

kungithya ti kaingi. Ingi ona ithangu ya nailoni
niyikiiawa kusia kiw'u kithi nthi.

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 iseleva na kwika yiselee
na kwananga mii na kwoou kitanda kii
uyithia nikyaailya maundu.

Kitanda kii kiyiulu nikyongelaa
utumiku wa kiw'u kivuioni. Onakau ala
mena ivuio sya muthemba uyu
nimamanyite nzia ingi ya usiia wasyo
wa kiw'u. Ngelekany'o ni kwonda
tanzania menzite mutau na makekia
mitau ya miti na kwalany'a matandaa
kitandani kii kya waya ukethia miti ino
nota yimuthangani nthi. Kiw'u kii
nikikwataw'a nimitau ino ya miti na
kuola kiw'u kukuwa ni nzeve kwoou



Katerera TIST Cluster in Uganda trained on raised nursery bed.



Uthukumi museo wa TIST kwa kuendeesya uvandi wa miti vamwe na liu na kuithya indo.

Uimi uyu wa kuvanda miti, ikuthu, kuithya na kuvanda liu in uetae wongeleku wa w'umi wa kisio kya muunda kwisila kutumia miti.

Miti yi vaita mwingi kwa muimi:

- Miti ya kwaka
- Ngu
- Matunda na liu
- Uithyo/Liu wa indo
- Kulumya muthanga
- Kuete unou wa muthanga
- Kusii kimeu kukuwa
- Kusii nzeve
- Kusii kukuwa kwa muthanga nguumoni sya mbusi
- Ndawa
- Muunyi

Nzia sya kuvanda miti vamwe na liu na ndithya Kwi nzia mbingi sya kuvanda miti vamwe na liu na ndithya, vala nzia imwe ni nzeo kwa isio imwe indi ti kwa ingi. Vaa ve imwe kati wa nzia sya uimi uyu.

1. Nima ya Wiio.

Ino ni nzia imwe ila mundu usakuaa mthemba wa miti ila ukuvanda ta wiio iatianie lainini umwe na ila yithiawa na vaita kwa muthanga. Wiio wendaa mwanya muni na nusii kukuwa kwa muthanga, matu ma wiio niutumwiwa ta liu wa indo kana kwikia muunyi ungu wa liu. Kwa ng'elekany'o mundu ni uvanda muti mthemba muna ta wiio muvakani. Utaaniu ula waile kwa miti ya wiio ni matambya eli kana atatu. Wanake museo niula uvulanitye miti imwe minene na ingi minini.

2 Nima ya kuvokany'a.

Ino Ni nzia imwe vala miti ivandawa iatianie lainini indi iyikiwa liu katikati . kwa ngelekany'o wavanda laini umwe wa miti uyikia laini itatu kana inya sya liu (mimea ta mbemba). Ngelekany'o nzeo ni leucaena na mbemba, Kaawa na Maiu. Miti miseo kaingi ya uvandaniw'a na liu ni ila inengae muthanga nzeve kana unou wa nitrogen. Utaaniu wa miti yi katikati wa liu waile ithiwa unyiva matambya atano (5m). Myanya ila yi katikati wa miti ino nikwaile ikala kwi kuime na kukathea kila ivinda na miti ino kusewa. Miti ta ino ndyaile kuekwa ikaasava muno nundu ya neneva muno niyambii kuminia mimea/liu unou wa muthanga na kumivwika kyeni kya sua.

Matu ala masewa kuma mitini ino nomatumike kwa kuete unou kisioni kiiu.

Kaingi miti ya uvandaniw'a na liu ndithiawa na vaita kwa uimi wa TIST nundu ndiekawa ikaasava muno yithiawa ta ikuthu na kwoou nditonya utalika ivinda ya kuta nzeve itavisaa onakau nimiseo kwa muimi nundu ninoasya muthanga na kutuma ethiwa na usyao mwingi. Ingi isioni ila nyumu miti ino niyendaa utaaniw'a munango nikana ndi kathaane kiw'u na liu kuma muthangani na mimea/liu.

3. Kusii Nzeve.

Miti ino ivandawa uteeni ngaliko ila nzeve yisilaa na ivandawa mbee miti ila minene yi katikati , ikakaatiwa ni miti mininangi laini ili ila iatiie, ikuthu na indi nyeki. Vaita wa kusii nzeve ni kana mundu ndendaa kisio kinene indi no kasio kanini ka kitheka na nitonya kuete wongeleku wa ngetha wa kilungu kya 30% isioni imwe. Manya kana miti ya kusii nzeve yavandwa nai nietae wasyo ethiwa nzeve yeekw'angali imwe. Mantha mundu wina utuika wa kuvanda miti ino ya kusii nzeve.

4. Kueka kuima kisio na kukivanda miti.

Vaa ni vala muimi uekaa kuvanda liu kisioni kina na kueka miti imee nikana atunge unou wa muthanga.

5. Nima ya Kuvulanya maliu na miti.

lino yithiawa na myanya yianene ya miti na liu. Miti miseo ni ila yithiawa itena muunyi munene na yongelaa muthanga nitrogen.

6. Nima ya miti na ndithya vamwe.

Nzia ino ivikiawa kwa kusuvia na kuvanda mitii kisioni kila indo iuya kutethya kukwata ngu na liu wa indo.

7. Miti ya kuvandwa vamwe ta kamutitu.

Kamutitu kanini nikatonya uvandwa kundu kula itheka itena w'umi nesa kwa ngelekany'o kula kwi mavia na matw'iku. Tumititu no tuvandwe ta miti ya kusii nzeve kana kuvandwa kithekani kithiitwe kiteutumika. Kwandaia lilikana miti ya TIST nonginya ivandwe na utaaniu ula waile na kwikala vo kwa ivinda iasa nikana iete unzeo ula uvaniwe.

Lilikana nzia imwe sya umi wa miti ninzeo kwa nima indi ititonya kuvitukithwa ivindani ya ndivi kwa TIST.

Mazingira Bora



TIST

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

Kipsigis Version

An Environmental, Sustainable
Development and Community Forestry
Program.



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

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Konoretab keswek ak ribet.

Konoretab kesuek

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



keswek. Naiy ile miten keswek che kemine kou

- Noton che 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 Ioltos 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

Angantan miten ngwony komiten segengeit netere tigitik komaba koloekitun missing . Ogetim temik tukul asi keswen ngo miten walet ne kararan .

kogon walutiet ngokararan anan tinye besit.

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

Toku anyun keboisien bek chechang en kabeti ini. Kokisom anyun konomikab boisioni Iton kotakowal boisioni iton. En emetab Tanzania kotinye keret age amun ichek kekerere Ngwony agote bogoinik ak segengeit (wire mesh) ak kominchi keswek barakunyin .



Katerera TIST Cluster in Uganda trained on raised nursery bed.



TIST: Practise ne kararannebo Agroforestry.

Agroforestryko 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.
- Toldolindab ng'ungunyek.
- Ribe bek chemiten koristo.
- Tre koriswek.
- Ribe ng'ung'unyek komoib bek sanasana oinoshek.
- Kerichek.
- Urwek.

Practices nebo Agroforestry: 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:

1. Hedges: Inoni ko oret ne kimine ketik en lainit asi kotoret imbaret. Hedgeskomoche space ne kiten, tere erosion, ago icheru sogek chekiboishen koig omitwogik 'ab tuga. Koborunet nebo niton ko kemin ketik en tobonwek 'ab imbarenik. Lochindo nekimogching'e ko 2m – 3m. Style nekararan ko kemin nebo circles.

2. Alley cropping: Inoniton komoche kemin ketik en spacing nebo 2m ak en rowishek . Imuche komiten rowit 'ab ketik asikosubu minutik en rowishek oeng' anan ko somok, agityo kosibge kounoton.

Koborunet 'ab niton ko minet 'ab bandek aka leucaena, anan ko coffee ak indizinik.

Ketik che kororonon ko che leguminous(Cho icheru nitrogen koba ng'ungunyek). Spacing en ketik ko yoche ko 5m. Rowshik choton bo ketik koyoche keistechin timdo en kila kenyit. Moyoche korut ketik koyechegitun angamun sindochinge ak minutik omitwogik ak asista. Yon kogibrunen sogek

kimuche kabach en ng'ung'unyek asi koig mbolea.

Ketik che kiiburyo kou timin ko momogotin en TIST payments ang'amun mogonu carbon chematin, Alakini toreti imbaret agokon manufaa alak chechang'. En komoswek cheyomyotin, komoimuche kogararan oraniton anan ketese lochindab ketik ak minutik alak asikoma borchin omitwogik chemiten en ng'ung'unyek ak asista.

3. Windbreak: Inoni ko minet 'ab ketik chtinye strips chechang' asikoter koriswek, che tere komowech koriswek minutik koriswek che yach. Inome imine ketik che yechen en kwenet, ketik chemengechen kosubu en rowishek oeng' agityo kosub shrubs, agityo kosub bushes ak suswek. Kororonindab windbreakers ko moyoche komin temeindet ketik en imbaret tugul lakini en komosto ne kiten . Moche imbaret ne kiten , ago manufaa kotese rurutik en 30% en komoswek alak . Ibwat ile windbreakers chemagimin komye koweche minutik ang'amun pune koristo konyik.

Imuche icheng' chi netinye naet en komositon kotoretin .

4. Fallow cropping: En oraniton koyoche kobagach imbaret temindet komagimin asi korut ichegen ketik agowek toltolindab imbaret.

5. Inter-cropping (minet ak minutik alak): En orani koyoche kogochi spacing ketik temindet en kwenitab minutik. Ketik che kororon kochon tinye canopies ago icheru nitrogen.

6. Grazing improvement: Imuche temindet kochomchi tuga koaam ole miten ketik ago koribe komowech ketik.

7. Woodlots: Woodlots che meng'echen kimuche kemin en imbarenik chetomo keboishen , kou. woodlots chekimuche kemin en ole miten koig anan ko olemiten gullies. Woodlots kimuche kora kemin koig windbreak, anan kemin en fallowland. Ibwat ile ketik ab TIST koyoche kigochi space negararn akoyechegitun komye ak en let kong'et en ngweny kogage. Alak en oratinwechubo agroforestryko oratinwek chekororon en minset, lakini imuch komoitchi lipanet neboo TIST.