

Mazingira Bora



TIST

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

English Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Baraka TIST Cluster members during their training meeting.

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TIST: Sustainable Agriculture: Agroforestry.



An important topic for sustainable agriculture is agroforestry.

Definition: 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:

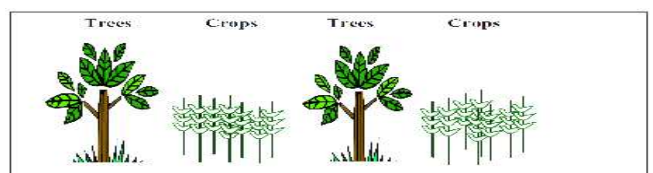
- Building material
- Fuel wood
- Fruits and other food
- Fodder
- Soil stabilization
- Soil fertility
- Moisture retention
- Wind shelter
- Marking of boundaries
- Medicine
- Cash income
- Reduced erosion (if a layer of litter/mulch is kept)

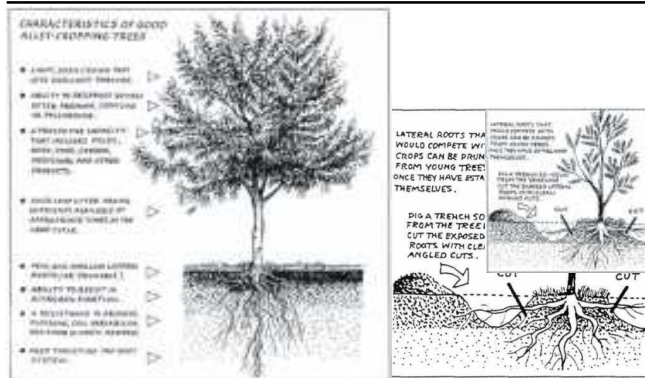
Agroforestry practices: There are many different techniques and new methods are being discovered all the time. Some techniques are successful in one place and a disaster in others. People need to try different techniques and share the best practices in the training meetings. The following are some common methods of agroforestry:

1. Hedges: This involves selecting a tree species which can be placed in a line and which have 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 1.5 - 2m. The best design includes a mixture of tall and short trees. e.g. *Croton megalocarpus* planted with *Euphorbia tirucalli* and/or *Lantana camara*.



2. Alley cropping: This involves establishing trees at very narrow spacing (0.5-2m) 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 not be more than 5-8m. 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. So these trees will not be suitable for TIST payments, as they have to be kept short, but they will improve the agricultural land and provide many other benefits to the farmer. Some good alley cropping trees have the ability to re-grow after they have been cut. This means they can be cut every crop season so that they do not grow too big and compete too much with the crops. This practice is called coppicing, and only works with some species. Some commonly coppiced species are *Calliandra calothyrsus*, *Cassia siamea*, *Cassia spectabilis*, *Eucalyptus spp.*, *Leucaena leucocephala*, *Markhamia lutea*. Some species coppice well when they are young but may not coppice when they are mature e.g. *Casuarina spp.*, *Grevillea robusta*, *Sesbania sesban* and some *Albizia spp.*

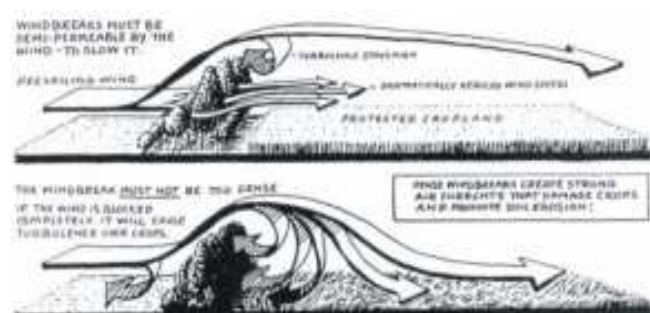
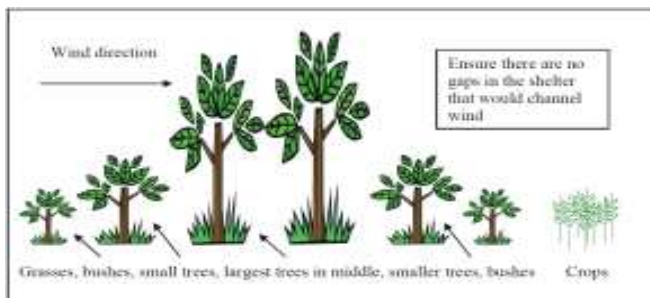




Have any farmers used this method of planting trees and crops together? If so, what were suitable combinations? Ask them to share their experiences and bring the information to the next training session.

Maybe farmers could try just a few rows of trees in their fields. Then they can see the results. If the results are good the number of tree rows can be increased next season.

3. Windbreak: Planting wide strips of trees to provide a windbreak. This then protects crops from the oncoming wind. Plant large trees in the center, smaller trees for the next two rows and low shrubs, bushes and grasses on the outside. Plant at right angles to the prevailing wind. Spacing within the lines of trees can be 4-5 m with 2-4 m between the lines.



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. 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. Mostly nitrogen-fixing shrubs are chosen e.g. *Sesbania* spp. and *Gliricidia sepium*.

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. More on this in the next unit.

6. Grazing area improvement: Managing trees on grazing land to provide wood and fodder. For example, in arid and semi-arid lands, consider *Acacia tortilis* or some of the following: *Salvadora persica*, *Cordia sinensis*, *Acacia eliator*, *Ziziphus mauritiana*, *Acacia albida*, *Acacia nubica*, *Acacia Senegal*, *Hyphaene compressa*.

In higher potential areas, depending on the altitude, consider *Leucaena leucocephala*, *Sesbania sesban*, *Calliandra calothyrsus* and *Leucaena diversifolia*. Consider supplementary feeding using leaves (15-20% of the feed) during the dry season for your animals.

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.

8. Marking boundaries e.g. *Croton megalocarpus* and *Commiphora zimmermannii* subsp.



Trainers, 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.



Other ideas to consider for certain ecological zones in Kenya.

Higher altitude slopes with acidic soils (e.g. areas where tea grows well)

Consider *Calliandra calothyrsus* and *Morus alba* for fodder production.

Consider boundary planting and windbreaks with *Croton megalocarpus*, *Grevillea robusta*, *Casuarina cunninghamiana*, *Millettia dura*, *Hakea saligna*.

Consider orchards for temperate fruits (e.g. plums, peaches, pears).

Lower altitude slopes (e.g. where coffee grows well)
Consider *Jacaranda mimosifolia* for boundary planting.

Consider *Syzygium spp.* for windbreaks and planting along water courses.

Consider fruit trees such as *Cyphomandra betacea* (tree tomato), *Persea americana* (avocado), *Macadamia tetraphylla* (macadamia), *Passiflora edulis* (passion fruit), *Casimiroa*.

Edulis (white sapota), *Annona senegalensis* (custard apple), *Psidium guajava* (guava), *Eriobotrya japonica* (loquat).

Calliandra, *Morus alba*, *Grevillea* and *Markhamia lutea* are good options for planting on areas you want to control for soil erosion (soil conservation structures).

Grevillea is a good shade tree for coffee.

High altitude plains, with gentle sloping land and scarce numbers of trees:

Consider windbreaks to protect crops, boundary planting and live fences e.g. *Acacia mearnsii*, *Grevillea robusta*, *Hakea saligna*, *Croton macrostachyus*, *Dombeya spp.*, *Dodonaea angustifolia*, *Casuarina cunninghamiana*, and *Dovyalis caffra*. Some temperate fruit trees may do well.

Rift valley maize and dairy system.

Since maize does not do well in shade, consider small woodlots or windbreaks, or trees planted on soil conservation structures e.g. *Grevillea robusta*, *Sesbania spp.*, *Croton macrostachyus*, *Croton*

megalocarpus, *Acacia abyssinica*, *Eucalyptus spp.*, *Acacia mearnsii*, *Casuarina cunninghamiana*, *Dovyalis caffra*, *Markhamia lutea*, *Cordia abyssinica*.

Reminder

Do remember that whilst planting trees brings many benefits you need to research the best types for your specific land type. Remember that trees compete with crops for water, and some crops do not like a lot of shade, for example. Get information from your nearby small groups and your extension workers.

- Particularly get advice on suitable trees with deep roots and fewer surface roots (these trees are beneficial in agroforestry since surface roots compete with crops). *Casuarina spp.*, *Leucaena leucocephala*, *Cupressus lusitanica*, and *Sesbania sesban* have shallow root systems and may be better for stabilising soil on conservation areas. *Eucalyptus spp.* and *Gmelina arborea* can produce compounds which inhibit crop growth.
- Intercropping may not work very well in areas receiving less than 800mm rainfall annually.

Resources:

There is a very useful website giving details on suitable trees for agroforestry in Kenya. You can search for details on specific trees. Available here: <http://agroforesttrees.cisat.jmu.edu/>

Videos

'**Grevillea agroforestry**' (6:26) introduces the many benefits of *Grevillea* within farming systems. It explains some of the management procedures such as pollarding and coppicing. <http://www.accessagriculture.org/node/895/en>

8. References

CARE-International (1989) *Agroforestry Extension Training Sourcebook*. Module 6: *Agroforestry Design*. Educational Resources Development Unit, Nairobi.

NEMA (1998) *Caring for our environment: A handbook for local leaders*. National Environment Management Authority, Kampala.

Tengnäs B (1994) *Agroforestry Extension Manual for Kenya*. International Centre for Research in Agroforestry: Nairobi.



Sustainable Agriculture: Weeding & Post-Harvest Reminder.

Weeding is important for these reasons:

- I. Your crops need water, soil nutrients and light to grow strong. Weeds will compete with your crops and use the soil nutrients and water that your crops need. The result is your crops will be weaker and may not survive.
2. If your area is not weeded, more pests will be attracted to the area. The fewer weeds there are, the less chance there will be of snakes and insects to damage your crops.

Advantages of weeding your fields:

- Crops grow faster because weeds won't take the nutrients and water from the soil
- Crops will become stronger and grow taller in a shorter period of time
- Crops can get the sunlight they need unhindered
- Crops are not exposed to as many diseases
- Crops are more protected from a fire spreading
- Clean fields indicate that Small Groups are maintaining them and are good examples of the TIST program. This will attract people to come and see your work.

Post-Harvest Reminder:

- Do not let your animals eat the crop remainder like maize and millet stalks, beans, legume leaves, groundnut leaves etc. Also, do not burn the remainders but collect and store them in a safe place where they won't be disturbed by animals or fire. This is so you can use the crop remainders to make compost manure, a very effective natural fertilizer. Details about how to make compost manure are given in the unit on soil fertility, and could be taught now as well.
- If you have excess crop remainders leave them on the fields so there is a covering over the field. The crop remains will rot down returning many good nutrients to the soil preparing and enriching it for the next planting season.
- If you had conservation farming holes this year, do not close them up but leave them open and ready for the next planting season. The more years you practice conservation farming in your fields the better the soil will become and the more harvest you will get (and even better if you rotate the crops you put in that field).
- Once you have weeded the area make sure you remove the weeds from the field. If you leave the dead weeds, they may attract pests and diseases that can damage your crop.

Using TIST Improved Cooking Stoves: Good for people, good for trees.

Why use an improved stove? There are so many benefits for people and trees. Here are just some:

For the stove user:

- I. Improved stoves minimize the use of firewood. Firewood used for cooking three days in a traditional stove can be used for a week in an improved stove.
- II. Minimizes cost of buying firewood.
- III. Saves time spent searching for firewood.
- IV. The stove uses one piece of wood to heat up to three pots, saving time and firewood.
- V. Minimizes accidents by fire, as the fire is covered.
- VI. Smoke is taken out of the kitchen by the

chimney. This reduces health related problems from smoke, such as respiratory disorders

For the environment:

The reduced demand for firewood helps to-

- I. Reduce deforestation.
- II. Reduce desertification.
- III. Prevent damage from sudden flooding.
- IV. Protect water resources and catchment areas.

Therefore, it is important to request the TIST stove builders to help you build one at low cost, using locally available materials. You can also purchase ready-made stoves from TIST. Talk to your Cluster Servants for more details.



Planting Trees in Dry Areas.

As TIST continues to expand both in high potential and dry areas, we face challenges in tree survival. In TIST we always develop and share best practices, and this has always helped us in the TIST family get good results.

Below are some best practices that we can try in tree planting in dry areas:

1. Site selection for your nursery is especially important in dry areas. Seedlings will need to be watered once or twice each day when they are young. Consider keeping the seedlings in a convenient area near your home so you can use household water for seedlings. Using a windbreak around the nursery will reduce water use, and provide shade to protect young seedlings.
2. Early Preparation: Prepare the holes for tree planting possibly 1 month before the onset of the rain, the hole will crack and this will help in easy water penetration when it rains. After the first downpour, plant the trees and fill in the hole starting with the topsoil and manure.
3. Try using rainwater harvesting techniques, like negarims and micro-basins, so that more water reaches trees. Trees may also better survive if planted near areas where water flows seasonally.
4. Mulching: Mulch after planting the trees. This will help in moisture retention as it reduces evaporation. Using a compost manure will add nutrients to soils, but rock mulching can also provide some benefit in rocky areas.
5. Agro forestry: Let us try to practice agro forestry. The survival rate of trees planted in farm areas is higher than those planted in grassland and bushy areas since trees are better cared for and on better soil.
6. Choose species that grow well in dry areas. Often indigenous species from the surrounding area are strong survivors. Some examples include *Melia*, *Acacia seyal*, and *Muuuku (Terminalia brownii)*.
7. Protect existing trees and allow them to regenerate. These established trees are strong, and can often survive difficult seasons if we protect them. They provide an important source of locally adapted seeds as well as shade and other services.
8. Raised seedbeds or sunken seedbeds can help. When we establish the raised seedbed, we get seedlings with strong roots, so their survival rate is high. It may also help to keep seedlings a bit longer in the nursery so they can grow bigger and stronger. However, a sunken seedbed may also be a good choice since it shelters the seedlings and reduces drying. In this case, be careful to turn seedlings frequently so roots don't grow into the ground below the tubes, damaging roots in transplanting.

Let's use the best practices we have, and develop and share with others so that we can achieve more results and help TIST grow in our areas.

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Kimereu Version

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Wanachama wa Baraka TIST Cluster wakiwa kwa mkutano wa mafunzo.

Inside:

Urими bwa Kungaania miiti na Imera Bingi. Page 2

Urими bwa gwitegemea: Kiririkania gia kirimira na nyuuma ya guketha. Page 5

Gutumira mariku jamathongi nkuruki ja TIST: Nigukuega kiri antu, nigukuega kiri miti. Page 5

Uandi miti ndene ya ntuura injumu. Page 6



Urimi bwa Kungania miiti na Imera Bingi.



Nteto cia gitumi iguru ria urimi bwa gitegemea bwa kungania miti na imera.

Maana: Gukuria miti amwe na imera bingi bia muunda.

Mworoto jwa kwaanda miti amwe na imera bingi ni gutetheria maciaro ja miunda jongerekete niuntu bwa gutumira miiti. Miiti iji iri na gitumi gikinene kiri murimi. Itumi bimwe ni:

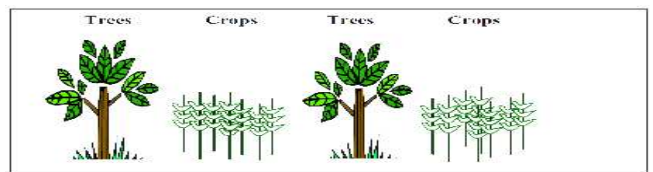
- Mbao cia gwaka nyomba
- Nku
- Matunda na biakuria bingi
- Iria ria ndithia
- Kurigiria muthetu jutigetithue ni ruuji
- Kwongera unoru bwa muthetu
- Kwongera ruuji muthetune
- Kurigiria ruuo rurwingi
- Gwita mianka ya miunda
- Ndawa cia mithemba imingi
- Kureta Mbeka
- Kirugiria muthetu gwita na ruuji

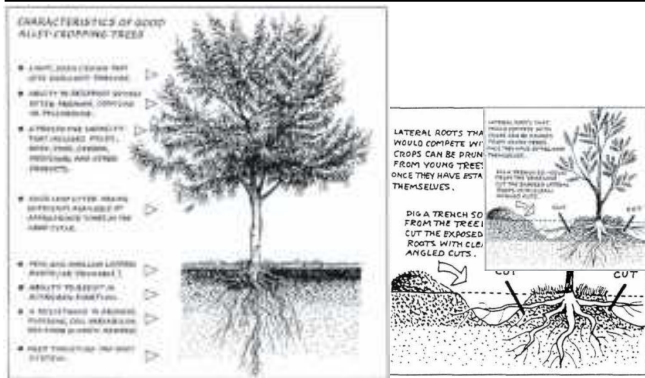
Kurima gwa kungania Imera na miiti: Kuri na njira inyingi na ingi injeru iria ikwenderea kumenyekana o igita na igita. Njira imwe ni injega gitumirwa na ingi ni inthuku. Antu ni babwiri kugeria njira mwanya mwanya na kwirana iria njega nkuruki ya iria ingi igita ria micemano ya kuritanwa.. Aja nandi ni njira iria itumagirwa mono mono kiri urimi bwa kungania imera na miiti.

I. Mianka ya miti: Iji ni njira ya kwaanda miti itaari na muraini. Mianka iji itiendaga kaanya gakanene gati gati ka miiti na ni itethagiria kurigiria mono muthetu gukamatwa ni ruuji. Miti iji ni imiega ya gutwira iria ria ndithia kana mati ja gukunikira imeera bia kumiithia. Kionekaria gikiega ni kwaanda miiti ithiurukirite mwanka jwa muunda kana kieni. Watho bwa kwaanda ni mita imwe na nusu mwanka ijiri (1.5M – 2m). Mwaandire juria mwega ni kuungania miiti imiraaja na imikui Croton megalocarpus yaandaniritue na Euphorbia tirucalli amwe na kana na Lantana camara



2. Kwaanda na Mistari: Iji ni njira ya kwaanda miti na twaanya tutuceke mono. Twanya ja twa nusu mita (0.5 – 2M) na mistari gati gati ka mistaari iri kana ithatu ya imera na gwita na mbeere muundeene junthe. Biria bibujanagira mono na njira iji ni imera ja mpempe amwe na Leucaena kana kauwa na marigu. Miiti iria miega mono ya urimi bubu ni iria iretaga riera ririega mithetune. Mianya gatigati ga mistaari iji ni kuuma mita ithano mwanka inyanya (5-8) na igakurikia kithimi kiu. Miiti iji nibwiri kurimirwa na gwitwa sakasi ogita na igita. Miiti iji itibwiri kurekerua irea mono nontu igashindana na imera bingi na bitikura bwega ikwaga biakuria muthetune na weru bwa kungana. Mabura jaria jaiti sakasi nijatethagia kwongera unoru muthetune. Niuntu bwa untu bubu, miti iji itiumba kuriwa ni TIST niuntu no mwanka igitwe ikare iri imikui. Amwe na buu miti iji ni itenthagiria kunoria mithetu ya muunda na kwongera mantu jangi jamega kiri murimi. Miti imwe iria itumagirwa kiri urimi bubu ni kuraga bwega kinya nyuma ya gutemwa. Guku ni ja kuuga no mwanka igitwe o nyuma ya iketha rionthe kurigiria itakanenee mono yambiria gushindanira irio na weru na imera bingi. Urimi bubu bubujaa na miti imitare. Imwe ya miti iji ni Calliandra calothyrsus, Cassisa Siamea, Cassia Spectabilis, Eucalyptus ssp, Grevillea robusta, Sesbania Sesban na miti imwe ya Mwiriga jwa Albiza spp.

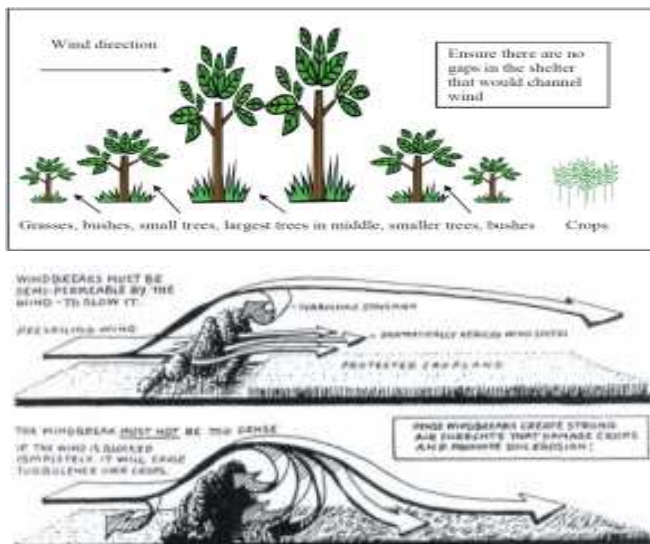




Ni Arimi babaingi bagutumira njira iji ya urimi ya kungania miti na imera amwe? Kethira niu ri, ibakwona urimi bubu bukibatethia? Borie berane uria bakwona urimi bubu bukari na beeje na ntento nkuruki mucamanione juu jungi jwa kuritanwa mantu nkuruki.

Arimi bamwe ibabwiri kugeria kwaanda mistari imikai ya miti miundene yao maanda jaja boone uria maketha jakethirwa jakari. Boona jabui no bongere mistari ingi ya miti maandene jau jangi

3. Miti ya kurigiria Ruuo: Kwaanda miiti na mistari itaraniritie ni itethagiria kurigiria kurutwa mono ni ruuo. Miiti iji ni irigagiria imera kurutwa ni ruuo rurwingi nkuruki. Anda miti imenene gatigati, na iminiini mistarine iu ingi iiri na tumiti tungi tutukui ruteere. Miiti iji ibwiri kwaandwa itegene na naria ruuo rukuma. Twanya twa kwaanda miti iji ni gatigati ka mita inya na ithano (4 –5) na mita ijiiri na inya (2 – 4) gatigati ka mistari



Weega bwa miti Iji ya kurigiria ruuo ni ati murimi atiendeka gutumira muunda jumunene kwaanda miiti Iji. Miiti iji ijukagia kamunda kaniini aki na mawega ja miiti iji nijamaingi niuntu nijatethagiria kwongera maciara ja munda na kiwango gia mirongo ithatu kiri igana(30%) guntu kumwe na kumwe. ni bwega kumenya ati miti imwe ya kurigiria ruuo ikarega kwaandwa bwega ni ithukagia imera nkuruki nontu ni itemere ruuo njira kwethirwa gutigi na twanya tutwingi nkuruki ya turia tubwite. Ni bwega kuuria muntu uria uri na umenyo guguthenteria kubangangania kwaanda muunda jwaku.

4. Kwaanda Miti Yonka: Urimi bubu ni buria mirimi andaaga miti yonka guti kimeru kinya kimwe muundene jwawe. Urimi bubu ni butethagiria muthetu gucokia unoru. Ni bwega mono mono kwaanda tumiti turia twongagiria riera riria mithetu yendaaga mono (nitrogen) ja *Sebania spp* na *Gliricidia sepium*

5. Urimi bwa Kungania: Kwanadaniria miti amwe na imera ukiejaga miti twanya gatigati ka imera biaku. Mithemba imiega ni iria iri na mugunya munini na iyongagira riera ririega muthetune. Tukabwira ntento nkuruki au mbere.

6. Kubwithia antu akurithiria: Iji ni njira ya kubangania miti muundene jwa kurithia kenda miiti iji Yuma nku na iria ria ndithia ciaku. Ja kethirwa kuri guntu Rwanda nibwega kwaanda ja *Acaciatorilis kana ingi ja Salvadoria persica, cordial sinensis, Acasia eliator, ziziphus mauritiana, Acacia albida, Acacia nubica, Acacia Senegal, Hyphaene compressa.*

Kuri guntu kuria kuumba gukura miiti nkuruki kuringana na riera ria ku ri thugania kwaanda miiti ja *Leucaena Leucocephala, Sesbania sesban, Calliandra calothyrsus na leucaena diversifolia.* Miiti iji no ikwee gancunci ga mirongo iri kiri igana(20%) ga iria ria ndithia ciaku.

7. Urimi bubu ni bwa kwaanda miiti rutere rwa muunda jwaku naria gutikuraa imera bwega. Ja kwaanda miti rurete rwa muunda naria kwina maiga kana mitaro imenene. Miiti iji no yaandwe mundeene amwe na imera na gutumirwa kurigiiria ruuo rurwingi kana kinya kwaandwa ja urimi buria twariririe au mbeere bwa namba inya

8. Gwita mianka. Ja *Croton Megalocarpus na Commiphora zimmermannii subsp.*



Aritani, menyeni ati miiti ya TIST no mwanka yaandwe bwega na ikejagwa twanya turia tubwiri kenda ikura bwega na ituura muthetune igita ririraja. Njiira Imwe iria twarikia kwariria ya kwaanda miti na imera ni njira injega mono cia uriimi Indi nibwega kumenya ati no ti mwanka iriwe ni TIST.

**Njira ingi cia urimi cia nteere imwe cia Kenya iria cirimaga na njira cia kumenyera mithetu.**

Nteere Iria iria iri mpio mono na muthetu ya acidi (Ja nteere iria ciandagwa majani)

Ni bwega kwaanda *Calliandra calothyrsus* na *Morus alba*. Iji niejanaga iria ria ndithia.

Gwita mianka ya miunda no waande *Croton megalocarpus*, *Grevillea robusta*, *Casuarina cunninghamiana*, *Millettia dura*, *Hakea saligna*.

Thugania kwaanda Plum na pear ja matunda nterene iu.

Nteere iria iti na mpio mono. Ja naria kauwa gakuraa bwega anda miti ja misakaranda (*Jacaranda mimosofolia*) gwita mianka

Thugania kwaanda *Syzygium* spp. Kurigiria ruuo rurwingi na nteere cia miuro ya ruuji.

Matunda najo ni ja *Cyphomandra betacea* (Ntunda cia ndamu), *Persea americana* (mibokado)

Macadamia tetraphylla (macadamia), *Passiflora edulis* (ntuunda cia muugu), *Casimiroa edulis* (white sapota), *Annona senegalensis* (custard apple), *Psidium guajava* (Mbeera), *Eriobotrya japonica* (ndukuati).

Calliandra, *Morus alba*, *ngirivillea* and *Markhamia lutea* iji ni miiti imiega mono ya kurigiria mithetu gukamatwa ni ruuji.

Ngirivillea ni muti jumwega jwa kwaa kauwa mugunya jumwega.

Nteere cia mpio na guntu guti na rigiri mono na naria guti na miiti:

Thugania kwaanda miti ja *Acacia mearnsii*, *ngiriverea robusta*, *Hakea saligna*, *Croton macrostachyus*, *Dombeya* spp., *Dodonaea angustifolia*, *Casuarina cunninghamiana*, and *Dovyalis caffra*. Na kinya miiti imwe ya matunda, ni ikuraa bwega mono nteere Iji.

Mpempe cia Rift Valley na ndairi. Nontu pempe citukuraga bwega rungu rwa kirundu, thugania kwaanda miiti miniini kana miti ya kurigiria ruuo kana ya kurigiria mithetu gwitithua ni ruuji jayo *Ngiriverea robusta*, *Sesbania* spp., *Croton macrostachyus*, *Croton megalocarpus*, *Acacia*

abyssinica, *Eucalyptus* spp., *Acacia mearnsii*, *Casuarina cunninghamiana*, *Dovyalis caffra*, *Markhamia lutea*, *Cordia abyssinica*.

Kirikania

Rikana ati ukianda miti ati kinya kethira nikuretagira mantu jamaingi jamega, ni bwega kithithia ucunkuni bwaku kenda umenya munda jwaku bwega na uumba gutaara miti iria igakara bwega mundeene jwaku. rikana ati miri na imera ibicindanagira ruuji na imera, na Imera bingi nabio bitienda mugunya. No urie ntento nkuruki kuuma kiri ikundi biria biri akui na aritani baria bariungaga na miunda.

- Mono mono, uria nkuagaya iguru ria miiti iria iri na miiri iria yorokagira mono na Iria iri na miiri imikai Itiorokagira (ntento iji no igutenthia mono nontu miiri iria itiorokagira nio ishindanagira ruuji na irio na imera bingi) *Casuarina* spp., *Leucaena leucocephala*, *cupressus lisutanica* na *Sesbania sesbania* iiri miiri itorokagira nthi mono na ibui mono ya gucokanaria mithetu *Eucalyptus* spp. na *Gmelina arborea* ni ciitaga kimiko Irigagiria imera bikura bwega.
- *Kungania imera* na miti no irege kubwa nterene iria cionaga ngai yarungu rwa milimita magana 800mm o mwaka

Utethio

Kuri na mutandao jwa intaneti juejanite ntento inyingi iguru ria urimi bubu bwa kuungania imera na miti aja Kenya. Weenda ntento nkuruki, Thingata andersi iji
<http://agroforesttrees.cisat.jmu.edu/>

Mitambo ya video

'Grevillea agroforestry' (6:26) ni Ikwejana ntento Inyingi nkuruki iguru ria miti ya Ngriveria. Video iji ni kwariria mantu jamaingi uria umbu kubangania miti iji kiri urimi bwaku
<http://www.accessagriculture.org/node/895/en>

8. Ntento Nkuruki

CARE-International (1989) *Agroforestry Extension Training Sourcebook*. Module 6: *Agroforestry Design*. Educational Resources Development Unit, Nairobi.

NEMA (1998) *Caring for our environment: A handbook for local leaders*. National Environment Management Authority, Kampala.



Urimi bwa gwitegemea: Kiririkania gia kirimira na nyuuma ya guketha.

Kurimira kuri gitumi mono niuntu bwa:

1. Imera biaku nibikwenda ruuji, muthetu juminoru na weru bwa kungana kenda bikuura bwega. kuri na iria muundene, Imera abigashindanira Intu biu. Iria rigatumira ruuji, unoru bwa muthetu na weru buria imera bikwenda kenda bikura bwega. Guku ni ja kuuga imera biaku abikonja kana bikue.
2. Kethira munda jwaku jutirimi, tunyomoo twa kuthukia Imera tukenda mono kwija mundeene jwaku. Ngugi ya tunyomoo tutu ni kuthukia imera. kwou kethira guti na iria, gutithirwa kuri na tunyomoo mundeene jwaku.

Mantu jameega ja kurimimira muunda

- Imera ibukuraa bwega mono riria muunda jurimi bwega nontu iria ritijukagia ruuji na into bingi buria bikwendekana ni imera
- Imera ibireaga ntunti na kugia na inya ndene ya igita riikui
- Imera bionaa riuu riuu kungana
- Imera bitigwatagwa ni mirimo ntuti
- Imera bitiumba kuya ni mwanki kinya jugatua gutamba.
- Miunda irimiri ikonania kionerereria gikiega gia mutaratara jwa Tist. untu bubu bugatuma antu beende kwija kwona ngugi yaku untu bubu bugatuma antu beende kwija kwona ngugi yaku

Kiririkania gia Nyuuma ya guketha.

- Ukareka ndithia yaku iria matigari ja maketha ja mati jwa muya na mpempe, mati ja mungau na nchugu karanga. Na ukaithia mati jau. jothuranie na ujeke antu amwe aria jutiagua ni ndithia kana mwanki. kenda ukajatumira kuthithia najo mboreo iria ithagirwa iri ingega mono nontu guti gintu yongereri kina kimiko. uritani nkuruki nibuejani gancucine ka njira ya kithuthia mboreo ya kirinya. na no iritanwe nandi.
- Kethira uri na na mati jamaingi mono kumania na maketha jaku, jatige ona u mundeene kenda jakunikira muunda. nyuuma ya kaagita, mati jaria jakora na jacokie unoru buria o kiri muthetu na kujunoria nkuruki.
- Kethira kuri marinya urenjite mwaka juju, ukajakunika, jatige jakunuri jeteere maanda jau jangi. O uria ugutiga marinya jau jakunuki miaka imingi no uu mithetu ikwoneru unoru na nou maketha jakaingia. (Na ibwega kugarura imera mundeene juu)
- Wathiria kurima: wiite iria mundeene. watiga iria riria rikuite mundeene nirituma tunyomoo kwija kuthukia imera.

Gutumira mariku jamathongi nkuruki ja TIST: Nigukuega kiri antu, nigukuega kiri miti.

Niki ubati gutumira riiko ririega nkuruki? Kurina baita inyingi mono kiri antu na kiri miti. Aja ni inkai ciacio:

Kiri mutumiri mariiko:

- I. Mariko jaja nijanyiagia utumiri bwa nkuu. Nkuu iria citumagirwa kuruga ntuku ithatu na kiriko kia kawaida no itumirwe kiumia kimwe kiri riiko ririega nkuruki.
- II. Nijanyiagia mbeca cia gutumira kiri kugura nkuu.
- III. Nijoonokagia mathaa jaria jatumagirwa kiri gucua nkuu.
- IV. Kiriko giki gitumagira ruku rumwe kuruga nyongo ithatu, na kwou kwonokia mathaa na nkuu.
- V. Nijanyiagia mitino ya mwanki, niuntu mwanki nijukuniki
- VI. Toi niumaragua oome ya nyomba ya kurugira

gukurukira chimney. Bubu nibunyiagia thina cia thiria iria ciumanagia na toi, ta thina cia gukucia miruko.

Kiri naria gututhiurukite:

- Utumiri bwa nkuu inkai nibutethagia-
- I. Reduce deforestation. Kunyiyia ugiti miitu.
 - II. Reduce desertification. Kunyiyia gutamba kwa uumo.
 - III. Kurigiria kuthuka kuria kuumanagia na mbura inyingi iria ijaga o rimwe.
 - IV. Kumenyera nduji na biumo biaru.

Kwou, burina bata kuuria athithia mariiko ndene ya TIST bagutethie kuthithia rimwe na mbeca inkai, bugitumagira into biria bikwoneka aria uri. Kinya no ugiure mariiko jathithitue kuuma kiri TIST. Aria na nthumba cia cluster yaku nikenda umenya nkuruki.



Uandi miti ndene ya ntuura injumu.

Ouria TIST igwita na mbele gutamba ndene ya ntuura irina kanya gakathongi na injumu, nitugutirimana na magerio jamaingi kiri gutuura kwa miti. Ndene ya TIST nituthithagia na kugaana mitire imiega buru ya kuthithia mantu, na bubu nibututethagia batwi ndene ya nja ya TIST rionthe kwona maciara jamathongi.

Aja ni mitire imwe iria miega buru iria tuumba kugeria kiri uandi miti ndene ya ntuura injumu:

1. Utaari bwa antu a gwika munanda jwaku burina bata mono ndene ya ntuura injumu. Miti igetie gwikirwa ruuji rimwe kana jairi o ntuku riria inyii. Thugania gwika miti antu aria gukuiriteie nja nikenda ugatumira ruuji ruria rugutumirwa nja gwikira miti. Kunyiyia ruugo akui na munanda gugatethia kunyiyia utumiri bwa ruuji na kua miti iminini kirundu.
2. Kuthuranira kurio:Thuranira marinya ja kuanda miti kwombika mweri jumwe mbele ya mbura, kirinya gikaunika na bubu bugatethiakuuthioa gutonya kwa ruuji riria gukaura. Nyuma ya ngai ya mbele anda miti na ujurie kirinya ukiambagiria na muthetu jwa iguru riu mboleo.
3. Geria gutumira njira cia kugwatia ruuji rwa ngai nikenda ruuji rurwingi rukinyira miti. Miti ikoomba gutuura yaandwa akui na aria ruuji rwithagirwa ruriku rionthe.
4. Gukunikira muthetu: Gukunikira muthetu warikia kuanda miti. Bubu bugatethua gwika ruuji niuntu nikunyiagia gukamatwa ni riu. Gutumira mboleo ya imera gukoongera

nutrienti muthetune indi gukunikira na maiga kinya ku no kulete baita gutune kuria kurina maiga jamaingi.

5. Kuungania imera na miti: Tugerieni kungania imera na miti. Miti iria iandagwa muundene niyo yuumbaga gutuura nkuruki ya iria iri ithakene niuntu nimenyagirwa na iri muthetune jumwega nkuruki.
6. Taara mithemba iria igakura bwega ndene ya ntuura injumu. Miti ya gintwirekuuma kiri ntuura iria ithiurukite niumbaga gutuura. Mng'uanano imwe ni Melia, *Acacia seyal*, na *Muuuku (Terminalia brownii)*.
7. Menyeera miti iria irio na umitikirie iciarane. Miti iji irio irina inya na niumbaga gukurukira mbura injumu twamikaria. Niejanaga kiumo kia bata kia mbeu cia gintwire amwe na kirundu na mantu jangi.
8. Minanda itiritie kana injiri no itethie. Riria twambia minanda itithitue, nituonaga miti irina miti imiriku na kwou igatuura. No itethie kinya gwika miti munandene igita riraja nikenda inenea nkuruki na igia inya. Indi minanda ya kwinjira no ithirwe iri imiega niuntu nikunikagira miti na ikanyia kuuma. Aja, menyeera kugaruria miti o nyuma ya igita nikenda miri itigakure itonya muthetune rungu rwa mubuko, na kwou igitaria miiri igita ria kuthamia.

Tutumireni mitire iria miega buru iria turinayo, na tuthithie na kugaana na bangi nikenda tukinyira maciara jamaingi na tutethia TIST gukura ndene ya ntuura cietu.

Mazingira Bora



TIST

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

Kikuyu Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Wanachama wa Baraka TIST Cluster wakiwa kwa mkutano wa mafunzo.

Inside:

Uhandi wa miti migunda-ini ya irio. Page 2

Urimi Mwega: Kurimira na matigari ma thutha wa magetha. Page 5

Kuhuthira riiko ria TIST: Niriega kuri miti. Niriega kuri andu. Page 5

Uhandi wa miti kundu kumu. Page 6



Uhandi wa miti migunda-ini ya irio.



Gutariria: Guku ni kuhanda miti hamwe na irio cia mugunda na kuriithia mahiu mugunda-ini umwe.

Gitumi kinene kia urimi uyu ni kwongerera magetha kuhitukira uhandi wa miti.

Miti niikoragwo na mawega maingi kuri arimi.

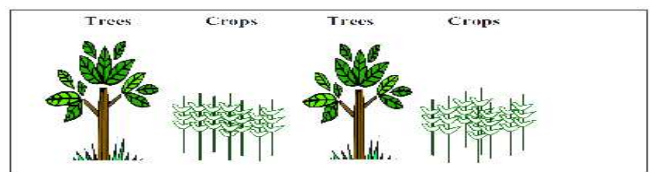
- Indo cia gwaka.
- Ngu cia riiko.
- Matunda na mangi maingi.
- Irio cia mahiu.
- Kwagirithia tiiri.
- Kwongerera unoru tiiri-ini.
- Kuiga tiiri uri mugunyu.
- Kunyihia ruhuho.
- Kuonania mihaka ya mugunda.
- Dawa cia urigitani.
- Kurehe mbeca.
- Kunyihia tiiri gukuuo ni maai.

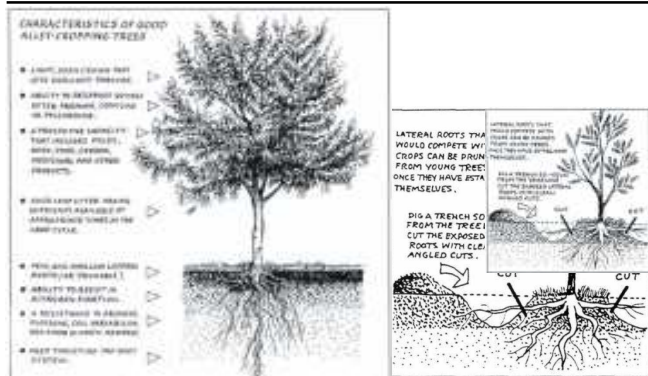
Urimi wa agroforestry: kuri na njira nyingi na ingi cirathundurwo. Njira ingi nicikoretwo na umithio kundu kumwe no cigakorwo citakwagirira kuria kungi. Andu nimagiriirwo nikugeria njira ngurani na mathomithanie micemano-ini. Ici ni imwe cia njira cia agro-forestry.

1. Hedges: ino ni njira imwe kuria ucaguraga miti iria ukuhanda na muhari na iri na umithio kuri mugunda. Hedges ibataraga mugunda munini, niugiragiriria tiiri gukuuo ni maai na nourute irio cia mahiu na mahuti ma kuiga ugunyuu. Muhiano wa hedges ni kuhanda muhari wa miti migunda-ini na utaganu uria mwitikiriku ni 1.5-2M. Njira njega nigutukania miti miraihu n amikuhi. Kwa muhiano *Croton megalocarpus* ihandaniirio na *Euphorbia tirucalli* na *lantana camara*.



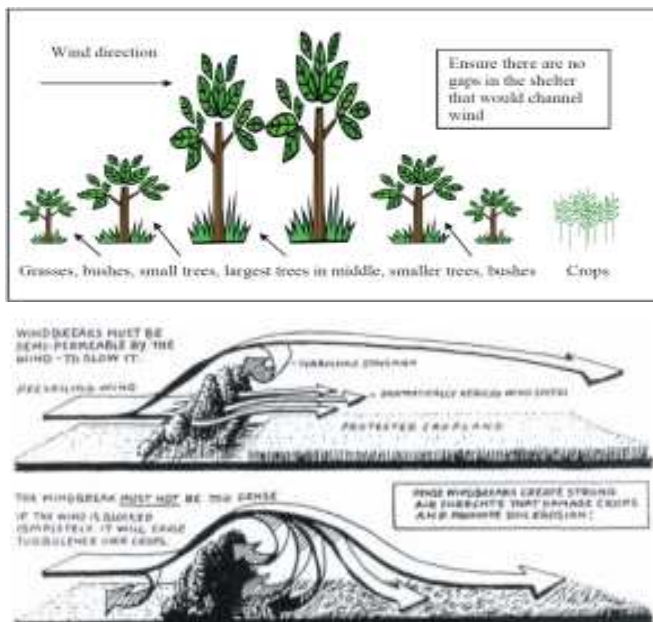
2. Alley cropping: ino ni njira ya guchagura miti ini na utaganu munini wa (0.5-2m) thiini wa muhari mugunda-ini. Nogukorwo na muhari wa miti urumiriirwo ni mihari 2 kana 3 ya irio cia mugunda. Muhiano wa njira ino ni kuhanda mihari ya mbembe utukanitie na ya leucena kana kahuwa na marigu. Miti iria miega na alley ni iria ithondekaga tiiri. Utaganu wagiriirwo nigukorwo uri wa 5-8M. Miti thiini wa mihari niyagiriirwo nikurimirwo maita maingi kana miti yage kuraiha muno. Ningi, noicindanire irio na riia ohamwe na utheri. Mahuti maria macehwo nomarekio thi niguu mongerere unoru no miti ndingitikirika marihi-ini ma TIST tondu timiraihu , no niiguteithia migunda na njira ingi nyingi. Miti imwe miega na alley niikoragwo na uhoti wa gukura ringi ona thutha wa gutemwo. Uu nikuga ati noitemwe thutha wa kimera niguu ikure iri minene na ihote gukuranira na irio. Njira ino itagwo coppicing, na irutaga wiro na mithemba imwe. Mithemba iria ihuthikaga muno ni *Calliandra calothyrsus*, *Cassia siamea*, *Cassia spectabilis*, *Eucalyptus spp.*, *Leucaena leucocephala*, *Markhamia lutea*. Mithemba imwe niyagagirira riria iri minini, muhiano, *Casuarina spp.*, *Grevillea robusta*, *Sesbania sesban* ana ingi ta *Albizia spp.*





Nikuri murimi uhuthirite urimi uyu wa kuhandaniria miti na irio cia mugunda? Angikorwo nikuri, ni mitukano iriko yakwagiriire? Morie mamwonie na mamuthomithie mucemano-ini. Ringi arimi nomagerie mihari minini ya miti migunda-ini. Niguo macoke mone maciaro. Angikorwo nikuri na umithio, wongerere kimeara kingi.

3. Windbreak: kuhandana miti miingi niguo kunyihia ruhuho niguteithagia irio. Niwega makiria kuhandana miti minene gatagati-ini ka mugunda, mini mininanini mihari-ini iri irumiriire, ithaka na nyeki nja ya mugunda. Na ningi, niiteithagiriria kuhandana miti na njira njega niguo inyihie ruhuho. Gutagania mihari-ini ni gwa 4-5m na 2-4 mihari-ini.



Nikuri na mawega ma kuhuthira windbreaks tondu murimi to muhaka ahuthire gicunji kinene kia mugunda niguo ahande miti. Ihuthagira muconjo umwe na noyongerere maciaro na gicunji kia 30% miena ingi. Ririkana ati, uhandi utabangitwo wega wa windbreak nouthukie irio makiria tondu nouhitukie ruhuho mianya-ini. Caria mundu uui uhoro uyu niguo akwonererie wega.

4. Fallow Cropping: njira ino ni riria murimi atiga kuhandana irio mugunda-ini na arekereria miti ikure niguo gucokereria unoru wa tiiri. Muno makiria miti iria ikiraga unoru tiiriini niuhuthikaga ta *Sesbania spp* na *Gilricidia sepium*.

5. Inter-cropping: kuhuthira utaganu munene wa miti gatagati-ini ka irio na kuhandana miti iri na gacumbiri kahuthu na kunoria tiiri. Makiria urimi-ini uyu niuguthomitanio mahinda mokite.

6. Grazing Area Improvement: rira wamenyerera miti yaku mugunda-ini wa kuriithia niguo ugie na ngu hamwe na irio cia mahiu. Kuri kuria kumaga, handa miti ya *Acacia nubica*, *Acacia Senegal*, *Hyphaene compressa*.

Kuri kuria kuri na maciaro mega, kuringana na riera, handa *Leucaena leucocephala*, *Sesbania sesban*, *Calliandra calothyrsus* and *Leucaena diversifolia*. Huthira mahuti kuhe mahiu(gicunji kia 15-20%) kimera kia riuwa kuri mahiu.

7. Woodlots: woodlots nini nocikurio mugunda-ini utarahuthika na utari munoru, na uria uri na mahiga maingi, woodlots nouhandwo mugunda-ini niguo unyihie ruhuho kana mugunda muinamu

8. Marking Boundaries: athomithania nimagiriirwo ni kuririkana ati miti ya TIST niyagiriirwo nigutaganio niguo ikure wega na iikare kahinda kanene.



Imwe cia njira irianjega kuri urimi, no citingihuthika thiini wa TIST ta *roton megalocarpus* and *Commiphora zimmermannii subsp*.

**Rora maundu maya niundu wa kundu kungi thiini wa Kenya:**

Kundu kuri na riera riega(kuria miti ikuraga wega)

Calliandra calothyrsus and *Morus alba* niundu wa irio cia mahiu.

Handa miti muhaka-ini niguu unyihie ruhuho na *Croton megalocarpus*, *Grevillea robusta*, *Casuarina cunninghamiana*, *Millettia dura*, *Hakea saligna*

Huthira orchards kuri miti ya matunda ta prumd, peaches na pears.

Riera ria thi kundu kuinamu kuria kahuwa gakeraga wega.

Huthira jacaranda mimosifolia mihaka-ini

Huthira *Syzygium* spp niguu kunyihia ruhuho na kuhanda njuui-ini.

Handa matunda ta *Cyphomandra betacea* (tree tomato), *Persea Americana* (avocado), *Macadamia tetraphylla* (macadamia), *Passiflora edulis* (passion fruit), *Casimiroa Edulis* (white sapota), *Annona senegalensis* (custard apple), *Psidium guajava* (guava), *Eriobotrya japonica* (loquat)

Calliandra, *Morus alba*, *Grevillea* and *Markhamia lutea*. Nimiega kuhanda niguu kugiririria tiiri. *Grevillea* nimiega ningi niundu wa kiiruru gia kahuwa

Kuria riera riri iguru na kuinamu hanini na miti mitaganu

Huthira windbreaks kugitira irio, mihakana rugiri ta *Acacia mearnsii*, *Grevillea robusta*, *Hakea saligna*, *Croton macrostachyus*, *Dombeya* spp., *Dodonaea angustifolia*, *Casuarina cunninghamiana*, and *Dovyalis caffra*. miti ingi ya matunda noikorwo iri miega

Ruhonge rwa urimi wa mbembe na uriithi wa mahiu Riftvalley.

Tondu mbembe nicikuraga wega handu hari na kiiruru, huthira woodlots kana windbreaks kana miti iria ikuragio kuria tiiri uramenyererwo ta *Grevillea robusta*, *Sesbania* spp., *Croton macrostachyus*, *Croton megalocarpus*, *Acacia abyssinica*, *Eucalyptus* spp., *Acacia*

mearnsii, *Casuarina cunninghamiana*, *Dovyalis caffra*, *Markhamia lutea*, *Cordia abyssinica*.

Kiririkania – ona uhandi wa miti ukirehaga mawega maguo, niwagiriirwo nikuhanda miti iria miega kuri migunda. Ririkana ati miti niicindanagira maai na irio na irio cikaga gukura wega. Caria uhoro kuma ikundi-ini na aruti wira angi.

- Makiria caria utaaro wa miti iria miega iri na miri mirumu(miti ino niikoragwo iri miega na agroforestry tondu miri yayo icindanaga na irio) *Casuarina* spp., *Leucaena leucocephala*, *Cupressus lusitanica*, and *Sesbania sesban* have shallow niikoragwo na miri miega na nimiega hari guthondeka tiiri. *Eucalyptus* spp. na *Gmelina arborea* niithondekaga indo njega ciagukuria irio. Kuhandaniria miti na irio nokwage gukorwo kuru kwega miena iria itamukagira mbura nyingi.

- Resources: rurenda rweka muno ruria ruraheana uhoro wa miti iria miega thiini wa Kenya kuria unguicaria uhoro uyu ni <http://agroforesttrees.cisat.jmu.edu/>

Video:

‘Grevillea Agroforestry’ (6:26) niwonanagia mawega maingi ma urimi . Niwonanagia imwe cia njira ici ta pollardinf na coppicing <http://www.accessagriculture.org/node/895/en>

References for #8: CARE-International Agroforestry Extension Training Sourcebook. Module 6: Agroforestry Design (1989) Educational Resources Development Unit, Nairobi.

NEMA (1998) Caring For Our Environment: A handbook for local leaders National Environment Management Authority, Kampala.

Tengnäs B (1994) Agroforestry Extension Manual for Kenya International Centre for Research in Agroforestry: Nairobi.



Urimi Mwega: Kurimira na matigari ma thutha wa magetha.

Kurimira nikwega niundu wa maundu maya:

1. mimera yaku niirabatara maai, unoru wa tiiri na utheri niguo ikure wega na iri na hinya. Riia nirigucindanira indo ici na mimera . Mimera yaku nikuga igukura itari na hinya.
2. Angikorwo gwaku ti kurimire, tutambi na memenyi ingi nicikuingira kuo. O uria riia riri inini noguo gutari na uhoteteku wa gukorwo na nyoka na tutambi tungi.

Mawega ma kurimira mugunda waku:

- Mimera niikuraga naihenya tondu ndiracindanira indo na riia.
- Mimera niigukura iri na hinya na iraihe gwa kahinda kanini.
- Mimera niyamukagira riuwa wega.
- Mimera ndikoragwo ugwati-ini wa kunyitwo ni mirimu.
- Mimera ni migitire makiria kumana na utheremu wa mwaki.
- Migunda mitheru iria ikundi ciri nayo ni kionereria kiega kia TIST. Niikuguciriria arimi angi aingi moke mone wira wao.

Matigari ma thutha wa magetha.

- Ndukareke mahiu maku marie matigari ma irio thutha wa magetha ta mbembe na muhia, mboco, mahuti ma irio ingi. Na ningi ndugacine matigari maya no umonganie na umaige handu hega haria mataguthumburwo ni nyamu kana mwaki. Niguo nouhuthire matigari maya guthondeka thumu wa mahuti uria ni wega muno tondu ti fertilizer. Uhoro makiria wa uria ungithondeka thumu uyu niuheanitwo gicunji-ini kia unoru wa tiiri, no nouthomithanio ona riu.
- Angikorwo uri na matigari makiria noumatige mugunda niguo mahumbire mugunda. Matigari maya nimekubutha na mekire tiiri unoru uyu niuguo magetha magakorwo mari maingi kimera kingi.
- Angikorwo niurari na marima ma kilimo hai mwaka uyu, ndukamathike no umatige uguo niundu wa kimera giki kingi. O uria wahuthira Kilimo Hai miaka miingi, noguo tiiri waku ukwagira na magetha maingihe (na makiria ungirima urimi wa guthiururukania irio).
- Thutha wa kurimira mugunda tigrira niwanina riia kuma mugunda-ini. Ungitiga riia riu rikuu norirehe tutambi na tuthukie mimera yaku.

Kuhuthira riiko ria TIST: Niriega kuri miti. Niriega kuri andu.

Ukuhuthira riiko riri niki? Nikuri na umithio munene wa andu na miti. Umwe wa maya ni:

Kuri ahuthiria a riiko riri:

1. riiko riri nirinyihagia uhuthiri wa ngu. Ngu iria cihuthagirwo thiini wa matuku 3 na mariiko maya mangi nocihuthike na week I .
2. kunyihia uguri wa ngu.
3. Kunyihia mahinda ma gweha ngu.
4. Riiko riri rihuthagira ruku rumwe kuhuhia nyungu.ngu 3, kunyihia uhuthiri wa ngu na mahinda ma kuruga.
5. Kunyihia mitino ya miaki tondu mwaki nimuhumbire.

6. Ndogo niyumagio nja ya riiko na chimney. Kunyihia mirimu.

Kuri maria maturigiciirie:

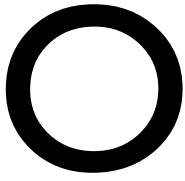
unyihu wa ubatari wa ngu uteithagia na

- I. kunyihia utemi wa miti.
- II. Kunyihia nyanjara.
- III. Kunyihia ugwati wa miiyuro ya maai.
- IV. Kugitira ihumo cia maai.

Niundu wa uguo, niwega gwitia riiko ria TIST kana urie aria mathondekagaa maguteithie guthondeka ukihuthira indo ciaku. Araniria na atongoria a cluster yaku niundu wa uhoro makiria.



Uhandi wa miti kundu kumu.



TIST igithiaga na-mbere na gukura miena yothe iria yaraga na yumaga, nitukoragwo na mathina ma gukuria

miti. Thiini wa TIST tukuragia na tugatwarithia mitaratara miega, na njira ino niituteithitie thiini wa TIST kugia na maciaro mega.

Ino ni imwe ya mitaratara ya kurumirira gukuria miti kundu kumu:

1. guchagura handu hega ha ha nathari ya miti. Mimera niiribatara kuheo maai riita I kana maita 2 hari o muthenya riria iri minini. Cagura kuhanda mimera hakuhi na mucii niguo uhuthire maai manyumba gutiriria mimera. Ukihuthira indo ciakugitira ruhuho guthiururukiria nathari yaku nigukunyihia uhuthiri wa maai na kuhe mimera kiiruru.
2. Uhariria wa tene: hariria marima ma kuhandira miti muno mweri I mbere ya mbura, iria nirigwatuka na uteithie maai kuingira tiiri-ini wega mbura yaura.
3. Geria gutega maai ma mbura niguo maai maingi makinyire miti. Miti noikure wega riria yahandwo kuria maai mageraga.
4. Ikira mahuti mugundaini niguo maige ugunyu tiiri-ini.

5. Hamda miti mugundaini wa irio. Riria wahanda miti mugunda-ini niikuraga wega tondu niiramenyererwo hamwe na irio iria iri mugunda.
6. Cagura mithemba ya miti iria ikuraga wega na riuu. Muno miti ya ki-nduire niyo miega. Kwa muhiano Melia, Acacia, na Muuku(Terminalia brownii).
7. Menyerera miti iria iri kuo na umihotihie gutherema. Miti ino mikuru iri na hinya, na noiikare gwa kahinda karaihu twamimenyerera. Niiheanaga kihumo kia mbegu cia kuhanda.
8. Tuta njoe iguru nociteithie. Riria twathondeka tuta njoe iguru, nitugiaga na mimera iri na miri iri na hinya na irakura wega. Noiteithie kuiga mimera iri na hinya thiini wa nathari niguo ikure iri minene na ikure na uraihu munene. No ona kuri o uguo tuta njoe iguru noikorwo iri njega tondu niitumaga mimera ndigakue na ihenya. Niundu wa uguo, menyerera na ugarure mimera niguo miri ndigakinye thi.

Reke tuhuthire mitaratara miega na tukurania na tuthomithanie na nitukwigwatira maundu manene thiini wa TIST.

Mazingira Bora



TIST

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

Kiswahili Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Wanachama wa Baraka TIST Cluster wakiwa kwa mkutano wa mafunzo.

Ndani ya Gazetti:

Kilimo Endelevu: Kilimo Mseto. Uk. 3

Kilimo Endelevu: Mawaidha kuhusu kupalilia na baada ya kuvuna. Uk. 5

Kutumia meko bora ya TIST: jambo zuri kwa watu, jambo zuri kwa miti. Uk. 5

Kupanda miti katika maeneo kavu. Uk. 6



Kilimo Endelevu: Kilimo Mseto.



Mada muhimu kwa kilimo endelevu ni Kilimo mseto.

Ufafanuzi: Kupanda miti na vichaka pamoja na mimea ya chakula au mifugo.

Lengo la kijumla la klimo mseto ni kuongeza uzalishaji wa ardhi kupitia matumizi ya miti. Miti ina faida nyingi kwa mkulima:

- Vitu vya ujenzi
- Kuni
- Matunda na chakula kinginecho
- Chakula cha mifugo
- Kutuliza udongo
- Rutuba ya udongo
- Kuweka unyevu
- Wind shelter
- Kiashiria cha mipaka
- Dawa
- Mapato ya kifedha
- Kupungua kwa mmomonyoko wa udongo (iwapo safu ya taka au mimea itatandazwa)

Mitindo katika kilimo mseto:

Kuna mbinu mbalimbali na zingine mpya zinazogunduliwa kila wakati. Baadhi ya mbinu hufanikiwa mahali pamoja na kuwa na maafa kwingine. Watu wanahitajika kujaribu mbinu mbalimbali na kugawana mitindo iliyo bora zaidi katika mikutano ya mafunzo. Zifuatazo ni baadhi ya mbinu zinazotumika sana sana katika kilimo mseto:

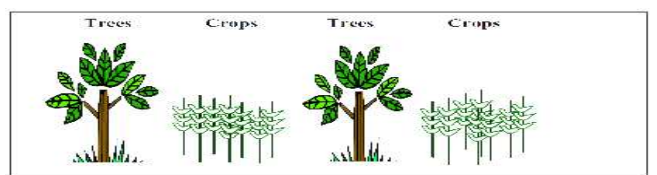
1. Nyua: Hili huhusisha kuchagua aina ya mti utakaopandwa kwa mistari na ambao una faida kwa ardhi. Nyua huhitaji nafasi ndogo, huzuia mmomonyoko wa udongo na hutengeneza majani kwa ajili ya chakula cha mifugo na matandazo. Mfano wa kutengeza ua ni kupanda miti kwa mistari ikizunguka mpaka wa shamba.

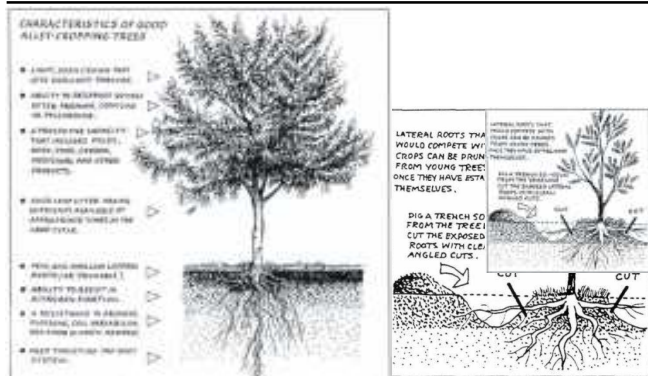
Nafasi kati ya miti inayopendekezwa ni kati ya mita moja na nusu na mita mbili. Njia bora zaidi ni kuchanganya miti mirefu na mifupi.

Kwa mfano *Croton megalocarpus* waweza pandwa pamoja na *Euphorbia tirucalli* pamoja na *Lantana camara*.



2. Kilimo mseto kwa mistari: Hili huhusisha kupanda miti iliyo na nafasi ndogo sana (nusu mita kufika mita mbili) iliyopandwa kwa mistari shamba lilivyo. Kwaweza kuwa na mistari wa miti halafu mistari miwili au mitatu ya mimea, halafu mistari mwingine wa miti, halafu mimea, na kadhalika. Mfano wa hili ni kupanda mistari ya mahindi iliyoandana na *Leucaena* au kahawa na ndizi. Miti iliyo bora zaidi ni ile ya familia ya kunde (inayoweka naitrojeni udongoni). Nafasi kati ya mistari ya miti yafaa kuwa mita tano kufika nane. Mistari hiyo ya miti yafaa kupaliliwa na kupunguzwa majani mara kwa mara. Miti hiyo isiwe mirefu au itanza kupigana na mimea ili kupata virutubisho na mwangaza. Majani yaliyokatwa yaweza kuongezwa kwa udongo ili kuongeza rutuba ya udongo. Kwa hivyo miti hii haitaweza kupata malipo ya TIST, kwani inafaa kuwekwa ikiwa mifupi, lakini itaboresha ardhi kwa kilimo na kumpa mkulima faida zingine nyingi. Baadhi ya mimea mizuri ya kupanda pamoja na mimea huweza kukua tena inapokatwa. Kumaanisha inaweza kukatwa kila msimu wa mimea ili isiwe mikubwa sana isije ikapigana sana na mimea. Mtindo huu unaitwa 'copicing' na hufanikiwa kwa baadhi ya mimea. Aina za miti hii ni *Calliandra calothyrsus*, *Cassia siamea*, *Cassia spectabilis*, *Eucalyptus spp.*, *Leucaena leucocephala*, *Markhamia lutea*. Baadhi ya miti humea tena vizuri inapokuwa change lakini haimeji tena inapokomaa kwa mfano *Casuarina spp.*, *Grevillea robusta*, *Sesbania sesban* na baadhi ya *Albizia spp.*

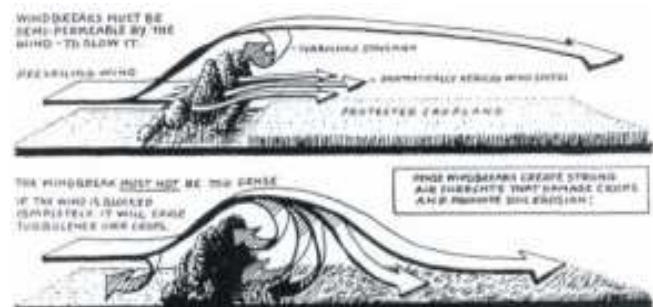
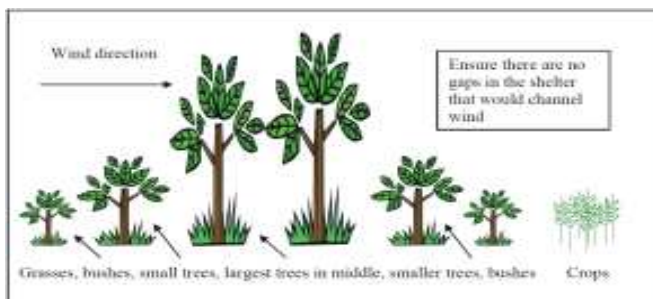




Je, wakulima wametumia jinsi hii ya kupanda miti na kulima? Kama ndivyo ni njia gani mwafaka ya kuchanganya? Wauleze wajandilieni na wakuje na majibu kwenye mkutano ujao.

Pengine wakulima wanaweze jaribu mistari kadhaa kwenye mashamba zao. Wangalie majibu. Kama majibu iko sawa waongeze mistari mingine musimu ujao

3. Kizuia upepo: Kupanda miti iliyofuatana ili kutengeneza kizuia upepo. Miti hii hulinda mimea kutokana na upepo unaokuja. Panda miti mikubwa kati kati, midogo zaidi mistari miwili inayofuata na miti mifupi, vichaka na nyasi nje. Panda ikiwa dhidi ya upepo unaokuja. Nafasi kati ya miti iwe mita nne au tano na mbili kufika nne kati ya mistari.



Faida ya viziua upepo ni kuwa mkulima si lazima hatoe shamba lote ili kupanda miti. Inachukua kipande cha ardhi na faida zaweza ongeza mazao kwa asilimia thelathini katika baadhi ya maeneo. Kumbuka kuwa viziua upepo visivyopangiwa vizuri vyaweza kuharibu mimea kwani vinaweza kupitisha upepokupitia nafasi. Tafuta mtu aliye na ujuzi kukusaidia kupangia kizuia upepo.

4. Kupumzisha ardhi:

Hapa ni ambapo wakulima huacha kupanda mimea kwa kipande cha ardhi na kuiacha miti kumea ili kusaidia kurejesha rutuba ya udongo. Ni miti mifupi inayoweza naitrojini udongoni inayochaguliwa mara nyingi kwa mfano *Sesbania* spp. na *Gliricidia sepium*.

5. Kuchanganya mimea na miti: Hili huhusisha kupanda miti yenye nafasi kubwa kati kati ya mimea. Miti mizuri ni isiyo na matawi mengi na inayoweza naitrojini udongoni.

6. Kuboresha pahali pa kulisha mifugo: kuchunga miti iliyo katika ardhi ya kulisha mifugo ili kukupa kuni na chakula cha mifugo. Kwa mfano, katika maeneo kame fikiria kupanda *Acacia tortilis* ama baadhi ya miti ifuatayo: *Salvadora persica*, *Cordia sinensis*, *Acacia eliator*, *Ziziphus mauritiana*, *Acacia albida*, *Acacia nubica*, *Acacia Senegal*, *Hyphaene compressa*.

Katika maeneo mazuri zaidi, kulingana na urefu juu ya ziwa, panda *Leucaena leucocephala*, *Sesbania sesban*, *Calliandra calothyrsus* na *Leucaena diversifolia*.

Fikiria kuhusu malisho ya nyongeza kutumia majani (asili mia kumi na tano kufika ishirini ya malisho) wakati wa ukame ya mifugo wako.

7. Misitu midogo wa miti:

Miti mifupi yaweza kupandwa katika maeneo yasiyotumika au yasiyozalisha, kwa mfano miti ilipondwa katika eneo lenye mawe yaliyojitokeza juu na katika mitaro. Miti mifupi pia yaweza kupandwa katika ardhi yenye mimea kufanya kazi ya kizuia upepo, ama yaweza kupandwa katika ardhi iliyopumzishwa.

8. Kuashiria mipaka e.g. *Croton megalocarpus* na *Commiphora zimmermannii* subsp.



Wanaofunza, jua kuwa miti ya TIST inapewa nafasi nzuri ili ikue inavyofaa na ikae ardhini kwa muda mrefu. Baadhi ya mbinu za kilimo mseto zilizo hapo juu ni mitindo bora zaid ya kilimo lakini miti haitaweza kupata malipo ya TIST.

**Fikira zingine za kujaribu katika baadhi ya maeneo ya kiasiri Kenya.**

Miteremko iliyo katika maeneo ya urefu mkubwa yenye udongo wenye acidi (kwa mfano ambapo majani chai hukua vizuri).

Fikiria kupanda *Calliandra calothyrsus* na *Morus alba* kupata chakula cha mifugo.

Kupanda mipaka na vizuia upepo fikiria miti kama *Croton megalocarpus*, *Grevillea robusta*,

Casuarina cunninghamiana, *Millettia dura*, *Hakea saligna*.

Kwa matunda fikiria miti ya bustani (kama plums, peaches, pears).

Miteremko iliyo maeneo yenye urefu mdogo (kwa mfano ambapo kahawa hukua vizuri)

Fikiria kupanda *Jacaranda mimosifolia* kama mti wa kutengeza mipaka

Unweza panda *Syzygium* spp. Ili kuzuia upepo au kando ya mikondo ya maji.

Fikiria kupanda miti ya matunda kama *Cyphomandra betacea* (tree tomato), *Persea americana* (avocado), *Macadamia tetraphylla* (macadamia), *Passiflora edulis* (passion fruit), *Casimiroa edulis* (white sapota), *Annona senegalensis* (custard apple), *Psidium guajava* (guava), *Eriobotrya japonica* (loquat).

Calliandra, *Morus alba*, *Grevillea* na *Markhamia lutea* ni miti mizuri ya kupanda katika maeneo unayotaka kudhibiti mmomonyoko wa udongo (miundo ya kuhifadhi udongo).

Grevillea ni mti mzuri wa kuipa mimea ya kahawa kivuli

Maeneo tambarare yaliyo na urefu mkubwa, yenye ardhi iliyo na mteremko mdogo na miti michache:

Kama vizuia upepo ili kulinda mimea yako, miti ya mipaka na nyua zilizo hai fikiria miti kama *Acacia mearnsii*, *Grevillea robusta*, *Hakea saligna*, *Croton macrostachyus*, *Dombeya* spp., *Dodonaea angustifolia*, *Casuarina cunninghamiana*, and *Dovyalis caffra*. Baadhi ya miti ya matunda inayokua mahali penye joto la kawaida yaweza kukua vizuri. Mfumo wa mahindi na maziwa katika bonde la ufa kwa sababu miti haikui vizuri chini ya kivuli, fikiria miti mifupi ama vizuia upepo au miti inayopandwa katika mfumo ya kuhifadhi udongo kwa mfano

Grevillea robusta, *Sesbania* spp., *Croton macrostachyus*, *Croton megalocarpus*, *Acacia abyssinica*, *Eucalyptus* spp., *Acacia mearnsii*, *Casuarina cunninghamiana*, *Dovyalis caffra*, *Markhamia lutea*, *Cordia abyssinica*.

Kumbuka

Kumbuka kuwa ingawa kupanda miti huleta faida nyingi unahitajika kutafiti kuhusu aina bora zaidi kwa aina maalum ya ardhi yako. Kumbuka kuwa miti hushindana na mimea kupata maji na mimea mingine haipendi kivuli kingi, kwa mfano. Pata taarifa kutokana na vikundi vidogo vilivyo karibu nawe na wafanyikazi katika sekta ya kilimo.

- Pata ushauri sana sana kuhusu aina ya miti inayofaa iliyo na mizizi inayofika chini zaidi na yenye mizizi ya juu michache (miti hii ina faida katika kilimo mseto kwa sababu mizizi ya juu hushindana na mimea). Mizizi ya *Casuarina* spp., *Leucaena leucocephala*, *Cupressus lusitanica*, na *Sesbania sesban* have shallow yaweza kuwa bora kwani inatuliza udongo katika maeneo yanayohifadhiwa. *Eucalyptus* spp. na *Gmelina arborea* hutengeneza misombo inayozuia mimea kukua.
- Kupanda mimea pamoja na miti haifanikiwi san asana katika maeneo yanayopata mvua isiyozidi milimita mia nane kila mwaka.

Marejeo:

Kuna tovuti inayosaidia sana iliyo na maelezo kuhusu miti mwafaka kwa kilimo mseto katika Kenya. Waweza kutafuta maelezo kuhusu miti maalum. Ipo hapa:

<http://agroforesttrees.cisat.jmu.edu/>

Video

'Grevillea agroforestry' (6:26) hukupa utangulizi kuhusu faida kadhaa za *Grevillea* katika miseto ya ukulima. Inaeleza baadhi ya taratibu katika usimamizi kama kukata vichwa na kukata miti kabisa. <http://www.accessagriculture.org/node/895/en>

8. Marejeo

CARE-International (1989) *Agroforestry Extension Training Sourcebook*. Module 6: *Agroforestry Design*. Educational Resources Development Unit, Nairobi.

NEMA (1998) *Caring for our environment: A handbook for local leaders*. National Environment Management Authority, Kampala.

Tengnäs B (1994) *Agroforestry Extension Manual for Kenya*. International Centre for Research in Agroforestry: Nairobi.



Kilimo Endelevu: Mawaidha kuhusu kupalilia na baada ya kuvuna.

Kupalilia ni muhimu kwa sababu zifuatazo.

1. Mimea yako huhitaji maji, virutubisho vya udongo na mwanga ili kuongeza nguvu. Kunapokuwa na magugu, yatashindana na mimea yako kupata vitu hivi. Magugu yatatumia virutubisho na maji yanayohitajiwa na mimea yako. Mwishowe mimea yako itapunguza nguvu na yaweza kushindwa kuishi.
2. Iwapo eneo lako halijapaliliwa wadudu watakutwa kuja katika eneo hilo. Wadudu waweza kuharibu na kuuha mimea yako. Jinsi magugu yalivyo machache ndivyo kutakuwa na nafasi iliyopungua ya kuwa na nyoka na wadudu.

Zinazofuata ni baadhi ya faida za kupalilia mashamba yako:

- Mimea hukua kwa upesi zaidi kwani magugu hayachukui virutubisho na maji kutoka kwa udongo
- Mimea itakua zaidi kinguvu na kuwa mirefu zaidi kwa wakati mdogo
- Mimea yaweza kupata mwanga bila ya kufunikwa
- Mimea haijawazishwa kwa magonjwa mengi
- Mimea hulindwa zaidi kutokana na kuenea kwa moto
- Mashamba safi huonyesha kuwa kikundi kinayachungu na mifano mizuri katika mradi wa TIST. Hili litavuta watu kuja na kuona kazi yenu.

Mawaidha kuhusu baada ya kuvuna.

- Usiache mifugo ile mabaki ya mimea kama ya mahindi au mtama, maharagwe, majani ya kunde, majani ya njugu na kadhalika. Pia usiyachome mabaki hayo. Badalake, wafaa kuyakusanya na kuyaweka mahali pazuri ambapo hayatasumbuliwa na wanyama au moto. Sababu ya haya ni ili uyatumie mabaki kutengeza mbolea, ambayo ni mbolea nzuri sana ya kiasiri.
- Iwapo una mabaki kuzidi yanayotosha yaache shambani ili yafunike shamba lako. Mabaki ya mimea huoza na kurudisha virutubisho vizuri udongoni na kuhutayarisha kwa msimu unofuata wa kupanda.
- Iwapo ulikuwa na mashimo ya kilimo hai mwezi huu, usiyafunike lakini uyaache yakiwa wazi na tayari kwa msimu hujao wa kupanda. Jinsi miaka uliyotumia mbinu ya kilimo hai shambani mwako inavyoongezeka ndivyo udongo wako unavyoboreka na mavuno utakayopata yanavyoongezeka (na pia ni bora zaidi iwapo unaweza kubadilisha mimea unayopanda katika shamba hilo).
- Unapopalilia eneo hilo hakikisha umetoa magugu kutoka shambani. Unapochua magugu yaliyokufa shambani karibu na mimea, yanaweza kuvuta wadudu na magonjwa yanayoweza kuumiza mimea yako.

Kutumia meko bora ya TIST: jambo zuri kwa watu, jambo zuri kwa miti.

Mbona utumie jiko bora? Kuna faida nyingi kwa watu na kwa miti. Hapa ni faida chache:

Kwa anayetumia jiko bora:

- I. Meko bora hupunguza utumizi wa kuni. Kuni zinazotumika siku tatu katika jiko jadi zaweza kutumika wiki mzima katika jiko bora.
- II. Hupunguza gharama ya kununua kuni.
- III. Huokoa masaa yanayotumika kutafuta kuni.
- IV. stove uses one piece of wood to heat up to three pots, saving time and firewood. Jiko hutumia kuni moja kupika vyungu vitatu, kwa hivyo kuokoa wakati na kuni.
- V. Hupunguza ajali za moto, kwa sababu moto umefunikwa.
- VI. Moshi hutolewa nje ya chumba kwa kutumia chemni. Hili hupunguza shida za kiafya

zinazoambatana na moshi, kwa mfano shida za kupumua.

Kwa mazingira:

Kupungua kwa mahitaji ya kuni husaidia-

- I. Kupunguza ukataji miti.
- II. Kupunguza kuenea kwa ukavu.
- III. Huzuia uharibifu wa mafuriko ya ghafla.
- IV. Hulinda rasilmali za maji na maeneo maji yanapozana .

Hivyo basi, ni muhimu kuuliza wajenzi wa meko katika TIST kukusaidia kujenga moja kwa gharama ya chini, mkitumia vifaa vilivyopo katika eneo lako. Pia waweza kunua jiko lililo tayari kutumika kutoka kwa TIST. Ongea na watumishi wa cluster yako ili kupata maelezo zaidi.



Kupanda miti katika maeneo kavu.

Jinsi TIST inavyoendelea kutamba katika maeneo yaliyo na uwezo mkuu na makavu, inakumbana na changamoto katika kuishi kwa miti. Katika TIST sisi huanzisha na kugawana mazoezi au njia bora za kufanya mambo, na hili limetusaidia kila wakati katika familia ya TIST kupata matokeo mazuri.

Hapa chini ni njia chache bora tunazoweza kujaribu tunapanda miti katika maeneo kavu:

1. Uteuzi wa mahali pa kuanzisha kitalu chako. Miche itahitaji kuwekewa maji mara moja au mbili kila siku ikiwa michanga. Fikiria kuweka miche yako karibu na nyumba ili uweze kutumia maji yanayotumika nyumbani kuimwagia. Kutumia miti ya kupunguza upepo kutapunguza matumizi ya maji na itaipa miche yako michanga kivuli.
2. Maandalizi ya mapema: Andaa mashimo ya kupanda miti mwezi mmoja kabla ya mvua kuanza ikiwezekana, shimo litapasukapasuka na ili litasaidia maji kuingia udongoni kwa urahisi kunaponyesha. Mvua wa kwanza ukishaanguka, panda miti na ujaze shimo kwanza na udongo wa juu halafu mbolea.
3. Jaribu kutumia njia za kushika maji ya mvua ili maji mengi zaidi yaweze kufikia miti. Miti pia itaweza kuishi ukiipanda karibu na maji yaliyopo kila msimu.
4. Kufunika ardhi: Funika ardhi baada ya kupanda miti. Hili litasaidia kuzuia kupotea kwa maji kwa sababu kunapunguza kubebwa kwa maji na jua. Kutumia boji kutaongeza virutubisho udongoni, lakini kufunika kwa mawe pia kwaweza kuleta faida zingine katika maeneo yenye mawe.
5. Kilimo mseto: Tujaribu kilimo mseto. Kiwango cha kuishi cha miti iliyopandwa katika mashamba ni juu zaidi ya iliyopandwa misituni na vichakani kwa sababu itatunzwa na ipo katika udongo bora.
6. Chagua aina inayokua vizuri katika maeneo kavu. Mara nyingi miti ya kiasili iliyotoka eneo linalozingira huweza kuishi san asana. Mifano ni *Melia*, *Acacia seyal*, na *Muuuku (Terminalia brownii)*.
7. Linda miti iliyopo na uiruhusu kuzaa. Miti hii iliyopo ni yenye nguvu na yaweza kuishi katika misimu iliyo na ugumu tunapoilinda. Inatupa chanzo la mbegu zilizozea eneo hilo pamoja na kivuli na vinginevyo.
8. Vitalu vilivyoinuka vyaweza kusaidia. Tunapoanzisha vitalu hivi, tunapata miche yenye mizizi yenye nguvu kwa hivyo itaishi. Vinaweza pia kusaidia kuweka miche kwa muda mrefu zaidi katika kitalu ili iwe mikubwa na yenye nguvu. Hata hivyo, vitalu vilivyochimbiwa vyaweza kuwa chaguo nzuri kwa sababu vinafunikia miche na vinapunguza kufa. Hapa, kuwa mwangalifu na ugeuze miche kila baada ya wakati Fulani ili mizizi isimee na kuingia udongoni.

Tutumieni njia bora zaidi tulizonazo, na tutengeze na kugawana na wengine ili tuweze kufikia matokeo mengi na kusaidia TIST kukua katika maeneo yetu.

Mazingira Bora



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Kikamba Version

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Wanachama wa Baraka TIST Cluster wakiwa kwa mkutano wa mafunzo.

Inside:

Uimi kana ndilikasa ya kuendee. Page 2

Ndilikasa ya kuendee: Kililikany'o kya Kuimia na Itina wa uketha. Page 5

Kutumia maiko mongele uso ma TIST: Ni maseo kwa andu na nimaseo kwa miti. Page 5

Kuvanda miti isioni ila nyumu. Page 6



Uimi kana ndilikasa ya kuendee.



Nima ya miti la liu Kilungu kya vata kya uimi na ndilikasa ni nima ya liu na miti.

Ualyulo: Kuvanda miti, ikuthu vamwe na liu kana mimea na kana ndithya ya indo Mwolooto wa nima ya miti na liu yithiawa na mwelekelo umwe ula ni kwongela w'umi wa kitheka kwa nzia ya kutumia miti.

Miti yithiawa ya vaita mwingi kwa muimi ta:-

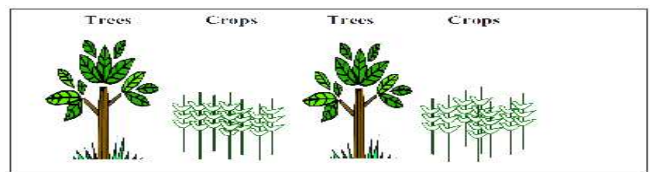
- Miti ya kwaka
- Ngu
- Matunda na liu
- Uithyo / Wovo
- Kulumya mbithanga
- Kwongela muthanga unou
- Kwikalya kimeu
- Kusiia kiseve
- Kwikia muvaka
- Ndawa
- Kuete mbesa
- Kuola kukuwa kwa muthanga.

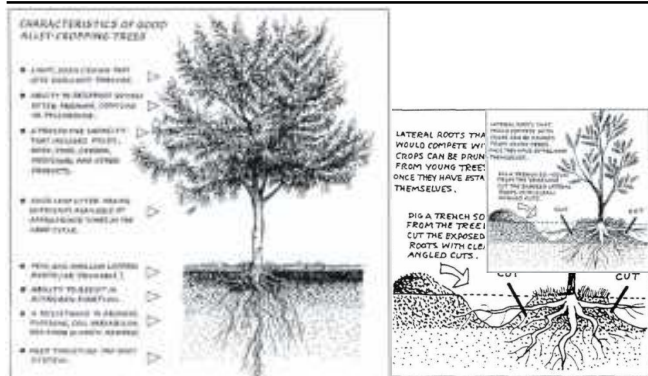
Nzia sya uvandi na uimi wa miti na liu; Kwi nzia mbingi ila iatiawa na kwi ona ingi nzau. Nzia imwe ni nzeo kwa isio imwe na nithuku kwa isio ingi. Andu nimendaa kutata nzia kwiana na kisio kila mai na kuete ona nzia ingi nzau na kwona nisyiva syaile kisio kyoo, ingi nimaile kwonasya ala angi yila mena mbumbano undu wa nzia ithi. Vaa ve nzia imwe ila itumiawa kaingi nthini wa nima ino:-

I.Wiio: Nzia ino yendaa ukamba usakua muthemba wa miti ula wavandwa lainini wikaa nesa na unengae muthanga vaita. Wiio wendaa kisio kinini, nusiiia muthanga kukuwa, niwumasya matu ma liu wa indo na kuvwika muthanga. Ngelekany'o ni kuvanda miti ithyululukitwe kiwanza ta muvaka. Miti ino niyaile uvandwa na utaaniu wa 1.5 - 2m. Kingi wiio withiawa museo yila wavanda miti miasa na mikuvi ivulene ngelekany'o Mithulu na ndau kana mutavisi.



2. Kuvanda mitauni:- Nzia no yendaa kuvanda kwa misitali ithengeanie tanyusu itambya kuvika matambya eli. No uvande mutau wa miti, mitau ili kana itatu ya liu ngelekany'o mutau wa mbemba mutau wa lusina kana maiu na kaawa. Miti ila miseo ya uvandaniw'a na liu ni ila inengae muthanga nzeve ya nitrogen. Utaaniu wa miti waile matmbya 5 - 8(m). Utaaniu niwaile kwika uyiimwa na iisewa nikana ndikasindane na liu undu wa unou na kyeni. Matu ala masewa no mavulanwe namuthanaga kuete unou kana makanengwa indo ta liu. Kwoou miti ino nundu niseawa ndikaasave muno ndithiawa yaile kwondu wa nima ya ndivi nthini wa TIST onakau nimiseu niseuvasya mawithyululuko undu wa nima nzeo na kwithiwa yi ya vaita kwa muimi. Miti imwe ila ivanda mitauni yithiawa nzeo nundu nithongooa nesa na kwoou noyithiwe itemwe kila mbua nikana inenge mimea/liu nzeve nesa. Nzia ino yithiwa nzeo na mithemba imwe ya miti ta Cassia siamea, Cassia Spectabilis, musanduku, Lusina, Kyoo miti imwe niyithiawa miseo ila mini no yeananga withiaa ndivandaniw'a na kindu nayo nita Mvinje, mukima / muvaliti, munyongo na Albzia spp.

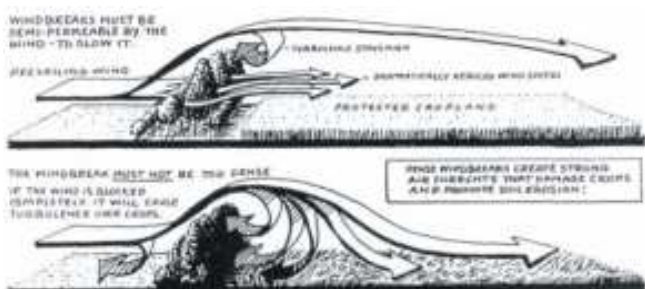
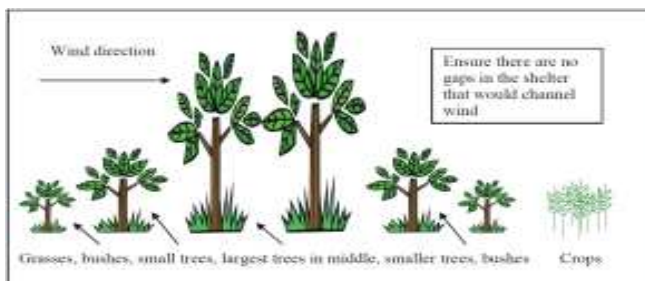




Ve muimi waatumia nzia ino ya kuvanda miti na liu vamwe? ethiwa evo, ni miti na liu wiva syeekie nesa syavandaniw'a? Makulye mamunenge uvoo iulu wa kila mamanyie kumanana na mbanda ino na muyuka na umanyi uyu ila ingi kukwithiwa na mauvundisyo.

Imwe aimi no matate kwa kuvanda mitau o minini niundani yoo na kwona kana vena kivathukany'o na mbua ila ingi.

3. Kusiia kiseve: Kuvanda miti laini itaanie nisiiaa kiseve. Uu naw'o nusiiiaa mimea/liu kumana na kukomwa ni kiseve na kwanangika, Vanda miti ila minene kati, miti ila mini iatiioe lainini usu ungi, na ikuthu na nyeki iyatiia. Vanda isiie kiseve. utaanu wa laini sya miti waile ithiwa wi 4-5m na 2.4m katikati wa miti ila yi lainini.



Useo wa kuvanda miti ya kusiia nzeve nundu muimi ndeithiawa ayumya kisio kinene kya muunda kuvanda miti no viata wa miti ino niwonekaa na ukatuma withiwa na ngetha nzeo nundu kiseve kila kitonya kwananga liu nikisiie. Ingi miti ya kusiia nzeve yavandwa nai nitonya utuma liu wangika nundu ethiwa nzeve yeelekelw'a ngali ila itaile kana mwina mwanya nzeve itonya ulikila nitonya kwananga mimea. Sisy mundu wisi undu miti ya kusiia nzeve ivandawa autetheesyethiwa wienda uvanda miti ya kusiia nzeve.

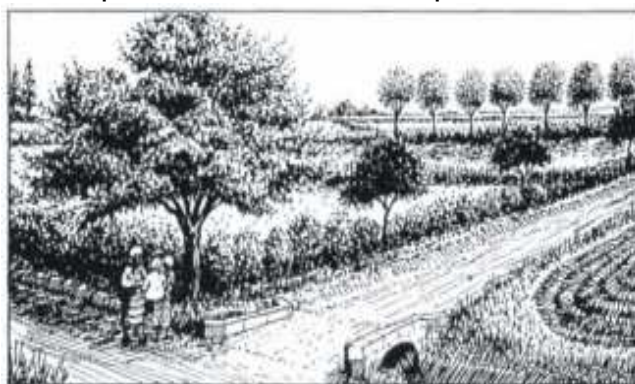
4. Kutiia uvanda:- Vaa ni vala muimi wambaa ukilila mbia siana una ate kuima kisio kina kya muunda na ayieka ikuthu iimea nikana muthanga utunge unou. Kana nutonya uvanda ikuthu ila syongelaa muthanga nitrogen ta munyongo na wuti.

5. Nima ya Kuvulany'a: vaa ni vala muimi uvandaa miti na liu vamwe indi miti uyithia ivanditwe mataila. Miti miseo ya nima ino ni miti ila ietae muunyi na kwongela unou wa muthanga. Uvoo mbeange kilunguni kingi.

6. Kwailya kisio kya ndithya: Kusuvia miti kisioni kya ndithya nikana wongele uithyo/ wovo na ngu. Kwa ngelekany'o kundu kula kumu miti ya imwea na isemei kana imwele, ivoa, muthiia, kyaiki, mulaa, kilului nimiseo nundu matu mayo ni maseo kwa kwa liu wa indo yila kwi thano.

7. Kuvanda miti ta tukuthu:- Kuu ni kuvanda miti mingi vandu vamwe tusio tusio tula twavandwa liu tutekaa nesa na no ivandaniw'e na liu ngelekany'o kuvanda muundani vala vakue ni kiw'u na kuu utee uivanda liu. ingi miti ino nisiiaa nzeve. Miti ino no ivandwe vandu vamosu kuseuvya muthanga wavo.

8. Kwikia muvaka: ngelekany'o Mithulu kana commiphora zimmermannii subsp.



Amanyisya, lilikanai kana miti ya TIST niyaile ithiwa itaanw'e undu vaile nikana yiane na kwikala kwa ivinda yila yaile. Nzia imwe kati wa ila ineenewe vaa iulu ni nzeo kwa nima ya uvandi wa miti na liu kana ndithya yoka na iitonya utumika kwa nima ya TIST ya ndivi.

**Mawoni angu ma kusisya nundu wa mbua isioni imwe sya Kenya.**

Isio ila syi iimani syithiawa na muthanga wina asiti mbingi (kula maiani mekaa nesa)

Sisya kuvanda Calliandra Calothyrsus na Morus alba kwa uithyo wa indo.

Kwa muvaka na kusii kiseve vanda Mithulu, Mikuvulya, Casuarina Cunninghamiana, Millettia dura kana Hakea saligna.

Kwonda wa matunda vanda miti ite uthui ta Ndunda, Ndula kana mapeasi.

Isio ila syinthe (ta kula kaawa kekaa nesa)

Sisya uvande jacaranda Mimosifolia mivakani Kwa kusii nzeve na w'umo wa kiw'u vanda mumba-aume/kisambalau.

Kwonda wa matunda vanda kitanda, kiluma, kivakato, kikandania, kikundi, casimiroa. Edulis (white sapota), Annona senegalensis (custard apple), ivela, na Eriobotrya japonica

Vala ukwenda usiia kukuwa kwa muthanga no uvande Calliandra, Morus alba, Grevillea na Markhamia.

Mukima ni muti museo kwa muunyi wa kaawa.

Kundu kula kwiiulu muno na kwikitheo kite kinene na miti ni minini.

Vanda miti ya usiia kiseve na wiio ila nita Imwea, Mikima, Hakea saligna, Mithulu, Dombeya Spp., Dodoneae angustifolia, Casuarina cunninghamiana, Dovyalis caffra. Na mithemba imwe ya miti ya mitunda noyikaa nesa kuu

Memba na ndithya ya ngombe syeia nthini wa Rift Valley.

Nundu mbemba iyikaa nesa vandu ve muunyi sisya uvande na isio sya miti ithengeanie (wood lots) kana miti ya usiia nzeve undu wa kusuvia muthanga ta mikima, Sesbania Spp., Mithulu, mutundu, imwea, ndau, mithiia, ming'olola, casuarina cunninghamiana, Dovyalis Caffra, Markhamia lutea, cordia abyssinica. kililikany'o

Lilikana

Kila miti ietae na uyika ukunikili umanye muthemba ula museo kwa kisio kyaku. Lilikana miti niyuaniia kiw'u, liu na mimea na mithemba ingi ya miemea ndyendete muunyi. Osa uvoa na utao mbeange kuma kwa tukundi twaku kana kwa athukumi maitu ma TIST.

- Kwa ngelekany'o kulya muti ula withiawa na mii miliku na mii minini vaa yiulu kwonda wa uimi wa miti na liu/mimea. Casuarina Spp. Leucaena leucocephala, Cupressus lusitanica na Sesbania sesban syithiawa na mii yi vaa iulu na noyithiwe miseo kwa kusuvia muthanga kukw'a. Ndau (eucalyptus spp na Gmelina arborea niyumasya sumu ula wuaa mimea ila ingi kana ukethia ndimea.
- Nima ya kuvulanya ndikaa nesa kwa isio ila ikwataa mbua yi itheo wa 800mm kwa mwaka.

Vala utonya ukwata umanyi:

Vewna uvoa wa vata unenganitwe iulu wa nima ya miti na mimea kuma website ya Kenya foest na no wisyaisye kwisila ([http:// agroforestress.cisat.jmu.edu/](http://agroforestress.cisat.jmu.edu/))

Videos

"Grevillea Agroforestry" (mutalakwe) (6:26) Ninenganite vaita mbingi sya mutalakwe kwa muimi na nthini wa uimi. ni ileeteye undu wa kusuvia na undu utonya uvandaniw'a na liu/mimea. Wenda sisya <http://www.accessagriculture.org/node/895/en>

8. Mavuku /Kundu kwa usisya na masyitwa mamo

CARE-International (1989) Agroforestry extension Training Source book. Module 6. Agroforestry Design. Educational Resources Development unit, Nairobi

NEMA (1998) Kusuvia mawithyululuko- A kavuku ka kw'oko na atongoi ma nduani. National Environment Management Authority, Kampala.

Tengnas B (1994) Agroforestry Extension Manual for Kenya. International Centre for Research in Agroforestry: Nairobi



Ndilikasa ya kuendee: Kililikany'o kya Kuimia na Itina wa uketha.

Kumia ni kwa vata kila ivinda.

1. Mimea yaku niyendaa kiw'u, liu kuma muthangani na kyeni nikana yiane undu vaile. Ethiwa muunda wina yia niyisindanaa na mumea ula uvandite na yia yikatumia kiw'u, unou wa muthanga na kyeni kila kikwendeka ni mumea ula uvandite. Na mwisu ukeethia kana mimea yaku niyamosa na ingi nitonya kuma.
2. Ethiwa nduimite kaingi iinyu na syindu ila syanangaa mimea/liu nisyendeeaw's nivandu tavau muno. Tusamu tuu nitutonya kuaa mumea waku. Manya kana undu vandu veany'a yia now'o minyoo, nzoka, maumbi, syingolond'o na inyu ila syanangaa mimea syithiawa mbingi.

Vaa ve moseo amwe ma kuima.

- Mimea niyanaa na mituki nundu vaikindu kiusindania liu, kiw'u na kyeni nayo.
- Mimea ni kwithiwa na ulumu na nikuasava kwa ivinda inini.
- Mimea nikwataa kyeni kila ikwenda vate kusiiwa.
- Mimea nithiawa na ivuso ya ukwatwa nimauwau maingi.
- Mimea nimisuviiiku kumana na mwaki undu unyaiikaa.
- Miunda mitheu niwonany'o wa kana tukundi tunini nitwithiitwe twi ngelekany'o nzeo sya

TIST. Na kii kikathokya andu kuka kwona wia wenyu.

Ulilikany'o -Itina wa kuketha.

- Ndukaeke indo ilike muundani kuya matilyo ma mavemba/makusa ala matialaa waketha mbemba, muvya, mboso ona ndwaile uvivya. Indi kolany'a wie nesa nikana utumie kuseuvya vuu wa yiima ula ni museo kwi wakuu. undu wa useuvya vuu wa yiima niwaneenei iulu wa unou wa muthanga na ethiwa ndwaivo no uvindiw'e ingi.
- Ethiwa wina makusa /matialyo maingi ma kumangethani matie muundani nikana mavwike muthanga. Matialyo aya moa nimeutungia muthanga unou kwoondu wa mbanda mbua ila yukite.
- Ethiwa uneekite nima ya kusuvia maima ala unenzite tukamavwike maeke kwondu wa kuvanda mbua ila yukite. Oundu weeka nima ya kusuvia kaingi muundani waku now'o muthanga waku ukuseuva na ngetha kwingiva. (Na mbeange ethiwa ukavandaa uikuany'a mithemba ya kila uuvanda).
- Wamina kuima ikiithya kana niwaveta yia muundani nundu watia yia yoe ungu wa mumea niyitonya kuete tumitutu tula twananga liu kana uwau kwa mume usu.

Kutumia maiko mongele uso ma TIST: Ni maseo kwa andu na nimaseo kwa miti.

Niki kutumia maiko mena uso mwongelelee? Ve vaita mwingi muno kwa andu na kwa miti. Vaa ve amwe kati wa vaita sya utumia maiko aya

Kwa mutumii wa yiiko:-

- i.) Ni yiolaa utumiku wa ngu. Ngu itonya utumika mithenya itatu kwa yiiko ya kikamba yu niutumika kyumwa kwa maiko aya mongele uso.
- ii.) Niyiolaa utumiku wa mbesa sya kuaa ngu.
- iii.) Niyisuvia ivinda yila yitumikaa kumatha ngu.
- iv.) Niyitumiaa uku umwe kuaa mbisu itatu kwoou yisuvia ivinda na ngu.
- v.) Niyiolaa ivuso ithuku ya mwaki nundu mwaki nimukunike.

vi.) Syuki niyumaalaa nza kwa mulingoti, kwoou uyithia niyasuvia uima wa mwii ta mathina ma kuveva.

Kwa mawithyululuko.

Uoleku wa utumii wa ngu nutetheesya ku:-

- i) kuola mititu kwengwa
- ii) Kuola unyaiiku wa Mangalata
- iii) Nuolaa wanangiko ula uetawe nikiw'u kisembete (matwiku, muthanga kukuwa)
- iv) Nisuviaa w'umo wa kiw'u na mbusi.

Kwoou, ni undu wa vata kwia aseuvya ma maiko ma Tist mautetheesye kuseuvya yimwe na thooa winthi kwa syindu ila syivakuvi. Ingi no uthooe iiko iseuvye kuma kwa TIST. Neenany'a na muthukumi wa ngwatano yenyu kwa uvoo mbeange.



Kuvanda miti isioni ila nyumu.

Oundu TIST iendee kwiana isioni ila itembunu na ila mbumu, now'o kuendee kwithiwa na uito wa miti kwikala. Nthini wa TIST nitwianasya na kumanyiana iulu wa nzia nzeo, na uu nututethetye ta musyi wa Tist kukwata ueti museo.

Vaa ve nzia imwe nzeo tutonya utata kutumia tuivanda miti isioni mbumu

1. Kisio kya kivuio. kivuio nikyaile ungithwa keli kwa muthenya, Sisyawikie kivuio vakuvi vandu utonya kungithya na kiw'u kila utumia vu musyi. Uitumia kusii nzeve niikuola utumiku wa kiw'u na uimanthia muunyi kusuvia miti isu minini.
 2. Inza maima tene ta mwai umwe mbee wa mbua kwambiia, yiima yii niyikwatuka na na kutuma kiw'u kilika na nthi. itina wa mbua ya mbee kua vanda miti na uyususya yiima na muthanga wa yiulu na vuu.
 3. Tata utumie nzia ya uketha kiw'u kya mbua ta tutila na kuikiithya kiw'u nikyavikia miti. Miti ingi noyikale nakwika nesa ethiwa yandandwa vala kiw'u kisilaa.
 4. Kwikia muunyi ungu kana matu. kii nikitetheeasya kwia kimeu na kuola kukuwa kwa kiw'u ni nzeve. Kutumia vuu wa yiima nikwongeleela unou wa muthanga na ingi ithiwa vai matu ona ivia noyitumike kuvwika muthanga.
 5. Ingi tutate uvanda miti miundani nundu muti uvanditwe muundani withiawa na ivuso inene ya kwikala kwi ula uvanditwe kithekani nundu vaa muundani nusuviawa na muthanga wavo nimuseo.
 6. Nzakua mithemba ya miti ila yikaa nesa isioni nyumu kuma mawithyululukoni. Ngelekany'o ni Melia, musemei, Muuku (terminalia brownii)
 7. Nzuvia miti ila yivo noimieka iendee na kusaana. Miti ino yithiawa yi milumu na kaingi nivitukaa mawumu othe ala yeethiana namo. Yithiawa yi ya vata kunengane mbeu na ninenganae muunyi na moseo angi.
 8. Ivuio syi kitandani nitethasya. Yila twavua itandani nitukwataa mbeu yina mii milumu na niyithiawa itonya kwikala na kumiisya. Ingi noitetheesye miti kwikala kivuioni ikaneneva na kwithiwa na vinya. Ingi kitanga kii ethiwa nikiliku nokisiie sua na kiw'u kuthi na mituki. Ingi ithiwa uivindua miti yikivuioni kusuvia mii ndikamee ilike na muthangani ungu na kwanangika ivinda ya kumithamya kuma kivuioni.
- Ekai tutumie nzia nzeo ila twinasyo, twiane na kumanyianya' a ithyotho tuvukie ukwati museo na kutethye Tist kwiana isioni situ.

Mazingira Bora



TIST

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

Kipsigis Version

An Environmental, Sustainable
Development and Community Forestry
Program.



Wanachama wa Baraka TIST Cluster wakiwa kwa mkutano wa mafunzo.

Inside:

Tononetab minutik: Minetab ketik ak minutik. Page 2

Tononetab minutik: Semberet ak keset: Tinye amunee isiyek semberet. Page 5

Keboishen Cooking Stoves chebo TIST che improvenotin: Kororon en bik ak en ketik. Page 5

Minet AB'ketik en emet ne ya'mat. Page 6



Tononetab minutik: Minetab ketik ak minutik.



Ororunet: minetab ketik ak bugonok koboto minutikab imbar anan ko baetab kiyakik en kayumetab niton kotogingei minetab ketik ak rurutik asi kotes rurutik chebo emet ye kiboisien ketik.

Tinye temik kelulenoik chechak en ketik.

- Kitekseen, logoek ak omitwogik alak.
- Kinyorunen kwenik, omitwogikab tuga.
- Ngungunyek chegororon, ngetunen beek ngungunyek, tere koristo, toreti kiwotosiek.
- Kerichek, konu rabinik, tere ngungunye komoib beek.

Koborunetab minutik ak ketik.

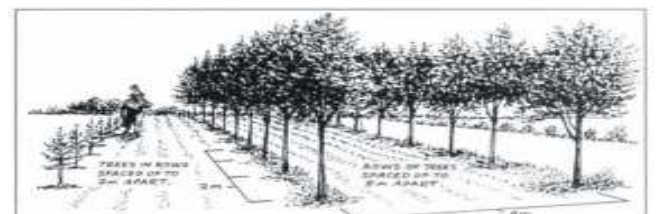
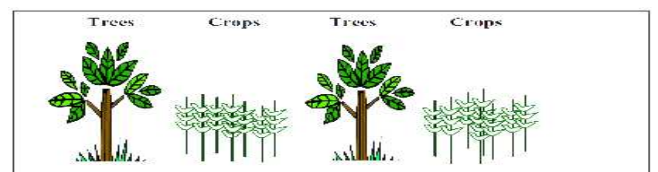
Miten kobotutik cheterchin chechang ak ortinuwek chelelachen chekinyoru en kasarta age tugul, kobowotutik alak kinyorunen kelut en komosto age ak kewelnatet en orage, kimoche biik koboisien kobotutik cheter ak kobchei en tuyosiek, cheisibu ko ortinuwek chebo.

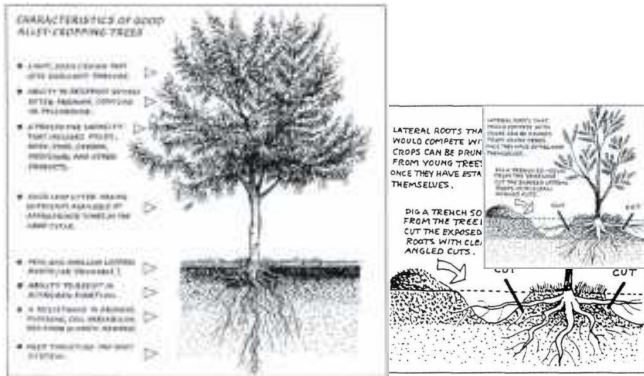
Koletab minutik ak ketik;

I. Ngotuuet: Niton kotinyegei ak lewenet nebo ketik cheichome asi imin koik ngotuuet an chetoreti imbaret, ketichuton kemin komoginge kokwoutik che mengech asi komuch koter ngungunyek ak kogonon beek ak kinyorunen omitwogikab tuga, koborunent nebo ketichu kemine en kiwoto komuti moche anyun kokwoutik kongeten 1.5-2m niton ko koborunet ne kararan komiten ketik chemengech ak chenuongen kou kelelwet ak *lantana camara*.



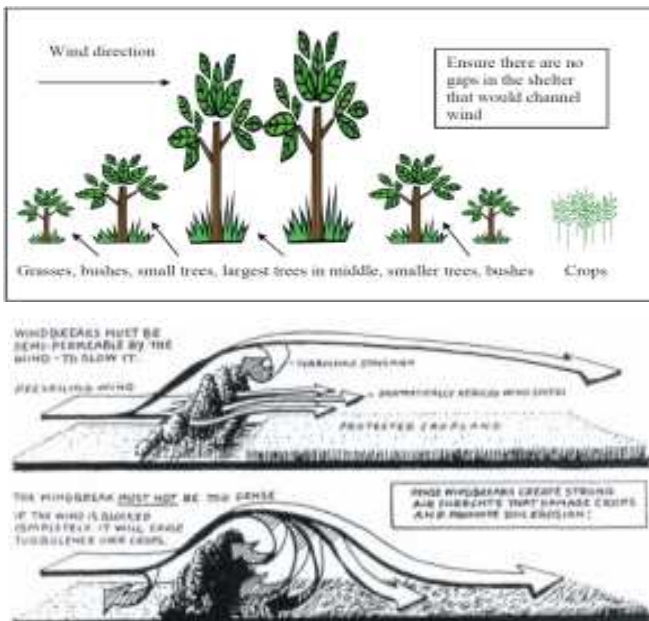
2. Ketik chetinye boronik: Niton kotinyegei ak kakwoutik chemengech (0.5-2m) en tebesindo imuchi kolainitab ketik ko oeng konebo minutik agichek ko somok kounoton en imbar korogunet ko kou bandaek ak indabibit ana ko gawek ak ndisinik, ketik anyun chegororo ko cheteche omitwogik en ngungunyek, en kokwoutik chebo ketik komosire (5-8m) en ketichun konyolu anyun kechoror en abogora asi komoegitun asi kobor chigei omitwogik ak loboiyet, sogek anyun kogochin konyor okwoiyet ngungunyek en abogora ketichon anyun komoliboni TIST amun ibe kasarta ne mingin toreti temik en tugul alak chechang, chechang en ketichu ko ingetil kongotos, niton kogochin ko moegitun koba barak, chenootin mising ko kou, *calliandra*, *cassi siameo*, *cassia spectabilis*, *eucalyptus spp*, *leucaena*, *markhamia* alak kogororon yon mengechen kou chesarur, sebesebe, *sesbania sesban*





Ara anyu miten temik che kogotiem koyai kouniton agot kogotiem konee ne kararan, ongebchei en tuiyosiek yon kitinye en abogora, asi kesuen walet

3. Tere koristo: kemin ketik chetinye kimnotet asi komuchi koter minutik en kasarta nemiten koristo ko kararan ingeminchin kwenetab imbar, kosib ketik chemengech en lainisiek oeng ak bugonok, ak susuek en komosta age, ibe kokwoutik (4-5) kongen ketit kot koit ak kokwouk (2-4m) en lainit,



toret mising temik amun nyurenen ketik chechang, toronito bo koristo komoche biik cheigen amun imuch kogon asenet agot komanai ole keminte

4. Keter imbaret amakikol: Niton komu che timik kobat imbaret ak kebagach koma kigol minutik alak tugul asi korut ketik kowegik okwoiyet ngungunyet, choton cheteche ngungunyek ko kou sesbania spp and gliricidia sepium

5. koyometar minutik ak ketik: Nito koibe kokwoutik cheboroen en minutik ak ketik asi kengalalen en kasarta ne nyone

6. Kiyagen kiyakik kotoreti: Yeimuch irib ketik en imbar inyoru ibai tuga amun inyoru kwenik ak omitwokikab tuga en komosto ne momiten robta kekole ketik kou chepnyolilok, sertuwet, chebitet, nikiruwet, chepkomon en emet ne miten robta komuche koboisien kou; callianda calothyru, sesbania, sesban ak leucaena, diversifolia, kiboisien sogek cheyomiotin keboen tugaana ko lego

7. Kimin kosibiny: En minaniton kemine ketik kosibiny en ole morutunen kii anan ole miten koik anan ko chepnyesut, toreti koter kosito ana ketem agebagach ko magigol

8. Kiyoen kinotosiek: Toretikab TIST kongen kole en minetab



ketik chebo TIST kotinye kokwouting asi konyor ketik koengitun ago cheibe kasarta negoi, kararan niton baten monyoru chekondok chebo TIST kou; kelelwet, ak commiphora zimermnii susp



Kerchinel kabwatan ak kebeberuwek chemiten en kenya;

- Korotinuwek chemiten barak ago tororen ago birir ngungunyat (kemine ketitab chaiyat)
- Kerchinen callianda calothyru ak morus aiba en bayetab tuga
- Kerchinen kiwotosiek ak koristo kou; kelewet, sebesebe, chesarur, milletia dura ak hakea saliga
- Kerchinen ketikab logoek kou; plums, peaches and pears
- Ole burgei ago chortaat ole rure kawek komie
- Kerchinen jacaranda ole kagiminen en kiwotosiek
- Kerchinen lamaiyat ye kagimin kosim oinet ak kotoreti koristo
- Kerchinen ketikab logoek kou; tree tomoto, perseia american (avocado) macadamia teraphylla, passiflora aduilus (kirintila) psidium guajara (maberiat) eriobotrya japonica (lakwat)
- Miten ketik chegororon en teretab ngungunyek kou; calliandra, morus alba, sebesebe ak markhamia lutea sebesebe ko kararan en uronok en kapchain ana en kawek

Koret nemi barak amaleike ako miten ketik che ngerin

Kerchinen ketik chetoreti minutik chemiten kiyotosiek ak ketik kou; chebitoik, sebesebe, hakea saliga, kelewet silibwet, chesarur ak logoek koyoe komie

Baetak kiyakik ak minetab bandek en rift valley.

En bandek komorure en olemiten uronok chebo ketik kou olekagiminen ketik chechang, olemiten che tere koristo, olemiten chetere ngungunyek ketik kou; grevillea robusta, sesbania spp, croton macrostachyus, kelewet, chepnyaliliet, eucayptus ssp ak corchia abbyssnica

Kibwat: yon kimine ketik ko konech kelunoik chechang ko nyolu ilewen komie chebo oleimenye, alage kogororon en minutik alak komomoche keurto onyuru konetisiek koyob kurubit anan ko en kiboitinikwok

Ketik chetinye tigitik che koen ko kororon amun motinye en baragunyin chechak nomegei niton ak minutik miten che mogororon en minutik kou; eucalyptbhus spp ak gmelina arborea

Tukuk chekonech konetisiet; Miten kou website kenyorunen ketik chegimu chekegol ak minutik en emenyon kinyorunen <http://agroforesttrees.cisat.jmu.edu/>

Videos: Gravillea aggravillea agroferesty. (6: 26) ororu mising agobo ketik ak minutik en <http://www.accessagriculture.or/node/8951/>

Ibuwotun en

8: Care:-international.

Agroforestry extension training source book module 6: agroforestry design (1989) educational resources development unit Nairobi



Tononetab minutik: Semberet ak keset: Tinye amunee isiyek semberet.

1. Moche minutik beek, omituwogik ak laboiyet asi konyor kimnotet, timndo koen minutik beek ak en let koyomdos.
2. Timndo kounye susurik che en let ko ngeme rurutik ak komeny indorok

Kororintab semberet

- Chogu rurutik amun tinye beek ak omituwogik.
- En kasarta neluach ko egitu rurutik.
- Nyoru rurutik assta .
- Monyoru rurutik mionuwek.
- Ribose rurutik itobitu ngoyonditab.
- Ye kirib mbarenikyok en sembert kogonu koborunet ne chome biik.

Okibwat yon kageges rurutik

Bogomonut mising igonor ngetunonikab rurutik igobo bandaek, ngendaek, mosogik, njuguk ak alak, konor en ole kararan asi itounen iyai kotoltoneiwek chebo imbar, ibosigei anyun karamet.

Agot itinye chechang ichobe kouni; tet kosib imbar en kokuwoutik cheigere ile yomege ak imete konunchi imbar kot koit kolset ne nyole.

Agot ko kogebal keringonikab cf go mat itub igotebi kogany kasrta ne nyone, nito kotoreti konyor ngugnunyek toltoliet, ako inyoru rurutik chewchang.

Kerine keste saratikab seberet komanda en imbar amun konori susurik che ome minutik.

Keboishen Cooking Stoves chebo TIST che improvenotin : Kororon en bik ak en ketik.

Ene asi iboishen stove che improvenotin? Tinye manufaa che chang' en bik ak en ketik. Ichochu ko alak en manufaa ichoton;

En chi neboishen stove initon:

- I. Stoves che improvenotin kobose kwenik . kwenik che kiboishen en betushek somok yon kiboishen stovit nombo kawaida, keboishen en weekit en stove ne improved .
- II. Bose alaet 'ab kwenik.
- III. Bose saishhek che kiboishen en cheng'et 'ab kwenik.
- IV. Stove inoton koboishen kwendet agenge koyo chebung'ushek somok.
- V. Bose ajalishek chebo maat, angamun tuchot maat.
- VI. Iyet koisto chimnit nemiten en stove inoton.

Inoniton kobose mionwokik che tinyege ak iyet cheu mionwokik 'ab teget.

En emet nyon:

Yon kagobosok maget 'ab kwenik -

- I. Kobose tilet 'ab osnoshek.
- II. Kobose churatet en imbarenik.
- III. Kobose flooding yon koet robta.
- IV. Kora koter ole yobu bek 'ab oinoshek.

Ingunon kobo maana keteb kegonech stove builders chebo TIST asi kotoretech keteche ageng'e en beit nemiten ng'weny, keboishen tuguk che kitinye en karibu. Kora imuche l'al stoves che chobotin en TIST .onglolchinen ak Cluster Servants asi kogonin maelekezo.



Minet AB'ketik en emet ne ya'mat.

Kotese ta TIST kotese tai en ole yamaat ak ole moginyorunen bek, Kiger komi yomutyet en sobet 'ab ketik. En TIST Kogibche kila ak kila practices che impya, ak kigo toretch niton en family nenyon nebo TIST kenyorun wolutik cheyachen.

Che isubu ko oratinwek che kimuche keboishen en emotinwek che yomyotin:

1. Lewenet 'ab ole ichoben nursery neng'unget ko kit nebo maana. Seedlings koyoche kinde bek yon kagemin. Imuche imin seedlings en ole negit ak kaa asi konyumnyumit kondeet 'ab bek. Kora kimuche iboishen windbreak en kaa koter korito komabar seedlings.
2. Preparation ne taa: Chob keringoik 'ab ketik en arawet ageng'e kotomo koit robwek, Toreti inoniton keringoik kochut pek .Yon kagoit robta neta imin ketik .Min ketik ak ikonaam ngungunyek chebo barak kosibu mbolea.
3. Yom iboishen oret 'ab harvesting bek 'ab robta, kou negarims ak micro-basins, Asi koitchi ketit beek chechang'. Kora ketik kosobtos zaidi en ole neg'it ak bek.
4. Mulching: mulchen ketik yon karimiin . inoniton kobose komoib asista anan ko koristo, beek . Kora yon kogiboishen mbolea che compost kotese rurutik, Lakini en ole miten koik kimuche keboishen rock mulching .
5. Agro forestry: ongeyom kinetge , ak keyai agro forestry . Ketik che kagimin en imbarenik kotinye nafasi newon koechegitun kosir che minotin en ole miten osnoshek ak suswek angamun riboksek komye ago nyoru ng'ung'unyek che kororon.
6. Chaguan species cherutu en korotinwek che yomyotin. Sanasan ketik chebo komosoton che indeginous ko choton che yechegitun kosir igo. Ketik cheu *Melia*, *Acacia seyal*, ak *Muuuku (Terminalia brownii)*.
7. Rib ketik che miten en inguni ak itoret icheget koregenereten . Ketichuton kogimen , ago ichek komuche kosobcho ogot en betushek che momiten robwek. Konu ichek seeds che kimuche kenyor en oret ne nyumnyum ak uronok.
8. Raised seedbeds anan ko sunken seedbeds komuche kotoret. Yon kogichob seedbed ne kitogos , kenyoru seedlings che kimen , so ingunon kosobtos. Kora kotoreti seedlings koyechegitun en petit agoik che kimen . lakini seedbed ne sunken komuche kora kogararan angamun tere asista komabar seedlings . En komositon ibwaat iwisowisi seedlings asi mochut tigitik ngweny, tun kowe chok yon kisibto.

Ongeboishen practice che kitinye, ak keendelezan oratinwechuton asi kenyorun rurutik ak koyet TIST en komoswechok.