

Mazingira Bora



TIST

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

English Version

TIST is an innovative, time - tested, afforestation program led by the participants.



Ndunguri TIST Cluster in Tharaka Nithi County during their monthly meeting last month.

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TIST: Thinning and pruning your trees for successful growth.

In general, the purpose of thinning and pruning trees is to improve individual tree health, as well as overall forest health. This is done by selecting the “best” trees in the forest to keep. For many species, including hardwoods, grevillea, eucalyptus and cypress, these are often the largest trees, each with a single, straight stem. Trees may have different needs for space depending on species, site, planting style (woodlot, incorporated into crop fields, or windbreak), and climate, but some general principles apply.

To grow strong, healthy trees, a spacing of two meters is recommended. This spacing works for many TIST trees (i.e. grevillea, and cypress), but remember some trees require more space (mango and macadamia, for example). Giving trees proper spacing helps them get enough water and nutrients to grow to their full potential. Closer spacing is acceptable when trees are young. As the trees begin to mature, some trees will be larger and more robust than their neighbors, and these best trees should be kept. Thin around the best trees to achieve good spacing.

Once you have determined which trees to remove, cut these at the base of the tree. In the weeks and months following cutting, many trees will begin to sprout from the stump. To keep the tree from coming back, cut or break these sprouts off at the base of the tree.

In general, if all trees of the same species in an area are close to the same age, the larger trees should be chosen to allow growing. Another good

indicator of tree health is the position of the crown of the tree in the canopy. Trees with crowns above the general canopy level can absorb more light than those lower down, and so can grow better. Finally, trees should have a single stem, with no major disease or rot. However, this does not mean that all small trees should be removed! Aim for a minimum of a two-meter by two meter spacing so that the trees are as large and as healthy as possible to maximize carbon capture.

When making thinning choices, remember that growth rate varies greatly by species. If a mango tree is growing near lots of eucalyptus, the mango may be far smaller and slower growing than the fast-growing eucalyptus, but it certainly should not be cut simply because it is smaller! In fact, a tree like mango is of great importance due to its usefulness in producing fruit for food and sale. Mango also is better for other crops growing in the field. Eucalyptus can make other trees and crops nearby grow poorly. It is important to remember this as you select which trees to thin. There are many uses for trees, depending upon species besides carbon capture. For example, you may want trees for shade. In this case, you should give the tree more room than usual to expose the tree to more sunlight. This will stimulate the tree to produce new branches on the main stem and on larger limbs. If you want to use a row of trees as a windbreak, keep trees in that row spaced closely together, but remove trees to either side in order to increase the “bushiness” of the trees.



Pruning

In a natural forest, trees naturally self-prune. Branches in the upper canopy shade out lower branches. As leaves on the lower branches begin to die off, so does the branch to which they are attached. Dead and rotted branches naturally fall off or are knocked off. While natural pruning may happen on TIST sites, it may be necessary, or beneficial to prune trees by hand. While each tree species requires a different pruning technique, some general principles apply to all trees as you decide which limbs to remove.

Most tree species should have a single main stem at the ground level. Trees with a single stem generally grow faster and are less prone to split during storms. If a tree with multiple stems is chosen as a crop tree, when choosing which stem to keep, generally choose the largest, but make sure it is healthy, with lots of leaves, free of rot, and relatively straight.

Many people think you should cut limbs parallel to the trunk. This is false. Cuts should be made perpendicular to the limb, slightly out from the trunk. This minimizes the amount of exposed wood, and allows the actively dividing cells in the branch collar to grow over the cut over time (see figure 3). This helps the tree to remain healthy and free of rot.

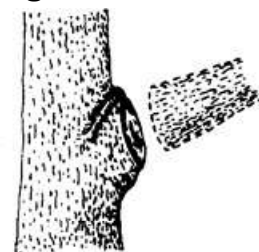
When pruning, don't be overzealous. Tree trimmings are often used for fuel wood or fodder. While this is good, remember that while pruning can improve tree health and increase growth over time, removing leaves will initially reduce the tree's ability to capture sunlight and cause stress to the tree by creating a scar, which it must heal. If you remove too many, the tree will grow slowly or may

die. After removing a limb, leave the area cut alone. Do not cover it with tar or any other material, so the tree can expel any toxic material on the wound. Don't forget that trees tend to produce new shoots near cuts from thinning or pruning. Some species do this more than others. Generally, these are very easy to remove during the first year after cutting by simply snapping off the supple shoots. Shoots will often not grow back.

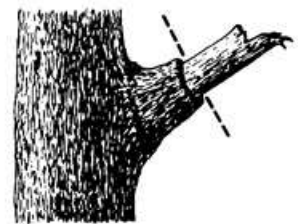
Some trees, especially fruit trees, produce better yields with multiple stems. These are cut near the base of the stem when they are young in order to stimulate new growth. Once the tree has established these new shoots, they too may be cut in order to produce more growth. This process may be repeated in order to increase the bushiness of the tree, but be sure to allow at least a few months or more between trimmings so the tree can recover from the stress caused by cutting.

Remember that to take part in the carbon market, we have to commit to keep trees for the long term. We should allow trees to grow for at least 30 years, thinning and pruning to produce useful, sustainable forests that provide us benefits for years to come. Coppiced trees may not qualify for the carbon market and so may not be counted as TIST trees.

Figure 3



Pruning cuts should be made just outside the branch collar.



On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar



TIST: Intercropping.

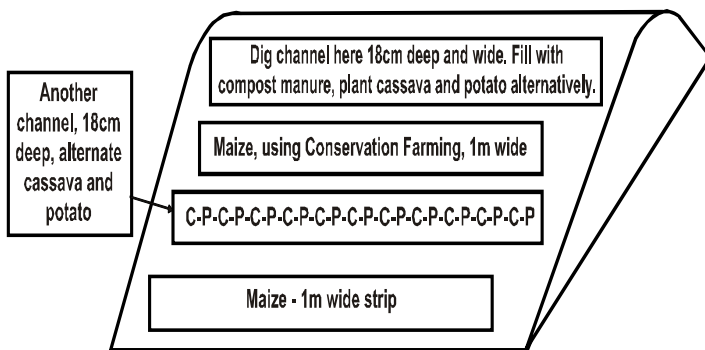
Multi-cropping is where two or more crops are grown together during a single season. With the right combinations this can help increase biodiversity on the land, increase soil fertility and reduce risk of pests and diseases.

Intercropping describes the practice where different crops are grown at the same time in the same field. It can also include growing crops with trees such as alley cropping.

Some TIST groups have tried the following technique, which is especially good for slopes

1. For the first row dig a trench 18cm deep and 18cm wide
2. Fill this trench with compost manure
3. Plant cassava and potato alternatively
4. For the next row plant a one-meter strip of maize using conservation farming holes
5. Another row of cassava and potato
6. Another row of maize, etc.

This technique uses much of what we have learned in the training: it involves using intercropping, it uses compost manure and also conservation farming.



- Try alternating rows of maize with rows of trees. Small groups have tried alternating a 3m strip of maize with a row of moringa / yellow cassia / leucaenia / bead tree trees.
- Rows of sorghum can be planted between rows of moringa or leucaenia.
- Try combinations of calliandra and bananas, calliandra and beans, calliandra and maize, maize and beans, beans and leucaenia, beans and bananas, beans and coffee (while young).
- Try intercropping cowpea with maize / sorghum or millet.

Experiment with the spacing to see what works best, and let TIST know the results.

Crop rotation ideas

Crop rotation is where farmers cycle through planting different crops over time on the same land. There is a particular order of crops followed, where the next crop chosen is from a different family than the previous one. Crop rotation can be beneficial for soil fertility as different crops have different depths of root systems, meaning the same layer of soil nutrients is not depleted year after year. This method also helps to break up the soil at different levels, which improves soil structure, and can attract different types of beneficial soil organisms.

To get the benefits of crop rotation a different type of crop must be planted in turn. This is because crops of the same type may attract similar pests and diseases, and rotating the types can reduce the risk of certain pests and diseases taking hold in the soil.

The following list categorizes crops according to groups. Crops from the same group should not be planted one after the other. Be sure to mix the groups in your rotation plan!

- Group 1: Cucumber, gourds, pumpkin, squashes, watermelon (Gourd family)
- Group 2: Broccoli, brussel sprouts, cabbage, cauliflower, collards, kale, radish, turnip, mustard, watercress (Crucifer/Brassica family)
- Group 3: Eggplant, pepper, tomato, potato (Solanaceous family)
- Group 4: Lettuce, artichoke (Aster family)
- Group 5: Maize, rice, sorghum, wheat, oat, barley, millet (Grains and cereals family)
- Group 6: Beans and peas (Legume family)
- Group 7: Garlic, leek, onions, chives (Allium family)
- Group 8: Carrot, celery, dill, parsnip, parsley (Carrot family)
- Group 9: Cassava, sweet potato, taro, yam, water chestnut (root crop family)
- Group 10: Cotton, okra (Mallow family)

If the above system is overly complicated, many farmers simplify crops to five groups to rotate between (information taken from Infonet-Biovision website):

- a) Leaf crops (broccoli, cabbages, cauliflowers, kales, spinach, etc.). They need more nutrients than other vegetables.



- b) Fruit crops (chilies, eggplants, peppers, tomatoes, etc.). They need a considerable amount of nutrients but not as many as 'leaf' crops.
- c) Root crops (carrots, beetroots, potatoes, onions, radishes, turnips, etc). They need fewer nutrients compared with leaf and fruit crops.
- d) Legumes (beans, chickpeas, cowpeas, grams, peas, pigeon peas, etc.). Their additional benefit is fixing atmospheric nitrogen into the soil.
- e) Cereals (maize, millets, sorghum etc.)

Ideas to consider:

Try planting maize and groundnuts together in year 1 and in year 2-plant sorghum. Try planting groundnuts in year 1 and then a mixture of legumes, sunflower and/or potatoes in year 2.

Another idea is to try planting maize followed by a legume such as soybeans or groundnuts. Then in the following season try a cash crop such as cotton.

Try leaving the land fallow for a whole year, then plant crops again for 3-5 years before leaving it to fallows again. This will give the land a chance to replenish its soil nutrients. Consider Napier grass for fodder if you have livestock.

In general, plant legumes before cereals. Planting crops from the Brassica family (e.g. cabbage) before and after crops from the Solanaceous family (e.g. tomatoes) can help prevent build-up of root-knot nematodes and bacterial wilt.

The following is a crop rotation idea taken from Infonet-Biovision. This takes an example of a farm with four plots covering four seasons with each season approximately 4 months.

First season:

- Plot 1: Maize / garlic / onions / or leeks
- Plot 2: Eggplant / chilies / potato / or tomato
- Plot 3: Broccoli / cabbage / cauliflower / or kale
- Plot 4: Beans / cowpeas / grams / or peas

Second season:

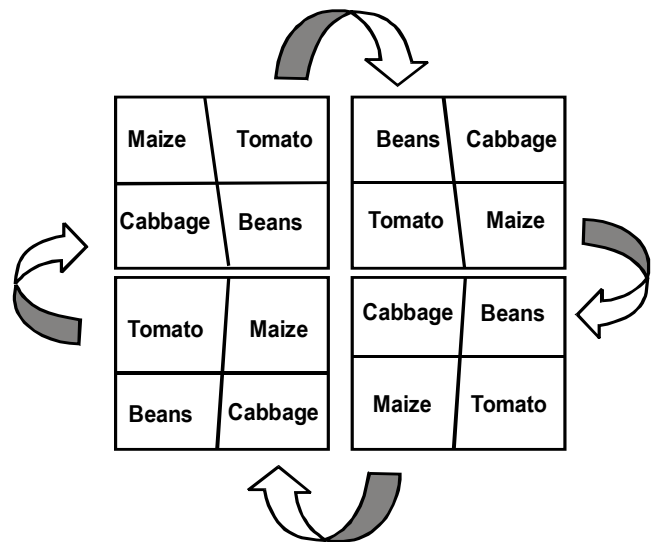
- Plot 1: Beans / cowpeas / grams or peas
- Plot 2: Broccoli / cabbage / cauliflower / or kale
- Plot 3: Eggplant / chilies / potato / or tomato
- Plot 4: Maize / garlic / onions / or leeks

Third season:

- Plot 1: Broccoli / cabbage / cauliflower / or kale
- Plot 2: Beans / cowpeas / grams / or peas
- Plot 3: Maize / garlic / onions / or leeks
- Plot 4: Eggplant / chilies / potato / or tomato

Fourth season:

- Plot 1: Eggplant / chilies / potato / or tomato
- Plot 2: Maize / garlic / onions / or leeks
- Plot 3: Beans / cowpeas / grams / or peas
- Plot 4: Broccoli / cabbage / cauliflower / or kale



Alley cropping





Preparing Compost Manure - a natural fertilizer.

Compost manure is a natural fertilizer that helps your crops grow. It is better than chemical fertilizer because it is natural, free, and will not damage crops and the environment as some chemical fertilizers can. There are many ways to make compost manure, but the following method has been useful in some areas. Ask your neighbors in your Cluster what has worked well for them.

Preparation of compost:

1. Choose an area for your compost pit measuring 4m by 4m.
2. Clean the area.
3. Dig a hole of diameter 3 - 4m and 1.5m deep.
4. Collect all the remains of the crops you have (e.g. leaves and stalks of maize, millet, beans) and cut these remains into small pieces.
5. Put these crop remains into the hole up to a depth of 0.5m.
6. Add five liters of ash.
7. Next add about 30cm (or as much as available) of animal dung (e.g. dung from pig, cow, goat or chicken).
8. Put another layer of crop leaves and stalks (0.5m).
9. Add another five liters of ash.

10. Repeat adding the leaves and stalks again until the hole is almost filled.
11. Finally add a layer of soil until the hole is filled.
12. While filling the hole with soil, put a long stick in the middle of the hole so it reaches the bottom.
13. Leave the compost pit for 90 days (three months).
14. During this period use your dirty water to water the compost pit. For example, after cleaning your house or clothes, empty the used water over the compost pit. If you have animals, you can also pour animal urine over the pit. This adds extra nitrogen to the compost.
15. Try to water the compost pit in this way every day, or whenever water is available.
16. After 90 days the manure will be ready.

Use the stick as a thermometer. When the compost is ready it should be hot and you may even see steam coming from the stick after you have removed it. Then stir all of the compost together so it is mixed well.

Use of compost:

When you have dug your holes for planting maize, millet or other crops, add one handful of your compost manure to each hole. Watch for the results!

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Kimeru Version

*TIST is an innovative, time - tested,
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Ndunguri TIST Clusta ya County ya Tharaka Nithi wakiwa kwa mkutano wao wa kila mwezi.

Inside:

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Kunyiya na kugiita miti yaku biang'i nikenda inenea na ikura bwega.

Antune anene, kunyiyia miti na kugiita biang'i, nigutethagia kuthongomia thiria ya muti amwe na thiria ya mwitu junthe. Bubuthithagua gukurukira gutaara miti iria mithongi buru ndene ya mwitu. Kiri mithemba ya miti imingi, amwe na mibao, mikima na mithithinda, iji niyo miti iria minene buru, o muti juri jumwe jutiumirite ingi rutere na jumutamburuku. O muthemba jwa muti nijwendaga mantu mwanya kulingana na muthemba, antu aria juri, uria juandi (iandi yonka, iandi gati gati ka imera, kana iandi kunyiyia ruugo) kana rera, indi kuri mantu jethagira jario kunthe.

Gukuria miti irina inya na thiiria injega nikwendekaga utarania miti bwega (Meter ijiri). Gutarania na meter ijiri nikukwega buru kiri miti imingi ya TIST (ta mibao, mikima na mithithinda), indi ririkana ati miti imwe niendaga gutarania kukunene nkuruki (ta miembe na mikandamia). Gutaarania miti bwega nikumiejaga kanya ga kukinyirwa ni ruuji na irio bing'ani, biria bitethagia miti kunenea mwanka aria ibati. Kuanda miti akui nigwitikiritue riria miti ianaki. Riria miti ikwambiria gukura, kuri na miti iria ikaneneanga na kugia inya kiri ingi. Iji niyo miti iria ibati gutigwa muundene, (Imera miti). Kiri gutaara ni miti iriku ikagitwa, tega miti iji mithongi na umenye kethira nitarenie bwega. Kethira ititarenie bwega, miti iria iri akui ikendeka kugitwa.

Warikia kumenya ni miti iriku ikugitwa, migitire nthiguru buru. Ndene ya biumia na mieri iria ikathingata, miti imingi ikambiria kuumira au gitinene. Nikenda muti jutiraume kairi, iji ikuumira niigitwe kana iunirwe nthiguru buru.

Njira imwe iria mbuthu buru kumenya kethira muti nijubati kugitwa ni gutege uria jung'ana

ugiteganagiria na miti iria iri akui ya ukuru o ja bwaju. Ririkana ati gukura kwa muti gukaringana na muthetu, ruuji na jangi jamaingi. Antune aria anene, kethira miti yonthe iria iri amwe iri na ukuru akui bumwe, miti iria minene niyo ibati gutaarwa gutigwa muundene. Gintu kingi kiria umbaga gutege thiria ya muti nakio ni aria mathangu jaria maingi ja muti jou jari wateganiria na ingi. Miti iria iri mathangu jamaingi iguru ria miti ingi niumbaga kujukia weru bubwingi nkuruki ya iria iri nthiguru na kwou igakura bwega nkuruki. Kuthiria, miti iria igutigwa no mwanka iithirwe iri imitamburuku itiumiriite ingi rutere na itina mirimo kana kurota. Indi bubu ti kuuga ati miti yonthe iria itinenenei igitwe. Muntu nabati gutegeera gutarania kwa meter ijiri nikenda amenya miti ikunenea na yagia thiria injega buru nikenda ruugo rurwingi ruruthuku rumba kujukua.

Riria ukuthithia mantu jau jariau iguru, rikana ati gukuranga kwa muti ni mwanya mono kiri mithemba mwanya ya miti. Kethira muembe jurikura akui na mibao imingi, muembe nojwithirwe junii mono na jugikuraga gapori nkuruki ya mubao juria jukurangaga, indi jutibati kugitwa nontu niju munini! Kwaria mma, muti ta muembe ni muti kimera juria juri bata niuntu bwa utumiki bwaju ja kuejana irio. Kurina utumiri bungi bubwingi bwa miti, kulingana na muthemba, tutigutara kugwatia ruugo ruruthuku. Mung'uanano, muti nojwendekere niuntu bwa kirundu kiaju. Antune aja, nubati kua muti kanya nkuruki ya ingi nikenda jukinyirwa ni riu, riria rigatuma muti jugia biang'i bibieru kiri gitina na kiri biang'i biria biri iguru. Ukenda gutumira miti kunyiyia ruugo, nubati kumenyeera ati miti iu iri lainine nikwaniritie, indi rita miti nteere cionthe nikenda juumba kwingiyia mathangu na biang'i amwe.



Kunyyia mathangu

Ndene ya mwitu jwa kuuma jungwa, miti nicinyiagia mathangu yongwa. Biang’i biria biri iguru buru nibigwithagia biang’i biria biri rungu. Ouria mathangu jakuuma kiri biang’i bia nthiguru nou kinya kiang’i kiria mathangu jau jari kiendeleagaa kuuma. Gukurukira kugaruka kwa rera ya ntuku, biangi biria bikuite na biria biori bikagua kana bigwithue. Kinya kethira miti nicinyiagia mathangu yongwa miundene ya TIST, kwethira kubui kana kurina gitumi kunyyia mathangu na njara. Riria ukuthuura ni biangi biriko ukugiita, nubati kuthingatira mantu jamakai. Kinya kethira o mthemba jwa muti nijwendaga njira mwanya ya kunyyia mathangu, mantu jamwe nijathithagua kiri miti yonthe.

Mithemba imingi ya miti nibati kwithirwa irina gitina kimwe nthiguru. Miti iria irina gitina kimwe niyo ikurangaga na itiunikangaga igita ria ruugo kana ngai inyingi. Muti jurina itina bibingi jwatarwa gutigwa muundene, kurina mantu jamaingi jaria uumba gutegeera riria ugutara ni gitina giku ugutiga. Ja uria uumba kuthugania, gitina kiria kinene nikio kibati gutarwa gutigwa. Kwongera, gitina kiu kithirwe gitikurota, kionanie kiri na thiria (ta kithirwe kirina mathangu jamaingi), na kithirwe gitamburuki.

Gintu kimwe kithuganagirua uria gitibati niati nuubati kugita kiang’i, winami bwa gitina. Bubu ni urongo. Ubati kugita uumarite bwa ome ya gitina. Njira iji ninyiagia antu aria ugukunura na igetikiria muti juumba guciorangia kironda nyuma ya igita. (Tega Mbicha I), untu buria butethagia muti gukara juri na thiria na jutikwoora

Riria ukunyyia mathangu ukenda kuthithia uju mono. Biang’i na mathangu jaria jagitagwa nijatumagirwa mono ja nkuu kana iria. Kinya kethira bubu nibwitikiritue buru, rikana kunyyia mathangu nogutethie kuthongomia thiria ya muti na kujuneneangia igitene, indi kurita mathangu

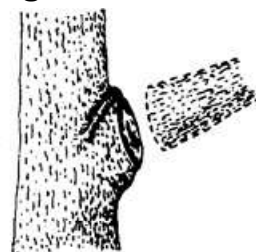
gukamba kunyyia kuumba kwa muti kugwatia riuu na nogutume muti jukaga inya nontu bwa kujwikira kironda, kiria no mwanka kiore. Warkia kugita kiang’i, au kugita gutibati gutongwa. Ugagukunikira na gintu kinya gikari, nikenda muti jumba kurita maira kirondene. Iji noyo njira iria mwiri jwa muntu jutumagira riria jukworia kironda.

Ukorirua riria kunyyia mathangu na ukunyyia miti ati miti niomagira itina bingi akui na aria kwagitwa. Mithemba imwe nithithagia uju nkuruki ya ingi. Antune anene, itina bibi nobiritwe na uuthu mwakene jwa mbele nyuma ya kugita na njira ya kuuna aki. Jaria maingi itina bibi bitiuma kairi.

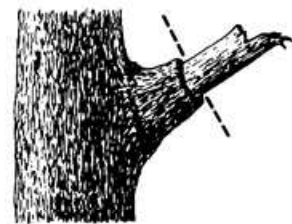
Miti imwe, mono mitunda, ikaciara bwega nkuruki irina itina bibingi. Iji nigitagwa akui na muthia jwa gitina iri iminini nikenda itina bingi biumira. Muti jwarikia kuuma tutina tunini, kinyatu notugitwe nikenda tungi tuuma. Bubu nobucokerwe nikenda muti jumata, indi menyeera ati nukua muti mieri imikai kana imingi nikenda yumba kwora kuumania na kugitwa kou.

Rikana ati gutonya thokone ya ruugo, nitubati gwika wirane gwika miti yetu igita ririnene. Nitubati gwitikiria miti ikuura mwanka miaka mirongo ithatu, tukiminyiagia na kunyyia mathangu nikenda yumba kua miitu ya bata na iria tukomba gwika itue baita miaka iria iijite. Miti iria igita yaumira itibua ya gwikua thokona ya ruugo na kwou ititarwa iri miti ya TIST.

Figure 3



Pruning cuts should be made just outside the branch collar.



On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar



TIST: Kuanda imera mwanya amwe.

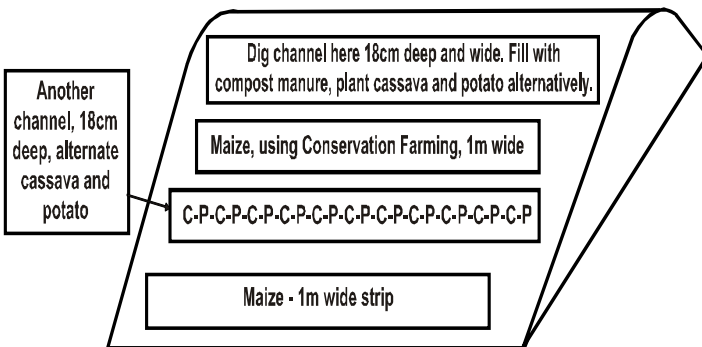
Multi-cropping ni Uandi bwa imera biiri kana bithatu mwanya amwe igitene rimwe. Uungenie bwega bubu nibuongagira gukaraniria kwa mithemba mwanya ya imera na nyomoo, kwongera unoru bwa muthetu na kunyiyia kanya ga kugwatwa ni tunyomoo na mirimo.

Intercropping nayo niaria imera mwanya igitu rimwe na muundene jumwe. No ithirwe kinya iri kuanda imera bia irio amwe na miti ja kuanda miti iri lainine muundene jwa imera bia irio.

Ikundi bimwe bia TIST nibigeretie njira iji, injega mono naria kurina ibari

1. Mulainine jwa mbele inja mutaro jurina uraja bwa 18cm na warie bwa 18cm.
2. Ujurie mutaro juju na mboleo ya mati
3. Aanda mianga na ikwaci bithingatene.
4. Mulainine jou jungi anda mpempe mita imwe ugitumagira marinya jwa urim bubwega.
5. Aanda laini ingi ya mianga na ikwaci
6. Aanda laini ingi ya mpempe na wite na mbele o ou

Mwitire juju nijutumagira jamaingi ja jaria tuthomete kuumania na uritani: nijwegie kuandaniria imera mithemba mwanya amwe, njwegie mboleo ya mati na kinya urimi bubwega



- Geria kuthingatania milaini ya mpempe na milaini ya miti. Ikundi bibinini bimwe nibigeretie kuanda mpempe mwanka warie bwa mita inya ithingati ni laini ya moringa / yellow cassia / leucaenia / bead tree.
- Milaini ya mwere no iandwe gati gati ka milaini ya moringa kana leucaenia.
- Geria kuanda calliandra na marigu, calliandra na mung'au, calliandra na mpempe, mpempe na mung'au, mung'au na leucaenia, mung'au na marigu, mung'au na kauwa (kari kanini).
- Geria kuanda ncugu na mpempe / mwere kana muya.

Geria gutarania mwanya mwanya nikenda umenya ni mwanya jwiku juri jumwega nkuruki na wire TIST jaria ukoona.

Mathuganio jegie kuthiurukia imera

Kugarurania imera ni aria arimi bathiurukanagia bakiandaga imera mwanya o igitu muundene jumwe. Gutu uria imera bibati kuthingatana, aria kimera kiria kithingatite nigitaragwa kuumania na nja mwanya na iu iraandi. Kuthiurukania imera kuri baita kiri unoru bwa muthetu niuntu imera mwanya biri miri irina uraja mwanya, kwou irio biria biri amwe aria miiri igukinyira bititumirwa o mwaka nyuma ya mwaka. Njira iji kinya nitethagia kuunanga muthetu guntu mwanya mwanya, untu buria buthongomagia uria muthetu jubangi na buria bumba kinya gukucia tunyomoo twa mithetu mwanya mwanya turina baita.

Nikenda wona baita cia kuthiurukania imera, kimera mwanya nikibati kuandwa o igitu. Bubu niuntu imera bia muthemba jumwe nobikucie tunyomoo na mbajua mwanya mwanya na kuthiurukania imera nikunyiagia kwithirikua kwa tunyomoo tutu na mbajua muthetune.

Aja nthiguru ni imera biiki kiri ikundi. Imera kuumania na gikundi kimwe biti bati kuandwa kimwe nyuma ya kingi. Menyeera ati ukuungania ikundi bibi riria ukugarurania!

- Group 1: Cucumber, tukiri, malenge, squashes, watermelon (nja ya malenge)
- Group 2: Broccoli, brussel sprouts, cabbage, cauliflower, collards, kale, radish, turnip, mustard, watercress (Nja ya mpoka)
- Group 3: Eggplant, nchini, nyanya, ikwaci (Nja ya Solanaceous)
- Group 4: Lettuce, artichoke (Nja ya Aster)
- Group 5: Mpempe, muchele, mwere, nkano, oat, barley, muya (Nja ya mpindi)
- Group 6: Mung'au na nono (Nja ya ming'au)
- Group 7: Garlic, leek, matunguru, chives (nja Nja ya karati)
- Group 9: Mianga, mukuo, taro, ikwa, water chestnut (Nja ya miri)
- Group 10: Cotton, okra (Nja ya Mallow)

Kethira njira iji iri au iguru ni injumu, amemba babaingi nibekagira imera kiri ikundi bitano riu bakagarurania kuuma o kiri kimwe gwita kingi (umenyo buumenie na website igwitwa Infonet-Biovision):

- a) Imera bia mathangu (broccoli, cabbages, cauliflowers, kales, spinach, etc.). Nibiendaga irio bibingi nkuruki ya imera bingi



- b) Imera bia matunda (chilies, eggplants, peppers, tomatoes, etc.). Nibiendaga irio bibingi indi ti ta imera bia mathangu
- c) Imera bia miri (carrots, beetroots, potatoes, onions, radishes, turnips, etc). Nibiendaga irio bibikai nkuruki ya imera bia mathangu na bia matunda.
- d) Ming'au (beans, chickpeas, cowpeas, grams, peas, pigeon peas, etc.). Baita ya kwongera ni gutonyithia nitrogen muthetune kuuma ruugone.
- e) Mpindi (maize, millets, sorghum etc.)

Mathuganio ja kugeria:

Geria kuanda mpempe na njugu amwe mwakwa jwa mbele na mwaka jwa iiri uande mwere. Geria kuanda njugu mwaka jwa mbele riu muunganio jwa ming'au, sunflower na/kana ikwaci mwaka jwa iiri

Ithuganio ringi ni kuanda mpempe riu ithingati ni mung'au jumwe ja soya kana njugu karanga. Riu mbura iu ingi geria kimera kia mbeba ta cotton.

Geria gutiga munda jutiandi giti mwaka junthe, riu uande imera kairi miaka ithatu gwita itano riu ujutige jutiandi kairi. Bubu bukaa munda kanya ga gucokia iri biria bikwendeka. Thugania kuanda thaara kethira urina ndithia.

Kijumla anda ming'au mbele ya kuanda mpindi ingi. Kuanda imera kuumania na nja ya Brassica (ja mpoka) mbele na nyuma ya kuanda kuumania na nja ya Solanaceous (ja Nyanya) nogutethie kurua na kwingia kwa kwimba kwa miiri na kunyara kuumania na bakiteria

Aja ni ithuganio ria kuthiurukia imera kuumania na Infonet-Biovision. Mung'uanano juju ni munda jurina tumiunda tuna, ndene ya mbura inya aria o mbura ikujukia mieri inna

Mbura ya mbele:

- Plot 1: Mpempe / saumu/ matunguru/ kana leeks
- Plot 2: Eggplant /nchini / ikwaci / kana nyanya
- Plot 3: Broccoli /mpoka / cauliflower / kana sukuma
- Plot 4: Mung'au/ ncugu / ndengu / kana nono

Mbura ya ijiri:

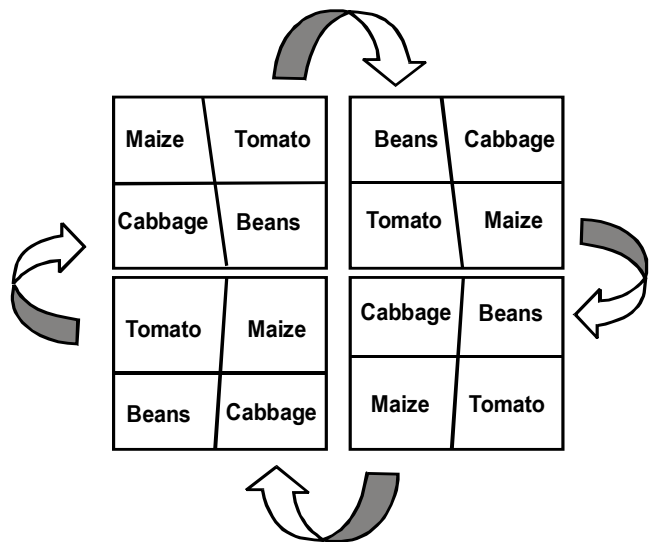
- Plot 1: Mung'au/ ncugu / ndengu / kana nono
- Plot 2: Broccoli /mpoka / cauliflower / kana sukuma
- Plot 3: Eggplant /nchini / ikwaci / kana nyanya
- Plot 4: Mpempe / saumu/ matunguru/ kana leeks

Mbura ya ithatu:

- Plot 1: Broccoli /mpoka / cauliflower / kana sukuma
- Plot 2: Mung'au/ ncugu / ndengu / kana nono
- Plot 3: Mpempe / saumu/ matunguru/ kana leeks
- Plot 4: Eggplant /nchini / ikwaci / kana nyanya

Mbura ya inya:

- Plot 1: Eggplant /nchini / ikwaci / kana nyanya
- Plot 2: Mpempe / saumu/ matunguru/ kana leeks
- Plot 3: Mung'au/ ncugu / ndengu / kana nono
- Plot 4: Broccoli /mpoka / cauliflower / kana sukuma



Alley cropping





Kuthithia mboleo yaku gwengwa – fertilizer itiongeri into bia kuthithua ni muntu.

Mboleo ya kuthithia na imera ni fertilizer ya kuumania na into bitina ugwati ya gutethia imera biaku bikura bwega. Ni injega nkuruki ya fertilizer cia nduka niuntu icithithitie yongwa na itina ugwati kiri imera na kiri naria kuthiurukite. Kurina njira inyingi cia kuthithia mboleo, indi njira iji ithingatite nitethetie ndene ya guntu kumwe. Uria muturi waku ndene ya cluster yaku jaria jabatethetie nkuruki.

Kuthithia mboleo:

- 1) Taara antu aria ukeenja kirinya giaku kia warie bwa mita inya na uraja bwa mita inya.
- 2) Theria antu au.
- 3) Inja kirinya kirina warie bwa mita ithatu gwita inya na mita imwe na nusu kwinama.
- 4) Uthurania matigari ja imera biaku jaria urinajo na ugitange tue tunini. (mung’uanano mathangu na mati ja mpempe, miere na ming’au).
- 5) Ikira matigari jaja kirinyene mwanka gitigare nusu mita.
- 6) Ongeera lita ithano cia muju.
- 7) Riu wongere centimita mirongo ithatu (kana o iria ikwoneka) cia mburi kana nguku).
- 8) Ongera matigari ja imera nusu mita.
- 9) Ikira lita ingi ithano cia muju.
- 10) Ongera matigari ja imera kairi mwanka kirinya kiende kuujura.
- 11) Muthia, ikira muthetu mwanka kirinya kiujure.
- 12) Ukiujuria kirinya na muthetu, tonyithia muti jumuraja gatigati ga kirinya mwanka jukinye nthiguru buru.
- 13) Tigana na kirinya giki ntuku mirongo kenda (mieri ithatu)
- 14) Igitene riri tumira ruuji rwaku rwa ruko gwikira boleo. Mung’uanano, warikia kuthambia nyomba kana nguo ciaku, ituura ruuji ruru ugutumagira kirinyene. Kethira urina ndithia ituura maumago jacio iguru ria kirinya.
- 15) Untu bubu nibwongagira nitrogen kiri mboleo yaku
- 16) Geria wikagire kirinya kiu ruuji na njira iji ntuku cionthe kana oriria ruuji rurio.
- 17) Ntuku mirongo kenda ciathira, mboleo ikethira iri tayari.

Tumira muti kuthima mwanki – mboleo yayia no mwanka ithirwe irina mwanki mwanka toi yoneke ikiumaga mutine wajurita ku.

Utumiri bwa mboleo:

Warikia kwinja marinya jaku ja kuanda mpempe, muya na imera bingi, ongera nkundi ya mboleo yaku kiri o kirinya. Etera wone uria gugakara!

Mazingira Bora



TIST

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

Kikuyu Version

*TIST is an innovative, time - tested,
afforestation program led by the
participants.*



Ndunguri TIST Clusta ya County ya Tharaka Nithi wakiwa kwa mkutano wao wa kila mwezi.

Inside:

TIST: Guceha na gutheria miti niguo ikure wega. Page 2

TIST: Kuhanda mithemba miingi ya irio. Page 4

Kuhariria thumu wa mborera – bataraita ya kimerera. Page 6



TIST: Guceha na gutheria miti niguo ikure wega.

Gitumi kinene gia geceha miti nikumihotithia ikure iri na hinya ohamwe na kwagirithia mititu.

Njira ino noirumirirwo riria ugucagura miti iria iri na hinya na miega. Makiria mithemba ya hardwood na grevillea, eucalyptus na cypress niyo ikoragwo iri minene na igakorwo iri mirungaru wega. Mithemba ngurani ya miti niyendaga utaganu ngurani kuringana na kuria ihanditwo kana niyakugayania mugunda kana niyakunyihioa rurhuho. Ririkana miti ingi niibataraga utaganu makiria ta miembe, mavadamia kwa muhiano. Riria wahee mitiutaganu wa kuigana niumiteithagia gukinyirwo ni maai na unoru wa tiiri nigu ikure. Utaganu munini nimwega riria miti iri minini tondu miti yambagiriria kugimara niinenehaga na miti ino yagiriirwo nikuigwo. Ceha miti niguo igiae na utaganu mwega.

Hingo iria wamenya ,iti iria ukwehulia, miteme haria gitianaini.Thutha wa wiki na mieri o ugitemaga miti miingi niirithundukaga na micehe ringinigu ndigakure yathunduka.

Miti yothe ya muthemba umwe kuma kundu kumwe ikoragwo iiganaine, miti iriaminene niyo yagiriirwo nigutigio. Kionereria kingi ati miti ati

nimiega ni uraihu wayo. Miti iria miraihu makiria niyo miega na niyo ihotete kwamukira utheri muiganu gukira iria ingina noikure wega.Wa muico, miti yagiriirwo gukorwo itahukite, na itari na murimu o wothe. No ningi, uu tikuga ati miti yothe iria minini yeherio! Tigirira utaganu niwa 2mX2m na miega makiria.

Riria uratua matua ma guceha, ririkana ati mithemba ya muiti ni ngurani.Angikorwo muti wa muembe urakura hakuhi na muti wa eucalyptus muti wa muembe nonginya ukorwo uri munini na nimwega niundu mawegamaguo ma matunda ma kuria na ma kwendia na ningui niukuranagira wega na irio mugundaini. Eucalyptus niutumaga miti iria iri hakuhi nague yage gukura na njira iria yagiriire na niwega kuririkana uu riria uraceha miti. Kuri na mwega mangi maingi ma miti kuringana na mithemba thengia ya carbon. Kwa muhiano nowende miti niundu wa kiiruru. Niundu wa uu, nouhe miti kahinda makiria ga gwota riu njira ino niikuhotithia miti ikorwo na honge nyingi makiria. Angikorwo niurendamiti ya kunyihia rurhuho rekeikure ikuhaniriirie no ucehe mahuti nathi.

**Guceha.**

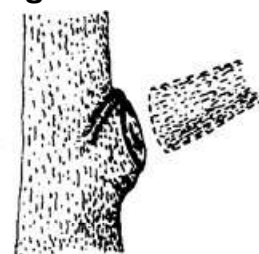
Mitituini ya kinfuire, miti niyo icehaga. Honge mitiini iria minene niitumaga iria minini iguithie mahuti na ririamahuti macio makua nacio honge cigakua na cikoora.honge icio niciguaga. Na ona igiicehaga yo nyene thiini wa TIST niwega guceha na moko. Mitingurani niibataraga mucehere ngurani no maundu ma kawaida nimahuthikaga.

Mithemba miingi ya miti yagiriirwo gukorwo itahukite kuma thi.miti tai no ikuraga naihenya na niuhuthu kumiceha. Riria wathuura miti yahukite, , cagura iria minene no utigirire iri na hinya na mahuti maingi.

Andu angi meciragia wagiriirwo ni gutini a miti iri miigananiru. Riria urahurura miti wagiriirwo ni kuinamiabanga. Njira inoniinyihagia miti kwora Riria urahurura, ndukahuthire hinya muingi. Mitiiria yahururwo niuhuthikaga na ngu ba irio cia mahiu. Ona njira ino iri njega, niitumaga miti inyihirwo ni uhot wa gukinyirwo ni utheri wa riuua niundu wa ironda cia gutemwo iria cikaaga cingikahona.. riria wahurura ndugathumbure haria watema. Ndukahahumbire na kindu o giothe niguu muti urute giko giothe.

Ndukariganirwo ati miti niuthundukaga ringi kumana na kuhururwo. Mithemba ingi niikaga uu makiria gukira iriaingi. Niukoragwo uri uhuthu gwika uu riria miti ino iri na mwaka umwe.

Miti ingi na makiria miti ya matunda niikoragwo maciaro maingi riria iri na mياهو miingi. Mياهو ino yumanaga na muti gutinio uri munini. Riria muti wagia na mياهو ino niwega onayo itinio niguu irute ingi. Njira ino noicokerwo maita mingi niguokwongerera biashara ya miti no eterera mieri na makiria mbere ya kuhurura ringi Ririkana ati niguu gukuhotithia kuingira thoko ya carbon wagiriirwo kureke miti ikure gwa kahinda kanene. Nitwagiriirwo ni kureka miti ikure gwa kahinda gatanyihire miaka 30, guceha na kuhurura niguu ikure iri na hinya muingi na mititu ikorwo iri miega.

Figure 3

Pruning cuts should be made just outside the branch collar.



On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar



TIST: Kuhanda mithemba miingi ya irio.

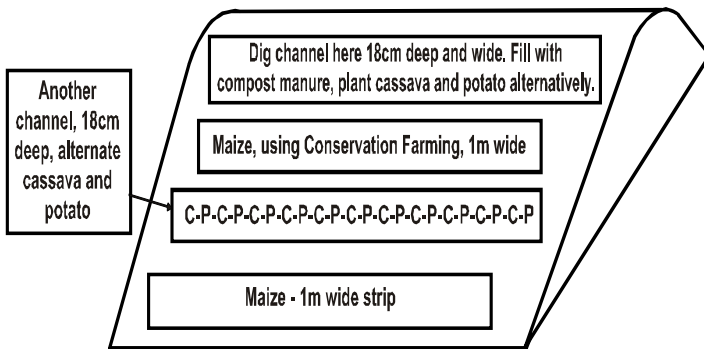
Murimi noahande irio mithemba miingi kimera kimwe. Ririawacagura mithemba iria ingitwarana wega nouteithiririe kwagirithia biodiversity migundaini, kwngerera unoru wa tiiri na kunyihia ugwati wa tutambi na mirimu.

Intercropping yonanagia kuhanda na gukuraniria iri mithemba miingi mugunda-ini umwe. Ona ningi kuhanda irio na miti hamwe.

Imwe cia ikundi cia TIST nicigeretie njira ta ici, iria ninjega na kuria kuinamu na kuri na iharuruka.

1. Muhari-ini wa mbere enja mutaro wa uriku wa 18cm na warii wa 18cm.
2. Ihuria mutaro na thumu.
3. Handa mianga na waru.
4. Huhari-ini ucio ungi, handa mbembe 1m ukihuthira Kilimo Hai.
5. Cokera mianga na waru
6. Cokera membe.

Njira ino ihuthagira makiria maundu maria tukoretwo tugithoma. Ni kuhandaniria na gukuraniria irio mithemba miingi mugunda-ini umwe, ihuthagira thumu na Kilimo Hai.



- Geria gucenjania mihari ya mbembe na miti. Ikundi nicigeretie kuhanda mihari itatu ya mbembe na muhari umwe wa mringa/yellow cassia/leucaenia/bead tree.
- Mihari ya muhia noihandwo gatagati ja mihari ya moringa na leucaenia.
- Geria mutukanio wa calliandra na mboco na marigu, mboco na kahuwa (riria kari kanini).
- Geria kuhandaniria njugu na mbembe/muhia na mwere.

- Geria na utaganu niguo wone ruia mwega na uheane maciaro kuri TIST.

Gucenjania uhandi wa irio mugunda-ini.

Crop rotation ni kuria arimi macenjanagia uhandi wa irio na imera mugunda-ini umwe. Nikuri mutaratara uria urumagirirwo kuria riria uracagura muthemba uria ukurumirira wagiriirwo ni kuya kuma family ingi. Guconjania guku niguteithagia kwngerera unoru wa tiiri tondu mimera ngurani ikoragwo na miri ya uraihu ngurani kuuga ati unoru niuthiaga ugityonyaga tiiri-ini kuringana na muthemba wa irio.

Niguo kugia na mawega ma gucenjania irio, ninginya uconjanie wega. uu

Nitundu mimera ya muthemba umwe noiguciririe muthemba umwe wa tutambi na mirimu na riria wacenjania niunyihagia ugwati wa tutambi na mirimu gutherema na guikara tiiri-ini.

- Group 1: Cucumber, gourds, pumpkin, squashes, watermelon (Gourd family)
- Group 2: Broccoli, brussel sprouts, cabbage, cauliflower, collards, kale, radish, turnip, mustard, watercress (Crucifer/Brassica family)
- Group 3: Eggplant, pepper, tomato, potato (Solanaceous family)
- Group 4: Lettuce, artichoke (Aster family)
- Group 5: Maize, rice, sorghum, wheat, oat, barley, millet (Grains and cereals family)
- Group 6: Beans and peas (Legume family)
- Group 7: Garlic, leek, onions, chives (Allium family)
- Group 8: Carrot, celery, dill, parsnip, parsley (Carrot family)
- Group 9: Cassava, sweet potato, taro, yam, water chestnut (root crop family)
- Group 10: Cotton, okra (Mallow family)

Angikorwo njira ino ninditu, arimi aingi nimahuthagia na gukorwo na ikundi 5 ci gucenjania.

- a) Mathangu(broccoli, mboga, cauliflower, kales, spinach etc) nicifataraga unoru muingi gukira mboga.



- b) Matunda (chilies, eggplants, peppers, tomatoes, etc.).nicibataraga thumu muingi no ti ta irio cia mathangu.
- c) Irio cia miri crops (carrots, beetroots, potatoes, onions, radishes, turnips, etc.).citibataraga humu muingi ta mathangu na miri.
- d) Legumes (beans, chickpeas, cowpeas, grams, peas, pigeon peas, etc.).maundu mangi ma bata macio ni guthondekanitrogen tiiri-ini.
- e) Cereals(mbembe, muhia, mwere)

Maundu ma kurora mbere.

Geria kuhanda mbembe na njugu hamwe mwaka wa mbere na mwaka wa keeri uhande muhia. Handa njugu mwaka wa mbere na utukanie na legumes, sunflower na/kana waru mwaka wa keeri.

Njira ingi ni kuhanda mbembe irumiriirwo ni legumes na soybeans kana njugu na kimera kiu kirumiriire ugerie kindu ta cotton.

Geria gutiga mugunda utarimite gwa kahinda ka mwaka umwe ucoke uhande ringi gwa kahinda ka miaka 3-5 utautigite ringi. Njira ino niikuhe mugunda kamweke ga gukorwo na unoru. Geeria thaara na nyeki ya ngombe.

Na muno makiriahanda legumes mbere ya kuhanda cereals. Riria wahanda mimera ya Brassica(ta mboga) mbere na thutha wa Solanaceous(ta nyanya) noguteithie kugitira mirimu ya tiiri na miri.

Ino ni njira ya gucenjaniai muhandire wa irio mugundaini kuma kuri Infonet-Biovision. Iroya muhiano wa mugunda uri na plot 4 hari imera 4 na o kimera kiri na mieri 4.

Alley cropping



Kimera 1:

- Plot 1: Maize / garlic / onions / or leeks
- Plot 2: Eggplant / chilies / potato / or tomato
- Plot 3: Broccoli / cabbage / cauliflower / or kale
- Plot 4: Beans / cowpeas / grams / or peas

Kimera 2:

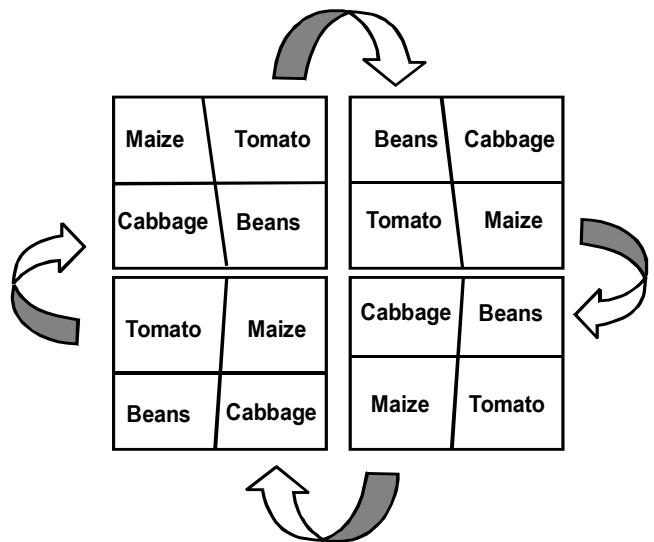
- Plot 1: Beans / cowpeas / grams or peas
- Plot 2: Broccoli / cabbage / cauliflower / or kale
- Plot 3: Eggplant / chilies / potato / or tomato
- Plot 4: Maize / garlic / onions / or leeks

Kimera 3:

- Plot 1: Broccoli / cabbage / cauliflower / or kale
- Plot 2: Beans / cowpeas / grams / or peas
- Plot 3: Maize / garlic / onions / or leeks
- Plot 4: Eggplant / chilies / potato / or tomato

Kimera 4:

- Plot 1: Eggplant / chilies / potato / or tomato
- Plot 2: Maize / garlic / onions / or leeks
- Plot 3: Beans / cowpeas / grams / or peas
- Plot 4: Broccoli / cabbage / cauliflower / or kale





Kuhariria thumu wa mborera – bataraita ya kimerera.

Thumu wa mborera ni bataraita ya kimerera iria iteithagia mimera gukura wega. Bataraita ino ni njega gukira ya nduka tondu I ya kimerera, ndiri thogora, ndithukagia mimera hamwe na maria maturigiciirie ta uria bataraita imwe cia nduka ciikaga. Kuri njira ngurani uria unghota gwithondekera thumu waku wa mborera. Hari njira imwe iria tuguthomithia iria ikoretwo igitumirwo ni andu aiangi. Niwega urie arimi aria angi muri mucemanio wa cluster ni njira iria matumagira.

Kuhariria guthondeka thumu:

1. Chagura handu haria ikwenja irima riaku ria mita inya kwa inya.
2. Theria handu hau.
3. Haririria kana uchimbe irima ria warie wa mita ithatu nginya inya na iriku wa mita imwe na nuthu.
4. Cokeria hamwe maragara maku moth eta mahuti, mabebe , maboco kana muhia na umatinangie tuchunji tunini.
5. Ikia maragara macio irima-ini riaku kwa uriku wa nuthu mita.
6. Ongerera lita ithano cia muhu.
7. Thutha ucio, ongerera thumu wa ng'ombe kana mburi kana nguku kana nguruwe kwa uriku ta fiti imwe.
8. Ongerera maragara mangi inguru ta nuthu mita.

9. Ongerera lita ithano cia muhu.
10. Ongerera maragara maku nginya irima riaku rikirie kuiyura.
11. Wa muthia, humbura na tiiri nginya iria riiyure.
12. Hindi iria urahumbira na tiri, handa kamuti nginya kahutie irimariaku gitina.
13. Eterera gwa kahinda ka thiku 90 kana mieri itatu.
14. Gwa kahida gaaka korwo ugithiriria thumu waku maai maku ma giiko. Ungikorwo ni ukuhota ona mathugumo ma mahiu maku uitiririe.
15. Mathugumo ni mateithagia kuongera nitrogen.
16. Geria guitagiriria maai na muthugomo kwa mahinda makuhi.
17. Thutha wa thiku mirongo kenda, thumu waku ugakorwo uri muhiu.

Tumira kamuti karia uhandire ta githimi giaku. Hindi iria thumu waku wahia, wagiririrwo gukorwo wi muhiu na wacomora kamuti niwagirirwo ni kurata ndogo ya urugari.

Uhuthiri wa thumu waku wa mborera:

Warikia kuhariria marima maku ma mbembe kana muhia kana o mimera iria ingi urahanda, ikira thumu muigana wa m oko maku o hari o irima. Eterera wone maciaro!

Mazingira Bora



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Kiswahili Version

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Ndunguri TIST Clusta ya County ya Tharaka Nithi wakiwa kwa mkutano wao wa kila mwezi.

Ndani ya:

Kupunguza na kupogoa miti kwa ukuzi mwema. Uk. 2

TIST: Mseto wa mimea. Uk. 4

Kutengeneza mbolea kutokana na mimea – mbolea ya kiasili. Page 6



Kupunguza na kupogoa miti kwa ukuzi mwema.

Katika TIST, tumejitolea kutunza miti tunayopanda kwa ajiri ya TIST kuikuza kwa miaka thelathini kabla ya kuikata. Hii ni sababu mojawapo ya ni kwa nini ni muhimu kufikiria vizuri kuhusu ni miti ya aina gani twataka kukuza katika mashamba yetu. Hata hivyo, kupunguza na kupogoa miti kwaweza kusaidia kuiweka miti yako ikiwa yenye afya na inayotupa vitu muhimu mti unapokua.

Kwa ujumla, maana ya kupunguza na kuipogoa miti ni kuboresha afya ya kila mti, pamoja na ya msitu wote. Hili litafanyika kupitia kuichagua miti iliyo bora zaidi katika msitu. Kwa aina nyingi za miti, pamoja na miti ya mbaao, grevillea, mikaratusi na cypress, miti hii san asana huwa miti mikubwa zaidi, kila mti ukiwa na shina moja lililonyooka. Miti yaweza kuwa na mahitaji mbalimbali ya nafasi kulingana na aina, mahali, ilivyopandwa (miti iliyo mashambani ya mimea ya vyakula ama miti iliyopandwa ili kupunguza upepo) na tabia nchi, lakini kuna kanuni zingine za kijumla hutumika.

Kukuza miti iliyo na nguvu na afya, nafasi ya mita mbili hupendekezwa. Nafasi hii ni sawa kwa miti mingi ya TIST (grevillea na cypress), lakini kumbuka kuwa miti mingine huitaji nafasi zaidi (miembe na mikandamia, kwa mfano). Kuipa miti nafasi inayofaa husaidia kupata maji na virutubisho tosha vya kuikuza hadi panapowezekana. Nafasi ndogo zaidi inaruhusiwa miti ilipo michanga. Miti inapokua, miti mingine itakuwa mikubwa kuliko majirani. Hii ndiyo miti wapaswa kuacha. Kuchagua ni miti gani ya kukata, angalia miti iliyo bora zaidi na ujue kama ina nafasi ifaayo. Kama haina, wafaa kutoa miti mingine iliyo karibu.

Ukishachagua miti ya kutoa, ikatie chini kabisa. Katika wiki na miezi inayofuata kukata, miti mingi itaanza kuchipua kutokana na kisiki cha mti. Ili

kuzuia mti kuchipuka tena, kata au uvunje miche iyo chipukizi iliyo katika kisiki.

Njia mojawapo iliyo rahisi zaidi ya kujua kama mti wapaswa kukatwa ni kuangalia ukubwa wake ukilinganisha na miti iliyo karibu ya umri na aina moja. Ukuaji wa mti utatofautiana kulingana na udongo, maji yaliyopo na kadhalika. Kwa ujumla, ikiwa miti yote ya aina moja katika eneo Fulani ina karibu umri mmoja, miti iliyo mikubwa zaidi inaweza kuchaguliwa kuachwa kukua. Kiashiria kingine cha afya ya mti ni mahali taji la mti katika dari lilipo. Miti liyo na taji juu ya dari la kijumla la miti yaweza kunyonya mwanga zaidi ya miti iliyo na taji chini zaidi na kwa hivyo huweza kukua bora. Kumaliza, miti yafaa kuwa na shina moja, lisilo na ugonjwa mkuu au kuoza. Hata hivyo, ili halimaanishi kuwa miti yote midogo yafaa kukatwa! Langa kunafasisha kwa mita mbili ili miti iwe mikubwa ba yenye afya iwezekanavyo ili kuzidisha kunyonywa kwa kaboni.

Unapofanya uhamuzi wa kupunguza miti, kumbuka kuwa kiwango cha ukuaji hutofautiana kulingana na aina ya mti. Kama mwembe unakua karibu na mikaratusi mingi, mwembe unaweza kuwa mdogo na unaokua pole pole zaidi ya mikaratusi inayokua haraka, lakini kwa uhakika haupaswi kukatwa kwa sababu ni mdogo zaidi! Kwa kweli, mti kama mwembe ni wenye umuhimu mkubwa kwa sababu ya matumizi yake katika kupeana matunda ya kula na ya kuuza. Mwembe ni bora zaidi pia kwa mimea mingine iliyo shambani. Mikaratusi waweza kufanya miti na mimea mingine iliyo karibu kukua vibaya. Ni muhimu kukumbuka hili unapochagua ni miti gani utapunguza. Kuna matumizi mengi ya miti, kulingana na aina zaidi ya kunyonya kaboni. Kwa mfano, waweza hitaji miti ya kivuli. Hapa, wafaa kuupa mti nafasi kubwa zaidi



ili kuufungulia jua zaidi. Hili litasisimua mti kutengeneza matawi mapya katika shina kuu na matawi makubwa. Ukitaka kutumia miti ili kupunguza upepo, iache miti iyo katika mistari kuwa karibu zaidi, lakini kata miti iliyo pande hizo zingine ili kuongeza kichaka.

Kupogoa

Katika msitu asili, miti hujipogoa yenyewe. Matawi katika dari la juu hufunikia matawi yaliyo chini zaidi. Jinsi majani yaliyo katika matawi ya chini ya yanakufa, ndivyo tawi lililoyashikilia pia linafa. Matawi yaliyokufa na kuoza huanguka yenyewe au kuangukwa. Hata kama kupogoa huku kwaweza kuonekana katika mashamba ya JTIST, inaweza kuwa muhimu, ama kwenye faida kupogoa kwa kutumia mikono. Ingawapo kila aina huitaji njia tofauti ya kupogoa, kanuni chache za kijumla hutumika katika miti yote unapokuwa ukichagua ni matawi gani yatakatwa.

Aina nyingi za miti huwa na shina moja kuu lililo mchangani. Miti iliyo na shina moja hukua haraka zaidi na haiwezi kupasuka kwa urahisi wakati wa dhoruba. Ikiwa mti wenye mashina mengi umechaguliwa kama mti mmea, wakati wa kuchagua ni tawi gani kuacha, kwa ujumla chagua tawi lililo kubwa ziadi, lakini hakikisha lina afya, matawi mengi, halijaoza na limenyooka.

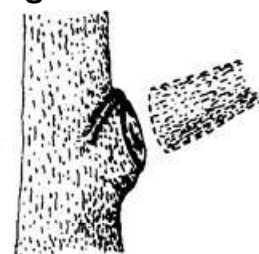
Watu wengi hufikiri wapaswa kukata matawi sambamba na shina. Huu ni uongo. Mikato yafaa kufanywa kwa upande tofauti na shina la mti, kidogo nje kutoka kwa shina. Hili hupunguza mti hulio wazi na huruhusu seli zinazojitenganisha katika tawi kukua juu ya mkato huo jinsi wakati unavyokwenda (angalia picha ya kwanza). Hili husaidia mti kukaa na afya na huzuia kuoza.

Unapopogoa usifanye zaidi ya inavyotakikana. Matawi yaliyokatwa yaweza kutumiwa kama kuni au chakula cha mifugo. Ata kama hili ni jambo nzuri, kumbuka kuwa ata kama kupogoa huboresha afya ya mti na huongeza ukuaji jinsi wakati unavyoenda, Usisahau kuwa miti hutengeza mashina mapya karibu na kulipokatwa. Kwa ujumla, mashina haya ni rahisi kutoa katika mwaka wa kwanza wa kukata kwa kuvunja mashina. Mashina mara nyingi hayakui tena.

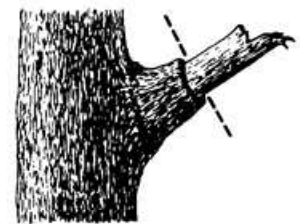
Miti mingine, sanasana miti ya matunda, hutupa mazao bora yakiwa na mashina mengi. Miti hii hukatawa chini karibu na mwisho wa shina ikiwa michanga ili kulisimua ukuaji mpya. Mti unapoimarisha mashina haya, kwanza uwezo wa mti wa kunyonya jua utapungua na mti utakazwa kwa sababu ya kidonda ambacho lazima kipone. Ukitoa mengi sana, mti hutakua pole pole au ufe. Ukishatawa tawi, liache eneo ilo. Usilifunike kwa chochote, ili mti hutoe sumu yoyote iliyopo katika kidonda. Hii pia ni njia ya kimsingi inayotumika katika binadamu kuponya anapokatwa.

Kumbuka kuwa ili kuingia katika soko la kaboni, twahitajika kujitolea kuikuza miti kwa muda mrefu. Twafaa kuruhusu miti kukua kwa miaka isiyopungua thelathini, kuipunguza na kuipogoa ili kutengeza misitu yenye matumizi na endelevu itakayotupa faida kwa miaka mingi ijayo.

Figure 3



Pruning cuts should be made just outside the branch collar.



On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar



TIST: Mseto wa mimea.

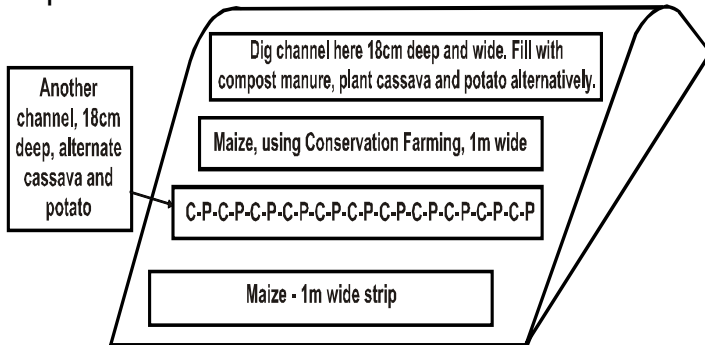
Upandaji wa mimea mingi ni ambapo mimea miwili au mitatu hukuzwa pamoja katika msimu mmoja. Kwa mchanganyiko unaofaa, hili laweza kuongeza bionuwai katika ardhi, kuongeza rutuba na kupunguza uwepo wa vijidudu na magonjwa.

Mseto hueleza zoezi la kupanda mimea tofauti wakati mmoja katika shamba moja. Pia yaweza kuhusisha kukuza mimea pamoja na miti kwa mfano kilimo mseto.

Baadhi ya vikundi wamejaribu mbinu zifuatazo, nzuri hasa kwenye miteremko

1. Kwa mstari wa kwanza, chimba mtaro wenye urefu wa centimita kumi na nane na upana wa centimita kumi na nane
2. Jaza mtaro huu na mbolea ya mimea
3. Panda mihogo na viazi vikifuatana
4. Kwa safu ya pili panda ukanda wa mahindi mita moja ukitumia mashimo ya kilimo hai
5. Mstari mwingine wa mihogo na viazi
6. Mstari mwingine wa mahindi na kadhalika

Mbinu hii hutumia mengi ya tuliyosoma katika mafunzo: ina kilimo mseto, ina mbolea ya mimea na pia kilimo hai.



- Jaribu kufuatanisha mistari ya mahindi na miti. Vikundi vidogo vimejaribu kufuatanisha ukanda wa mita nane wa mahindi na msatri wa miti ya moringa / yellow cassia / leucaenia / bead tree
- Mistari ya mtama yaweza kupandwa kati kati ya mistari ya moringa au leucaenia.
- Jaribu mchanganyiko wa calliandra na migomba ya ndizi, calliandra na mahagwe, calliandra na mahindi, mahindi na maharagwe, maharagwe na leucaenia, maharagwe na ndizi, maharagwe na kahawa (ilipo changa).
- Jaribu kuchanganya kunde na mahindi / mtama au uwele.

Jaribu nafasi mbali mbali ili uone ni gani bora zaidi, na ujulishe TIST matokeo.

Mawazo kuhusu mzunguko wa mazao

Mzunguko wa mazao ni ambapo wakulima huzunguka huku wakipanda mimea mbali mbali katika ardhi moja. Kuna utaratibu maalum wa upanzi wa mimea, ambapo zao litakalofuata hutoka familia tofauti na iliyopandwa kabla. Mzunguko wa mimea

waweza kuwa wenye faida kwa rutuba ya udongo kwani mimea tofauti huwa na urefu tofauti wa mifumo ya mizizi, kumaanisha si safu moja ya virutubisho vya udongo humalizwa mwaka baada ya mwaka. Mbinu hii pia husaidia kuvunja udongo katika safu tofauti, jambo ambalo huboresha mfumo wa udongo, na laweza kuvuta aina tofauti za viumbe hai wenye faida katika udongo.

Ili kupata faida za kuzungusha mimea, lazima aina tofauti ya mimea ipandwe kila wakati. Hili ni kwa sababu mimea ya aina moja huvuta vijidudu na magonjwa sawa, na kuzungusha aina kwaweza kupunguza uwezekano wa baadhi ya vijidudu na magonjwa kuchukua umiliki kwatika udongo.

Orodha ifuatayo inaweka mimea kulingana na vikundi. Mimea kutoka kikundi kimoja haifai kupandwa moja baada ya nyingine. Hakikisha umechanganya vikundi vyako katika mpango wako wa mzunguko!

- Kundi la kwanza: Tango, vibuyu, malenge, squashes, tikiti maji(Familia ya mtango)
- Kundi la pili: Broccoli, Brussel sprouts, kabichi, cauliflower, collards, sukuma, radish, turnip, haradali, watercress (Jamii ya crucifer / Brassica)
- Kundi la tatu: Mbilingani, pilipili, nyanya, viazi (Jamii ya solanaceous)
- Kundi la nne: Lettuce, artichoke (Jamii ya Aster)
- Kundi la tano: Mahindi, mchele, mtama, ngano, oat, shayiri, mtama (Jamii ya nafaka)
- Kundi la sita: Beans na mbaazi (jamii ya kunde)
- Kundi la saba: Vitunguu, leek, vitunguu saumu, chives (Jamii ya Allium)
- Kundi la nane: karoti, celery, dill, parsnip, parsley (Jamii ya karoti)
- Kundi la tisa: Muhogo, viazi vitamu, taro, viazi vikuu, water chestnut (Jamii ya mizizi)
- Kundi la kumi: Pamba, okra (Jamii ya Mallow)

Iwapo mfumo ulio hapo juu ni mgumu sana, wakulima wengi hurahisisha kazi hii kwa kuweka mimea katika vikundi vitano na kuzunguka kati ya vyenyewe (taarifa imetoka katika tovuti ya Infonet-Biovision):

- a) Mimea ya majani (broccoli, kabichi, cauliflowers, sukuma, mchicha na kadhalika). Huhitaji virutubisho zaidi ya zinginezo
- b) Mimea ya matunda (Pilipili, mbilingani, pilipili kali, nyanya na kadhalika.). Huhitaji kiwango kikubwa kiasi cha virutubisho lakini si kama mimea ya majani.
- c) Mimea ya mizizi (Karoti, beetroots, viazi, vitunguu, radishes, turnips, na kadhalika).



Huhitaji virutubisho chache ukilinganisha na mimea ya majani na ya matunda.

- d) Jamii ya kunde (maharagwe, chickpeas, kunde, ndengu, mbaazi, na kadhalika.). faida yao nyongeza ni kutia naitrojeni iliyo katika hewa udongoni.
- e) Nafaka (Mahindi, mtama, uwele na kadhalika

Mawazo ya kuzingatia:

Jaribu kupanda mahindi na njugu pamoja mwaka wa kwanza na mwaka wa pili upande mtama. Jaribu kupanda njugu mwaka wa kwanza halafu upande mchanganyiko wa jamii ya kunde, alizeti na/ au viazi katika mwaka wa pili

Wazo linguine ni kujaribu kupanda mahindi halafu jamii ya kunde ifuate kama vile soya au njugu. Halafu msimu utakaofuata jaribu kupanda mmea utakaoleta pesa kama pamba.

Jaribu kuacha shamba bila chochote mwaka mzima, halafu upande mimea tena miaka mitatu hadi mitano kabla ya kuliwacha tena bila chochote. Hili litaipa ardhi nafasi ya kurudisha virutubisho udongoni. Fikiria kupanda nyasi iwapo una mifugo.

Kwa jumla, panda jamii ya kunde kabla ya nafaka. Kupanda mimea kutoka jamii ya Brassica (kama Kabichi) kabla na baada ya mimea kutoka jamii ya Solanaceous (kama nyanya) kwaweza kuzuia mjengo wa mafundo ya viwavi na kukauka kunaoletwa na bakteria.

Lifuatalo ni wazo la kuzungusha mimea lililochukuliwa kutoka Infonet-Biovision. Linachukua mfano wa shamba lenye viwanja vinne huku kila msimu hukiwa takriban miezi minne.

Msimu wa kwanza:

Kiwanja cha kwanza: Mahindi / saumu / vitunguu / au iliki
 Kiwanja cha pili : Mbilingani/ pilipili /viazi / au nyanya
 Kiwanja cha tatu : Broccoli /kabichi / cauliflower / au sukuma
 Kiwanja cha nne :maharagwe / kunde /ndengu / au mbaazi

Alley cropping



Second season:

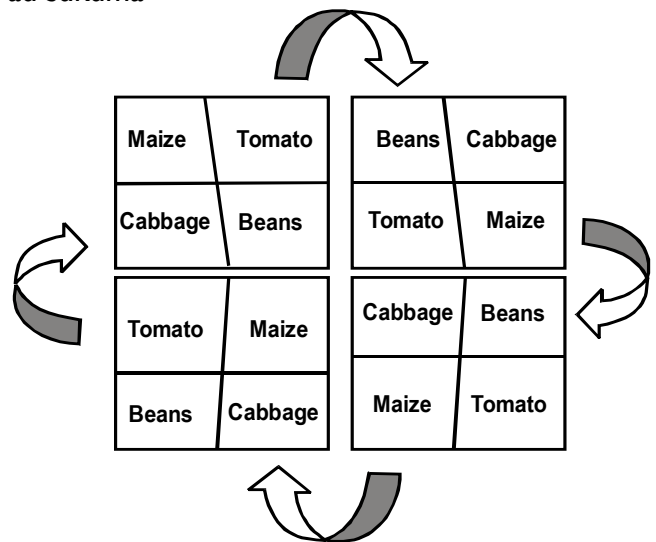
Kiwanja cha kwanza: maharagwe / kunde /ndengu / au mbaazi
 Kiwanja cha pili: Broccoli /kabichi / cauliflower / au sukuma
 Kiwanja cha tatu: Mbilingani/ pilipili /viazi / au nyanya
 Kiwanja cha nne: Mahindi / saumu / vitunguu / au iliki

Third season:

Kiwanja cha kwanza: Broccoli /kabichi / cauliflower / au sukuma
 Kiwanja cha pili: maharagwe / kunde /ndengu / au mbaazi
 Kiwanja cha tatu: Mahindi / saumu / vitunguu / au iliki
 Kiwanja cha nne: Mbilingani/ pilipili /viazi / au nyanya

Fourth season:

Kiwanja cha kwanza: Mbilingani/ pilipili /viazi / au nyanya
 Kiwanja cha pili: Mahindi / saumu / vitunguu / au iliki
 Kiwanja cha tatu: maharagwe / kunde /ndengu / au mbaazi
 Kiwanja cha nne: Broccoli /kabichi / cauliflower / au sukuma





Kutengeneza mbolea kutokana na mimea – mbolea ya kiasili.

Mbolea ya majani ni mbolea ya kiasilia ya kusaidia mimea yako kukua. Ni bora zaidi ya mbolea za viwanda kwani ni ya kiasili na haina athari za kuumiza mimea na mazingira. Kuna njia nyingi za kutengeneza mbolea, lakini njia ifuatayo imekuwa saidifu katika baadhi ya maeneo. Uliza majirani zako katika cluster yako ni gani imewaonekana.

Utayarishaji wa mbolea:

- 1) Chagua eneo lenye upana wa mita nne na urefu wa mita nne la kuchimba shimo lako la taka.
- 2) Fagia sehemu hiyo.
- 3) Chimba shimo la mdwara lenye upana wa mita tatu au nne na mita moja na nusu kina.
- 4) Kusanya masala yote ya mimea uliyo nayo na uyakate kuwa sehemu ndogo ndogo (kwa mfano majani na mashina ya mahindi, mtama, maharagwe)
- 5) Weka masala haya ya mimea katika shimo ilo hadi kina cha nusu mita.
- 6) Halafu ongeza lita tano za jivu.
- 7) Halafu uongeze centimita thelathini (ama kiwango kilichopo) za kinyesi cha mifugo (kwa mfano kinyesi cha nguruwe, ng'ombe, mbuzi au kuku).
- 8) Ongeza safu nyingine ya majani ya mimea na mashina (nusu mita)
- 9) Ongeza lita zingine tano za jivu.
- 10) Ongeza majani na mashina tena hadi shimo likaribie kujaa.
- 11) Hatimaye, ongeza safu ya udongo hadi shimo lijae.
- 12) Unapokuwa ukiweka udongo shimoni, ingiza fimbo ndefu katikati mwa shimo hadi ifike chini ya shimo.
- 13) Liache shimo la taka kwa miezi mitatu (siku tisini).
- 14) Katika kipindi hiki tumia maji yako machafu kuweka katika shimo hili. Kwa mfano, baada ya kuosha nguo au nyumba, yamwage maji uliyotumia juu ya shimo. Ikiwa una mifugo waweza pia kumwaga mikojo ya mifugo juu ya shimo.
- 15) Jambo hili litaongeza naitrojeni kwa mboleo yako.
- 16) Jaribu kuweka maji kila siku kwa njia hii, ama wakati maji yapo.
- 17) Baada ya siku tisini mbolea itakuwa tayari.

Tumia fimbo kama kipima joto – mbolea inapokuwa tayari lazima iwe na joto na waweza kuona mvuke ukitoka kwa fimbo hiyo baada ya kuitoa.

Matumizi ya mbolea hii:

Ukishachimba mashimo yako ya kupanda mahindi, mtama au mimea mingine, ongeza mboleo kiwango kinachotoshea katika kiganja chako katika kila shimo. Angalia ili kujua matokeo!

Mazingira Bora



TIST

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

Kikamba Version

*TIST is an innovative, time - tested,
afforestation program led by the
participants.*



Ndunguri TIST Clusta ya County ya Tharaka Nithi wakiwa kwa mkutano wao wa kila mwezi.

Inside:

TIST: Kutaanisa na kusea miti yaku kwoondu wa kwiana kwailu. Page 2

TIST: Kuvulany'a na kuvandanisa mimea/maliu. Page 4

Kuseuvia vuu wa yiima -Vuu ute na kemikoo. Page 6



TIST: Kutaanisa na kusea miti yaku kwoondu wa kwiana kwailu.

Kwa indi, kitumi kya kutaanisa na kusea miti ni useo wa uima wa kila muti, na kwa useo wa uima wa mutitu w’othe.

Undu uyu wikawa kwa kusakua miti ila miseo thini wa mutitu. Kwi mithemba mingi ila ni ta Misanduku, Mikuvulya na Minyoonyoo ino ni miti mala maingi yithiawa yi minene, na yina muthamba umwe (itena ngava). Kila muthemba wa muti niwithiawa na mawendi kivathukany’o nikana wiane kwa mituki na wina uima museo. Kwongeleela ni kana miti imwe niyithiawa iyenda usuvio kivathukany’o na ila ingi kwianana na vata wayo kana vala ivanditwe. Yila miti ivanditwe ta ya uimi wa muvango wa TIST ni ivandawa na nzia syi kivathukangany’o (ngelekany’o ni miti ya kusii kiseve muundani) thini wa isio syi kivathukany’o (ngelekany’o ta w’umiloni wa sua kiimani kya Mt. Kenya na uthuilono wa sua kiima kiu kya Mt. Kenya) na kivathukany’o kya seve na mawendi amwe ma miti uyithia ni mavwanene.

Kwa miti kwiana na ulumu yi na wailu matambya eli (2metres) ni maile kwa utaaniu wa miti. Kutaaniw’a kuu kwa miti kaingi ni kwailaa kwa miti ila ivanditwe ni TIST imwe yayo yi ta mithemba ya miti ta, misanduku, mivengele na mikuvulya kana minyoonyoo. Tulilikane kana miti imwe niyendaa utaaniu munene kwi ingi ta iembe na ikandania.

Kutaanisa miti nikutumaa miti itonya kumya liu na kiw’u kuma muthangani nesa vatekuaania, undu uu nutumaa miti yiana muvaka kiwango kila yaile. Miti ithengeanie niyaile miti yi minini indi miti yaendee na kwiana niw’o miti imwe niyithiawa yi minene na uthui mwingi kwi ingi. Miti ino niyo yaile kuekwa ikeana (“crop tree”). Thini wa kuamua ni muti wiva ukuvetwa na niwiva ukutiwa niwaile ni kuisiya kana mwanya ula wi katikati wa miti isu kana niwaile, ethiwa ndwianiie

niwailwe ni kumya miti imwe.

Itina wa kusakua miti ila ukumya, mitilile vaaya nthi, mithenya yukite kitina kiiu nutonya kwona kithongoote, nikana thongoo isu iikaendee kwiana niwaile kuitila ingi kuma kitinani.

Nzia imwe ya kumanya kana kusakua muti ula ukuveta ni kwa kusianisa undu muti wiana kwianana na miti ila ingi yavanditwe imwe. Elewa kana miti yianaa kivathukany’o kwianana muthemba wa muthanga, undu kiw’u kiana na vuu. Kwa vamwe, ethiwa miti ila yi vamwe ni ya ivinda yimwe miti ila minene niyo yailwe kuekwa ikena muvaka kuima “crop trees”. Kingi kitonya kutuma muti withiwa wi mwailu ni undu wina matu maingi kana tukava vala tui. Muti wina matu kana tuukava kuu yiulu withiawa utonya kwosa kyeni nesa na kwi miti ila matu me itheo na nitonya kwiana nesa. Mwisoni kana muti wa kuima “Crop tree” waile kwithiwa na muthamba /kitina kimwe, kitena uwau kana muinyu.

Onavala kuu tikwasya miti yothe minene niyaile kumw’a lakini kieleelo ni vethiwe na mwanya wa matambya eli (2metres) katikati wa miti in kana miti ila imeaa na ngava mbingi yithiwe yimianie na yiane nesa na kwosa kwa seve ila itumiawa ni miti (carbon capture) kwithiwe kwa iulu.

Yila uutumia nzia ithi syi vaa iulu lilikana kana kwiana kwa muti kuendanasya na muthemba wa muti. Kethiwa muti wa kiembe ni wianite vamwe na musanduku, kiembe kithiawa ki kinini na kianite mbola kwi musanduku ula wianaa na mituki, niw’o ndutonya kutema kiembe kiu nikwithiwa ni kinini kwa kuisiya. Niw’o muembe ni wavata nundu nutumiawa ta liu na ona kutwika wianaa kavola, na kwi miti mithemba mingi itumikaa maunduni kivathukany’o na ti kwa kwosa seve thuku tu (carbon capture). Ngelekany’o ni ta muti wa



muunyi, muti uyu niwaile kuunenga mwanya munene nika wose kyeni na sua nesa nikana umesye mbonge na ngava mbingi kwa mituki. Ethywa wienda miti ya kusiaa seve nayo niwailwe kumivanda kwa musitali ithengeanie nikana ithunge.

Kusea.

Nthini wa mititu ya kwimesya, miti niyi sea yo mbene. Ngava ila syi yiulu nivithaa tuukava kana tuvonge tula twi nthi wasyo na matu ma mbonge syithi mayambiia kuma na kwoa kila kitumaa nasyo mbonge/ngava isu syuma na kwoa na iyitila kuma mutini. Oyila kwisea kwa miti kutonya kwithiwa thini wa mititu ya TIST, nivaile vala ve vata na ni useo kusea na moko. Yila uutw’a /kuamua ni ngava/ mbonge syiva ukumya niwaile ni kuatiia nzia imwe, nikwithiwa miti yothe ndiseawa undu umwe.

Miti mithemba mingi yailwe ni kwithiwa na muthamba umwe kuma nthi. Miti ya muthamba umwe niyianaa mituki na ndithiwa na thina wa kwatuka yila kwina kiuutani. Ethywa muti wina mithamba mingi na niwasakuwa ta muti wa kuima “crop tree” ve syindu waile niumanya ta muthamba ula munou/munene niwaile, na ndwaile kwithiwa wi mwou kana kwoneka wina matu maingi ni waile ithiwa wi mulungalu.

Kindu kimwe kyosawa nai nthini wa kusea ni kana mbonge ila syianite vamwe na muthamba nisyaila kutemwa.

Uu ti w’o kutilwa kwaile kwa ngava ila yivaasa na muthamba. Kiikitumaa muthamba uyu waile wiana na kuvwika kitau kiu nundu wianu wa ukava usu niwianaa uvoetye kitau kii vate kwoa. Sisy visa namba 3 ula uatiie.

Yila ukusea miti ndukasee na itomo ati nikwithiwa kaingi nitumikaa ta ngu kana uithyo wa indo. Lilikana kana kusea nikutumaa miti yiana yina uima mwailu na ingi kwa ivinda ikuvi ikiana na mituki, kumya matu kutiaa muti utena vinya mwianu

wa kwosa sua na kwoou uituma muti withiwa na thina wa kwosa sua na uyithiwa na kitau kila kyaile uvoa. Itina wa kusea vala wasea nivaile kuekwa vakavoa, ndwaile kuvwika kitau kiu kiikatume muti usu wambiia kwoa kana kulikwa ni sumu, nundu muti uyu uvoaa uta mundu atemwa.

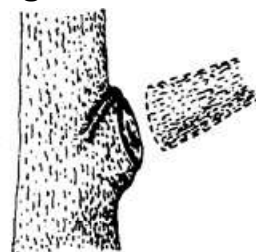
Undu ungi ni kana muti wasewa vala vaumw’a ukava vambiia uthongoo ovau utee kwoou nuseo kutila thongoo isu itaneana kaingi iisyokaa uthongoo ingi na ninzeeeka na mituki.

Miti imwe ta ya matunda niyiekaa na kusyaa nesa yina ngava mbingi. Kwoou miti ino niseawa yi minini ngava ila syi vakuvi na muthanga nikana itonye kuthongoo ingi kuu yiulu na iyiana na mituki. Muti uyu wa mina kwiana wambiia kuthongoo ingi thongoo ithi noitilwe ni kana muti uyu withiwa na usyao museo na muti uthunge nikana usyae nesa. Ithiwa wisi niwaile unenge muti ivinda itina wa kusea mbee wa utana usea ingi nikana muti withiwe unavoaa itau na ukakwata vinya.

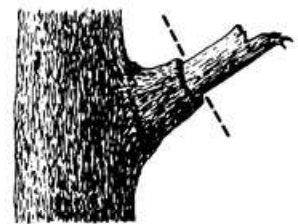
Lilikana kana thini wa soko wa seve thuku (Carbon market) nitwaisye nitwaile kwikalya miti vandu va ivinda iasa.

Miti niyailwe ni kwiana na kwikala ta vandu va myaka ta miongo itatu.(30years). Tuisea na kuimbia na kumitaanisya miti kwa useo wa myaka yukite. Miti imeete ta ikuthu nditonya utalika nthini wa soko ya nzeve itavisaa kwoou nditonya uvitukithwa nthini wa TIST ta miti italika.

Figure 3



Pruning cuts should be made just outside the branch collar.



On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar



TIST: Kuvulany'a na kuvandanisya mimea/maliu.

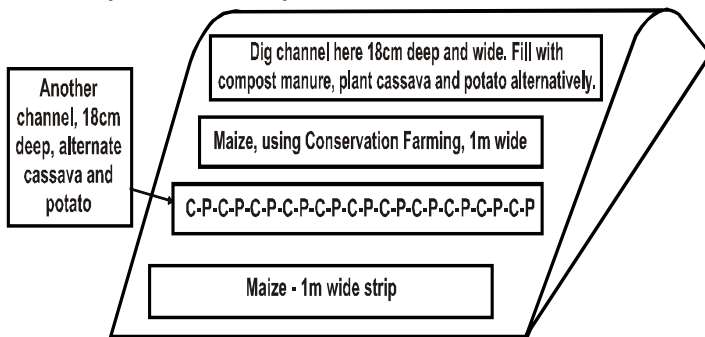
Kuvandanisya nivala mithemba ili kana mingaingi ivanditwe vamwe ivulene mbuani imwe. Kwa mithemba ila yaile ivokanyw'a nitonya kuete useo kwa muthanga, kwongela ngetha ona kuaa mitutu na mowau ula ukwataa mimea yi muundani.

Nima ya kuvandanisya/kivulany'o ni nzia ya kuvata mithemba kivathukany'o vamwe savali umwe ikethiwa na mbua imwe na no yithiwe yiya kuvandanisya miti na mimea/liu.

Ikundi imwe sya aimi ma TIST nitatite nzia ino yivaa nthi ila ninzeo kwa miunda ila mivauuku (yina itheeo).

1. Mukululo /laini wa mbee ni kwisa levu/mutau wina uliku wa 18cm na uthathau wa 18cm.
2. Ususya levu/mutau uyu na vuu wa yiima.
3. Vanda manga na maluu ivulene.
4. Mukululo/laini ula uatiie vanda kasio kena uthathau wa itambya mbemba uitumia nima ya kusuvia vala wisaa maima mauvanda.
5. Laini ungi wa manga na maluu.
6. Laini ungi wa mbemba.

Nzia ino itumiaa nzia imwe kati wa ila twimanyiitwye sya nima ya kivulany'o na itumiaa vuu wa yiima na nimaya kusuvia



- Tata nzia ingi ya kuvanda mbemba na laini sya miti. Ikundi imwe nitatite kwa kuvanda mbemba na miti ta Moringa/Yello cassia/Leucaenia/Bead tree.
- Laingi sya muvya muvandwa katikati wa miti ya Moringa kana Leucaenia
- Tata uvulany'a maiu na Calliandra, Calliandra na mboso, calliandra na mbemba, mbemba na mboso, mboso na leucaenia, mboso na maiu, mboso na kaawa kekanini.
- Tata kuvulany'a nthooko na mbembakana muvya kana mwee.

Tatithya na myanya wone nikiva kiika nesa na uitavwa tist kila woona na wamanya.

Kuvanda uivinduany'a mivai kivathukany'o kisioni kimwe

Kuvanda uivinduany'a ni undu ukuanasya vala

wiivandite ithiwa unavandite mbemba mbua mbitu kisioni kii mbua ino uivanda mboso. Ve nzia ila iatiiawa ukethia niwavanda mimea kuma mivaini kivathukany'o ya mimea. Kii nikitethasya muthanga muno ona muimi nundu muthanga nukwataa unou na vaita kivathukany'o kuma mimeani kivathukany'o ya mivai kivathukany'o nundu mii ya mimea kivathukany'o nitumaa mimea yosa liu kuma muthangani kwa uliku kivathukany'o. Kii ingi nikitumaa muthanga ulekany'a nundu mii yithiawa na uliku kivathukany'o na kuete utethyo kwa tusamu tula twikalaa muthangani na kutuma ona twongeleka.

Kukwata vaita wa nima ino ya kuvinduany'a kwa mithemba na mivai kivathukany'o nonginya kila ivinda uuvanda. Kitumi nundu muvai umwe niwendeeasya kiinyu na mitutu imwe na uwau umwe ndi wavinduany'a mivai ethiwa ve uwau kana mitutu inai inambii kulika muvaini ula unavandite nuvikiiaa na kuthela nakulea kwikinyia muthangani.

Vaa ve mithemba ya mivai kivathukany'o ya mimea. Mimea ya muvai umwe ndyaile uvandwa vandu vamwe mbua siatianie. Lilkana uvulany'e na uikuany'a. Ikundi sya mivai kivathukany'o nita:-

1. Kikundi 1. Cucumber, Ikuu, malenge, Mongu, matikitiki (gourd Family).
2. Kikundi 2. Broccoli, Brussel Sprouts, Makavisi, Coulliflower, collards, sukuma, radish, turnip, mustard, watercress (Crucifer/ Brassica family).
3. Kikundi 3. Eggplant, matulu, manyanya, maluu (Solanaceous family)
4. Kikundi 4. Lettuce, artichoke (Aster family)
5. Kikundi 5. Mbemba, musele, muvya, ngani, museleku, barley, wimbi (grains and cereals family)
6. Kikundi 6. Mboso, mivai ya mbiisi, nzuu, (legume family)
7. Kikundi 7. Saumu, Leek, kitunguu, chives (Allium family)
8. Kikundi 8. Kalati, celery, dill, parsnip, parsley (carrot family)
9. Kikundi 9. Manga, makwasi, ikwa, water chestnut, taro (root crop family)
10. Kikundi 10. Vamba okra (Mallow family)

Ethiwa walany'o uu wivaa iulu winavinya kuulewa nusyokete ukailwa ukoka ikundi sya mithemba itano vandu va ikumi ila ni waile ukuany'a kila mbua kwianana na walany'o wa (kisomo kya Infor-net-biovision Website)

- a) Mivai ya matu (sukuma, sivinakiyi, broccoli, makovisi etc) Nundu niyendaa liu mwingi kwi mivai ingi.



- b) Mimea mithemba ya mitunda (matulu, eggplant, ndulu, manyanya naingi mbingi) nisyendaa unou wa muthanga o kiasi lakini ti mwingi ta wa mimea ya matu.
- c) Mimea ya mii (kalati, betroots, maluu, kitunguu, radishes, turnips, makwasi, manga) nimendaa liu munini kuma muthangani masianiw’a na mimea ya matu.
- d) Mimea muthemba wa mavoso (mboso, mbiisi, ndengu, thooko, nzuu na ingi mbingi. nisyithiawa na useo ungi nundu nisyongelaa muthanga unou wa nitrogen.
- e) Mimea muthemba wa cerials (mbemba, uimbi, mweee, muvya, uimbi na ingi mbingi).

Kya usisya ni:-

Tata uvandanisye mbemba na nzuukaranga mbua ya mbee na mbua iatiie uivanda muvya. Tata uvande nzuu karanga mbua na uivulanya ni muvai muthemba wa mavoso ta ilaa(sunflower) na kana malumbua ya keli.

Kingi kiseo kya utata ni kuvanda mbemba iatiwe ni muthemba wa mavoso ta soybeans kana nzuu kalanga. Na mbua ila iatiie uivanda muvai ungi wa uete mbesa ta vamba.

Tata ingi kwa kueka muunda uteuima kana kuithya vandu va ilungu ya mwaka na indi uisyoka uvande myaka ta 3 - 5 mbee wa kueka ingi kwa ivinda o yamwaka. Kii nikiunenga muthanga ivinda ya kwitungiania na kutunga unoi. No wikie kitwethya vau utekuima ethiwa wina indo.

Kwavamwe nikana niwaile uvanda muthemba wa mavosvo mbee wa kuvanda mbemba kuvanda mumea kuma muvaini wa Brassica kana makovisi mbee na itina wa kumya muvai wa solanaceous(eg manyanya) ni usiia uwau ula withiawa makovisini na miini witawa nematodes na mbaa.

Vaa itheo ve kieleelo kya undu wa ukuanya mivai kivathukany’o kuma kwa infor-net-Biovision. Vaa vosetwe ngelekany’o ya muunda wina vuloti inya kana levu inya ila ikukua ivinda ya mbua inya kila mbua yina myai ina.

Alley cropping



Mbua yambee

Levu 1: Bemba/kitunguu saumu/kitunguu/kana leeks

Levu 2. Eggplant/chilies/maluu/na manyanya

Levu 3. Broccoli/lkovisi/Cuuliflower / na sukuma

Levu 4. Mboso/NzUU/Ndengu/ mbiisi

Mbua ya keli

Levu 1: Mboso/NzUU/Ndengu/ mbiisi

Levu 2. Broccoli/lkovisi/Cuuliflower / na sukuma

Levu 3. Eggplant/chilies/maluu/na manyanya

Levu 4. Mbemba/kitunguu saumu/kitunguu/kana leeks

Mbua ya katatu

Levu 1: Broccoli/lkovisi/Cuuliflower / na sukuma

Levu 2. Mboso/NzUU/Ndengu/ mbiisi

Levu 3. mbemba/kitunguu saumu/kitunguu/kana leeks

Levu 4. Eggplant/chilies/maluu/na manyanya

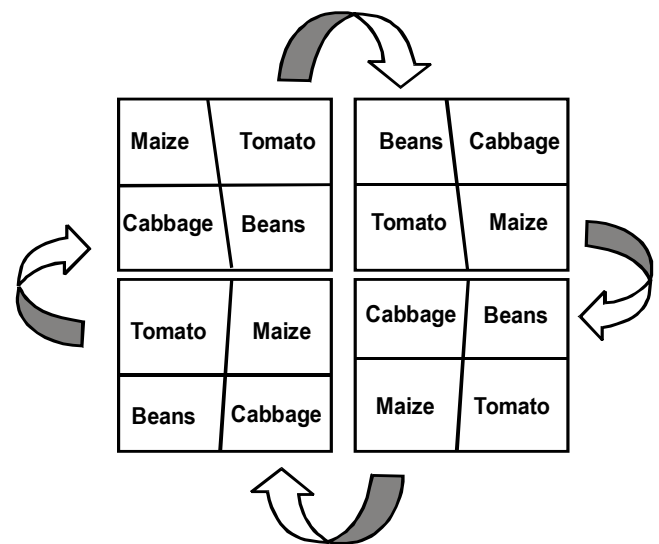
Mbua ya kana

Levu 1. Eggplant/chilies/maluu/na manyanya

Levu 2. mbemba/kitunguu saumu/kitunguu/kana leeks

Levu 3. Mboso/NzUU/Ndengu/ mbiisi

Levu 4. Broccoli/lkovisi/Cuuliflower / na sukuma





Kuseuvya vuu wa yiima - Vuu ute na kemikoo.

Vuu wa yiima ni vuu useuvitw'e vate ndawa na mimea kuma muundani na nutumaa mimea yiana nesa. Ni museo kwi vuu wa kuuu ula wina kemikoo nundu niwakuma mniemani na niwamana ti wakuu na nwanangaa liu kana mawithyululuko ta vuu /vatalisa wa kuuu. Ve nzia mbingi sya useuvya vuu uyu, lakini ve nzia imwe nzeango kwi syothe isioni imwe. Kulya mutui waku wa ngwatanio yenyu kila kithukumite nesa kwoo.

useuvya vuu wa yiima.

- 1) Kusakua kisio kya matambya 4 x 4m na kwisa yiima.
- 2) Enga kisio.
- 3) Inza yiima uthathau wa 3 - 4m na 1.5uliku.
- 4) Kolany'a matialyo ma mavemba, muvya, mavoso na uutilanga tulungu tuniini.
- 5) Ikiya yiimani itumie uliku wa 0.5m.
- 6) Ikiya muu wa lita itano.
- 7) Ongela kyaa kya indo ethiwa kivo kya uliku wa 30cm ethiwa vaii oundu kiana (uyu ni vuu wa nguluwe, ng'ombe, mbui kana nguku).
- 8) Ongela matu na makusa uliku ungi wa 0.5m.
- 9) Ikiya muu ungi wa lita itano.
- 10) Ongela matu na makusa withie yiima notayausua.
- 11) Ususya yiima na muthanga.
- 12) Uyususya yiima ikia muti muasa kati withie utinite yiimani ungu.
- 13) Eka yiima yiu yiyiue vandu va myai itatu kana mithenya miongo kenda.
- 14) Ivindani yii yonthe osaa kiw'u kila kina kiko uketa vo ngelekany'o kila wavua nakyo kana kuthambya miio. Ethiwa wina maumao ma indo no wite vo.
- 15) Kii nikyongelaanzeve ya Nitrogen nthini wa vuu.
- 16) Tata navinya ungithye yima yii kila muthenya kwa nzia ila utonya.
- 17) Itina wa mithenya miongo keenda vuu wiithiwa wi tayali.

Tumia muti uyu wikati ta kithimi kya uvyuvu. Vuu wasuva ukeethiwa wimuvyu na nowone muti uuyu waumya uitoa.

Utumii wa Vuu wa yiima.

wenza maima ma uvanda mbemba, muvya kana o mimea ingi ikia ngundi imwe ya vuu kila yiimani. Syaisya wone kila ukwata kuma vo!

Mazingira Bora



TIST

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

Kipsigis Version

*TIST is an innovative, time - tested,
afforestation program led by the
participants.*



Ndunguri TIST Clusta ya County ya Tharaka Nithi wakiwa kwa mkutano wao wa kila mwezi.

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Serishet ak chororet ketiguk sikobwa komie.

Tugul en tugul, boisietab serishet ak istoetab sakek chechang kotetat kotoret chametabgei nebo ketit ak timdo tugul komugul. Niton keyaei kokakewei ketik chekararon en timdo tugul. En ketik chechang kou chebo gaa,krivelia,blukam ak saipres ,chuton ko ketik che echen en tugul ak kotinyei temet agenge ne chulat. Makchingei ketik poroindo ko tiengei ole pitei, ole kakikolda ak etaptab barak lakini imuche kobais tuguk alak.

Sikopityo komie ketik, komakatin mitainik aeng en kwenetab ketik. Niton ko eng ketik che chang chebo TIST kou krivelia ak saipres nganda mache ketik alak paraindo neo cheu maembe ak makademia. Igochin paroindo ne mie ketik kosich bek ak tuguk che igochin kurut komie. Iyanat paraindo ne kiten yontakomengech ketik.Yan ekitu ketik, koegitu alak kosir alak. Kisere ketik si korut en boraindo ne yamei.

Yekailewen ketik che kiistoi, ketilei chuton en ng'wony. Yeipata wikisyek ak arawek, kotoi kobityo

ketik alak eng ketatan amu ing'ata. Kiiriye ketichuton mengech en ng'onny yon imache mapityo. Ngot ko chang ketik chekergei en oldo agenge keistoi ketik chemengech ak kebakakta cheechen kobityo. Atebetab metitab ketit ko kit age nebo komon. Ketik che tinyei metoek che baraen komuche konam kimnatetab asista kosir chemiten ng'wony ak komuch kobwa komie. Ne letunen, temik chetinyei kwenut agenge chematinyei mianwogik anan ko kiging'em. Nesire komoibaru kole ketik tugul che nuagen konyoru keisto! Barchingen baraindop mitaishek aeng sic kjomuch kokimegitun ak koechegitun akomuch koam koristo neo.

Yan imache iseraser ketik, konyolu inai ile ketik che terterchin koechegitu kotiengei kineu. Ngot konyonen maembe ak yemi blakam che chang, komuch kominginit kosir olemiblukam che kachan'ga. Maembe komuch korut kosir blukam chechagu, noto anyun konyalu ketil amun mingin.en imanit, ketit neu maembe kobokamanut missing



amun en tuguk che konu cheu lokoek che kiamei ak kialdoi. Maembe kora ko kararan en minutik alak che rutu en im bar. Blukam komuch kowech ketik alak ak minuti komarut komie. Bo kamanut kibwat niton yan ileweni ketik che iseraseri.miten boisionik che chang chebo ketik kotiengei kit neu ketit kotabala ametab koristo. Kou en kabarunet, imuch imache ketik che konin uruet. En niton, konyolu igochi paraindo ketik kosir ole chamikochindoi sikonyorf asista neo. Niton kogochin ketit koet ak kogochin temenik che chang en ketit. Kot ketik che tertai koristo en lainit imuch inde ketik korupkei nganda nyolu keisto ketik chemi komoswek si kotes timwek.

Chororet

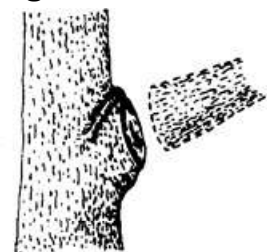
En timdo nebo ketikab kipgaa kochororigei ehegen.Temenik chemiten barak kotuchei chemite ng'wony. Yon inamei komeyo sokek chemitei ng'wony komeei kora temenik chenamei sakechuton. Temenik chekikosaiyo ak che kikochoroty kobutos ichegen. Imuche kochororak sagek ichegen en imbarenikab TIST

nganda toreti ngeisto sokek keboisie eunek. Nganda mache ketik cheterter olekichortai koterterchis komiten oratinwek che ratinwek che boisie en ketik tugul.

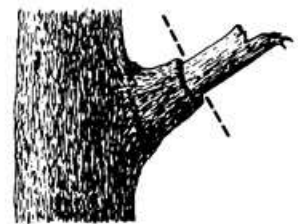
Ketik che chang ko magat kotinye temet agenge en ngwony. Ketik che tinyei ketit agenge koetu en chokchinet ak ketile yon miten robta.Ketik ne tinyei bitunwek che chang keibe koek minutik, yon kichenge ketit ne kiribe, cheng ne o en tugul ak inai ile matnyei miando age tugul ,ak kotinyei sogek ak ko tomo konun ak ko chulat.

Bik che chang kobwate kole kitile temenik en che matuitos al temenik. Inoni ko lembech. Tilet ko nyolu kotuiyo ak temenwet konegitchi ketit. Inoni koboose ole yataat ak kobagachi en orititab ketit si kogochi ketit koet komie en kasarta ne mie.

Figure 3



Pruning cuts should be made just outside the branch collar.



On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar



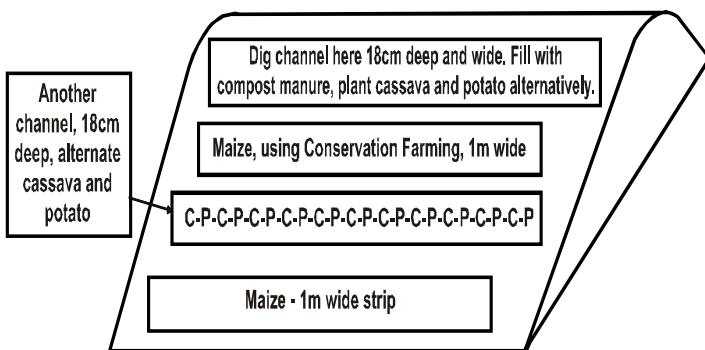
TIST: Koyometab minet chebo minutik.

Koyometab minutik chesire oeng en imbar anan kochechang en kasarta agenge niton kotoreti kotes timuwek kotesin ngungunyek kisich okwointo ak kongem suswe ak miyonuek.

Koyometab minutik komoe kole minetab rurutik chebesiotin en kasarta nenin kobo menetab ketik kou alley cropping miten anyun temik chebo TIST chekigoyom en tulonok.

1. En lainit netai kebole 18cm orit ak tebesinto
2. Kinte keturek
3. Kemin mogoak biasinik kosibngei
4. Lainit nebo oeng komin bandek 1m
5. Lainit ne isibu keminchi mogo ak biasinik
6. Lainit neisibu kemin bandek . E.t.c

Kigeboisien oraniton mising amun kigenyoru konetisiet kou koyometab minutik koboisien keturek imbaret ne makibat



- Yumten bandek ak ketik en lainitab kiyomta kurubisiek alak 3m chebo bandekak moringa /yellowcassia /eucaenia/bead tree.
- Lainitab mosoniking ak moringa ak leucaenia.
- Koyometab calliandra ak indisinik ,calliandra ak ngatek calliandra ak bandek, bandek ak ngeutek, ngeudek ak leucaenia ngendek ak indisinik ngedek ak kawek [komege chen]
- Koyometab cowpea ak bandek /songhum /bek. Yomten tuguchu asi inyoru wolutik ak imwochi TIST.

Kibwate nebo waletab minutik.

Noton anyun kominetab minutik cheter chin en imbaret ne agenge en kasarta neter kararan mising noton amun igochin imbaret kouyon okwoiyet amun minutik alak kotinye tigitik.

Chebenti kwony mising konyoru omitwogik Chemoten kwony, nyorunen kotik che miten ngungunyek kotesak amun bosbus ngungunyek Miten cuyun keiunet neo yon kagimin rurutik che besiolin en imbar amun agotkemin minutiet ne agege ko nyunmnyum kenyor susutik ak miyonuek ek minutik.

Che isibu ko minutik chemonyolu kemin kosibgel en kasarta egenge

1. Cucumber,gourd,pumpkin,sguashes,watermelon,gurd famliy,
 2. Broccoli, brussel sprouts, cabbage, couliflowers, collard, kale radish, turnip mustard, watereress (brassica family)
 3. Eggplant, pepper, tommatoes, potatoi (solanaceus)
 4. Lettuce, artichoke (aster family)
 5. Maize, rice, sorghum, wheat, cat, barley, millet, (grain and cereals family)
 6. Beans, and peas (legume family)
 7. garlic, leak, onion, clive (allium family)
 8. Carrot, celery, dill, parsnip, parsley (carrot family).
 9. Cassava, sweet potato, taro, yam, water chest nut(root crop family).
 10. Cotton, okra (mallow family).
- A) Sogegab (broccoli, cabbage, cauliflowers, kale, spinach atc) komoche missing omtuwokik chechang kosir nkewe alak.
- B) Logoek (chillies, eggplant, pepper, tomatoes) komoche omituwoki chechang ago mogou, che tinye sogek.



- C) Minutikab tigitik (carrot, beetroots, potatoes onion, radishes, turnips etc) moche ichek omituwogik che ngerin omoguu chebo logoek anan chebo sogek.
- D) Minutik kou (beans, chiek peas, cow peas, gram, peas, pigeon peas etc) toreti koyomti omituwogik en koristo ak kotesi ngungunyek
- E) Minutik (bandaek, mosogik, ak beek).

Okibwat kabwatani

Yomten imin bandaek ak ichuguk en kenyit agenge nebo imin mosonik min ichuguk kenyit anenge nebo oeng imin legum, sunflower, potatoes yomten bndaek agosib, legume kou soybeans or groundnuts ne isibu imin kou cotton.

Yomten ibagach imbaret kenyit agenge komagitem, yeisibu imin kenyisiek 3-5, niton kogochin koret konyor omituwogik, kol napar agot intinye tuguka.

Entugul isib imin minutik chebo tai kou ngende asi igote bandek, min minutik kou cabbage (brassica family kou ye isibu imin family solanaceous) kou nyanyik.

Che isibu ko minutik che kigole kosibgei yeibata age.

Minet netai:

- Plot 1. Maize/garlic/onion/leeks
- Plot 2. Eggplant/chillies/potato/tomato

Alley cropping



- Plot 3. Broccoli/cabbage/couflower/kale
- Plot 4. Beans/cowpeans/gram/peas

Koletab oeng:

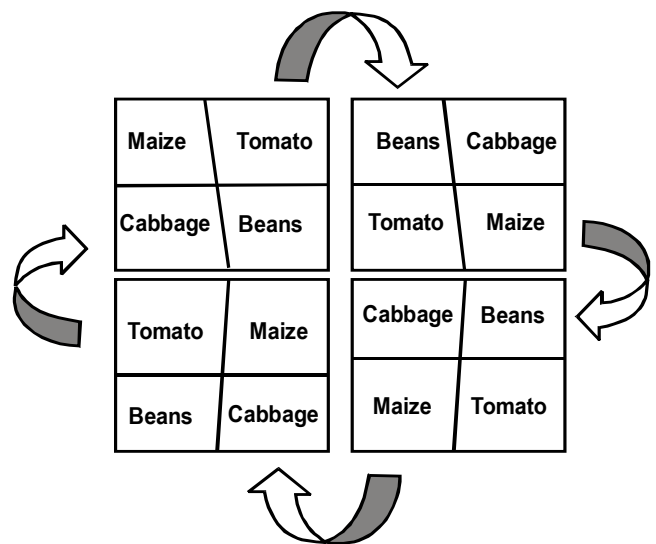
- Plot 1. Beans/cowpeans/gram/peas
- Plot 2. Broccoli/cabbage/couflower
- Plot 3. Eggplant/chillies/potatos/tomatoes
- Plot 4. Maize/garlic/onion/leeks

Koletab somok:

- Plot 1. Broccoli/cabbage/caouliflower
- Plot 2. Beans.cowpeans/gram/peas
- Plot 3. Maize/garlic/onion/leeks
- Plot 4. Eggplant/chillies/potomatos/tomatoes

Koletab angwan:

- Plot 1. eggplant/chillies/potato/tomatoes
- Plot 2. Maize/garlic/onion/leeks
- Plot 3. Beans/cowpees/gram/pees
- Plot 4. Braccoli/cabbage/couiflower





Ketoo keturrek chebo minutik.

Keturek ko toreti mising minutik kochok en ngungunyek. Ago kororonen amun motinye ngemet en rurutik ago nyumnyum kenyor ago motiye oliyet neo mising, motiye ngemet en agobo ltondab emet.

Miten anyun orinuwek chechang che kimuchi ketounen keturek en koborunet ne isibu ko kigoyomnda biik chechang temik. Otebenge en Kilasta ole kiboisio to biik alak.

Tounet ketoo kechob keturek.

1. Lewen ole imuchi ichoben keturek (4m by 4m).
2. Itilil yoton.
3. Bal keringet netinye kokwoutik 3m - 4m - 1.5m kochut orit.
4. Iyum anyun ngetunanikab imbar tugul ak itonaton komengegitun ak itorchi keringet chon ko kou (sogegab ketik mobekkab bandek, ngendek) ak alakau.
5. Torchi keringt koit 0.5m.
6. Tesin beekab 5ls chebo orek.
7. Tesin sorowekab tuga, neng, lgogenik kot koit 30cm.
8. Tesin ngetunanaik kot koit 0.5m.
9. Tesin beek 5ls chebo orek.
10. Testai itesi ngetunanik got konyi keringet.
11. Tesin baragut ngungunyek.
12. Ye itestai icheng bitoiyot ne koi ak ilumchi kwenutab keringet kot kotiny kwony.
13. Igomuny keringet kotar betusiek 90(orowek somok).
14. En kasariton tugul itestai itumchi beek chon kiunen tuguk en kaa. Ingot itinye tuga imuchi iyum sogororek asi itesi keringet.
15. Niton kotesin nitrogen.
16. Yai kouniton en betusiek tugul.
17. Ye kagobata orowek 3 ko koruriyo keturek.

Togunen burgeyet ne mi keringet.

Boisiyetab keturek:

Ye kagoit ichob imbaret inam ibal keringonik kosibgei ak minutik cheimoche igol. Keringet angenge koibe keturekab rubeito, rib anyun wolutik che bitunen imbarengu.