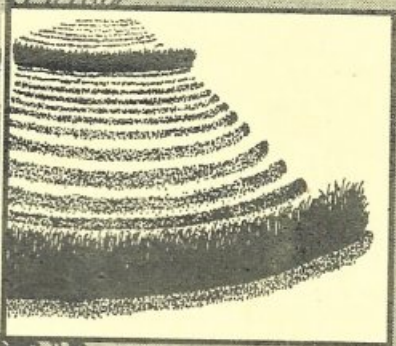


UDZU WA VETIVA



**KUTETEZA
KUKOKOLOKA KWA
NTHAKA**

UDZU WA VETIVA

Authored
by

John C. Greenfield

1987
World Bank

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MAU OYAMBA

Kwa Alimi onse,

Lero ndili wokondwa kwambiri pokhala ndi mwai uwu wapadera woti tikumbutsane za udindo wathu womeyana ndi mmodzi mwa adani adziko aja: NJALA kapena KUSOWA CHAKUDYA.

Monga mudziwa, mwa anthu onse okhala m'dziko muno, chiwerengero cha alimi chiposa magulu a anthu ena onse. Ichi ndi chifukwa chakuti dziko lino limadalira ulimi pankhani yochepetsa njala.

Zina mwa zolinga zazikuluzikulu za Unduna wa za Malimidwe ndi Chitukuko cha Ziweto ndizo:-

- (i) Kupititsa patsogolo chitukuko cha ulimi ndi Ziweto kuti tizidzidalira pa chakudya;
- (ii) Kupititsa patsogolo chitukuko cha umoyo wa thanzi wa anthu onse; ndinso
- (iii) Kuthandiza anthu kuti azipeza ndalama pogulitsa zina mwa mbewu ndi ziweto zao.

Undunawu umaika mfundo izi mwa zina zambiri patsogolo pofuna kuthandiza alimi kuti ulimi wawo upite mtsogolo.

Chilipo chinthu chimodzi chimene chikuopsyeza chitukuko cha ulimi m'dziko muno komanso m'madera ambiri a padziko lonse la pansi. Ichi ndicho kukokoloka kwa nthaka, makamaka

nthaka ya chonde yomwe ndi maziko a ulimi wonse m'dziko muno. Udzu, mbewu kapena mitengo sizingamere ndi kukula popanda nthaka. Choncho, ndichochititsa mantha kuti chaka ndi chaka nthaka ya chonde yochuluka kulingana ndi mapiri imakokoloka ndi madzi a mvula kupita kumitsinje ndi ku nyanja komwe sidzaonekanso mpaka muyaya. Zoopsya zotere zimachitika kawirikawiri ku madera okwera ndi otsetsereka, monga m'mpheapete mwa mapiri. Komanso ngakhale ku zigwa nthaka imakokolokanso pang'onopang'ono kotero kuti sitizindikira msanga kufikira itayamba kuguga. Pang'onopang'ono, timiyala ndi nthaka yopanda chonde yapansi imayamba kuoneka pa mtunda. Nthawi zambiri izi zimachitika ndi madzi a mvula amene amathamanga m'minda ndikukumba ngalande zikuluzikulu. Mbewu sizingathe kukula bwino m'madera otere. Chotsatira chake ndi njala ndi umphawi popeza zokolola zimamka zichepa chaka ndi chaka, Ngati nthaka yonse itha kukokoloka ndi kusiya miyala yokhayokha, alimi sangakolore chilichonse ngakhale atathira feteleza m'minda mwawo.

Kuonjezera apa, madzi a mvula akathamanga m'minda sangapeze mwai olowera pansu. Zikatero ndiko kuti ngakhale zitsime nazo sizingathenso kutulutsa madzi okwanira pa chaka chonse.

Tsono funso lalikulu ndi lakuti: Kodi tichitenji kuti bvuto ili lichepe kapenanso litheretu

kumene? Apa ndichodziwikiratu kuti mlimi aliyense ayenera kuyesetsa kupulumutsa nthaka.

Kwa nthawi yaitali muno m'Malawi, alangizi a malimidwe akhala akutiuzza zakufunika kwa akalozera ndi migula m'minda yathu, pogwiritsa ntchito ma "A feremu", kapenanso 'Laini levulo'; kukweza njira zodutsa m'malire a minda; kukwirira zigwembe zobwera chifukwa chakukokoloka kwa nthaka; ndi malimidwe a makono a mbewu zosiyanasiyana.

Komatu ngakhale izi zili tero, palinso vuto limodzi popeza migwereyi ndiyopangidwa ndi dothi ndipo kuti pakapita nthawi imatha kufafanizikanso ndi mvula komanso ngakhale wanthu ndi ziweto popondapondapo.

Pachifukwa ichi, lero ndili wokondwa kwambiri pokudziwitsani za mtundu wina wa udzu wotchedwa "VETIVA". Udzu umenewu umayenera kubzalidwa pa migwere (migula) kuti vuto lakufafanizika kwa migwereyi lithe. Izi zimatheka chifukwa udzuwu ukagwirana ndi kuyangata bwino, umapanga mpanda pomwe nthaka yokokoloka ndi madzi imatsakamira.

Kodi nanga udzu umenewu maonekedwe ake ndi wotani? Nanga tingaubzale bwani? Nanga ungasamalidwe bwani kuti ugwire bwino ntchito yake yoteteza nthaka?

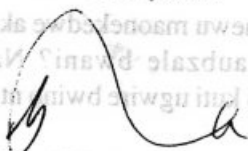
Mayankho a mafunso amenewa ndiwo gwelo la kabuku kano. Kabukuka kanatanthauzidwa

kuchokera m'kabuku ka Chingerezi. Cholinga chochitira izi ndi chakuti inu alimi mukhoza kukagwiritsa ntchito podzikumbutsa za mmene mungagwiritsire ntchito udzu wa "vetiva". Kabukuka kadzasanduka bwenzi lanu lokuthandizani kupulumutsa miyoyo ya a Malawi onse kudzera m'kuteteza nthaka.

Pomaliza ndikuthokoza a Bungwe Lowona za Chuma pa Dziko lonse Lapansi la World Bank, popereka chilolezo ku bungwe la PAPPPA, lomwe limalimbikitsa kuteteza nthaka ndi malimidwe a makono, kuti litanthauze kabukhuka m'chichewa. Ndifunanso kuthokoza ogwira ntchito m'bungwe la PAPPPA chifukwa chodzipereka kwa thunthu pa ntchito yonse yotanthauzira ndi kusindikiza kabukuka.

Ofalitsa Nkhani mu Unduna wa za Malimidwe ndi Chitukuko cha Ziweto (Agricultural Communication Branch) tiwaombere m'manja chifukwa ndi amene adatanthauzira ndi kusindikiza kabukuka.

Ndikufunirani kuwerenga kwabwino ndinso kuti tsiku lina tidzaoneko udzu obiriwira bwino wa "vetiva" ku minda yanu.



Dr. S.S. Kamvazina

(Mlembe Wamkulu wa ku Unduna wa
Za Malimidwe ndi Chitukuko cha Ziweto).

ZA MKATIMU TSAMBA

Mau oyamba	i
Nthaka imakokoloka ndi madzi a mvula	1
Ulimi wodalira mvula	6
Vetiveria	14
Maheji a udzu wa vetiva	16
Kubzala maheji a udzu wa vetiva	34
Kusunga chinyonho m'nthaka	41
Ubwino wa udzu wa vetiva poteteza nthaka ndi kusunga chinyonho	46
Ntchito zina za udzu wa vetiva	48
Kusamala udzu wa vetiva	69
Mizere yolondola akalozera	76
'Laini Levulo' ndi ntchito zake	78
"A" Felemu	84
Mmene mungagwiritsire ntchito zipangizozi	86

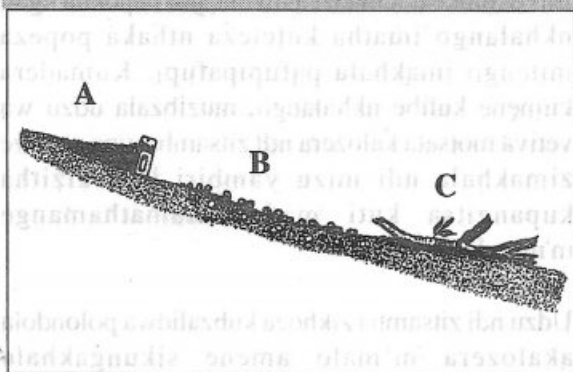
NTHAKA IMAKOKOLOKA NDI MADZI AMVULA

Nthaka yambiri yimakokoloka ndi madzi a mvula makamaka pa malo osatetezedwa. Anthu ambiri sazindikira chimenechi kotero kuti siambiri amachitapo kanthu pofuna kuchepetsa vutoli.

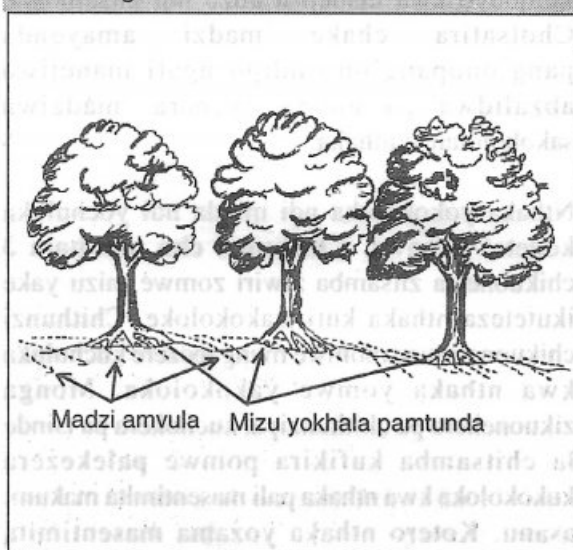
Tsono popeza vutoli limayamba kaamba ka mvula, nthaka imakokoloka kwambiri chaka ndi chaka nyengo ya dzinja. Chimene chimachitika nchakuti mvula yamphamvu ikamagwa, madontho ake amakumba nthaka makamaka m'malo osatetezedwa. Nthakayi imanka nikokoloka ndi madzi a mvula kupita ku madambo kapena ku mitsinje.

Zigwembe ndi makhwawa mukuona pa **Chithunzi cha nambala 1A** pakuonetsa dothi litakocheza, pa B pakuonetsa miyala yomwe yatsalira m'mbuyo chifukwa madzi a mvula alephera kuinyamura ndipo pa C pakuonetsa dothi ndi zinyalala zitakocheza pa mtengo wa kugwa. Vuto la mtundu umenewu limaoneka kwambiri kumadera komwe kuli mitengo yambiri, koma kopanda udzu malo ena. M'malo otere, kukokoloka kwa nthaka kumasiya mizu ya mitengo pa mtetete, monga mukuonera pa **chithunzi cha nambala 2**. Madzi amatha kudutsa pansu pa mizuyi ndipo nthaka ikakokoloka yonse mitengo imagwa.

Chithunzi Nambala 1: Zizindikiro za kukokoloka kwa nthaka ndi madzi a mvula



Chithunzi Nambala 2: Kukokoloka kwa nthaka ndi mitengo

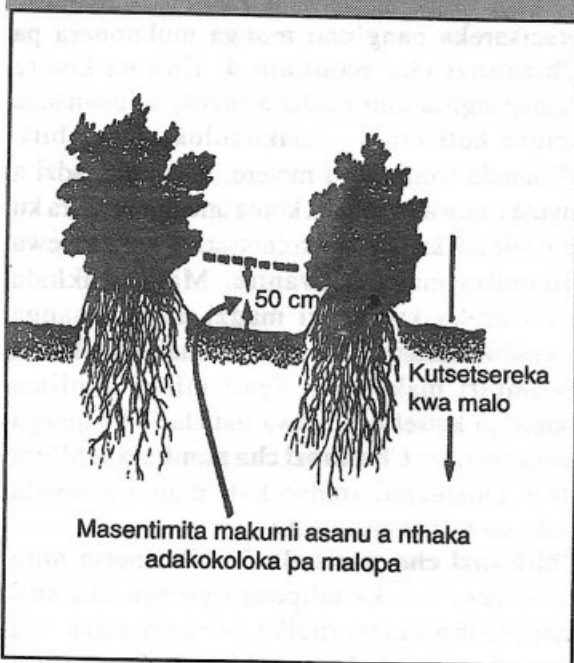


Mitengo payokha siingathe kuteteza nthaka kuti isakokoloke ndi madzi a mvula, pokhapokha ngati nkhalango imatha kuteteza nthaka popeza mitengo imakhala pafupipafupi. Kumadera kumene kulibe nkhalango, muzibzala udzu wa vetiva motsata kalozera ndi zitsamba zina zomwe zimakhala ndi mizu yambiri kuti zizitha kupangitsa kuti madzi asamathamange m'mundamo.

Udzu ndi zitsamba zikhoza kubzalidwa polondola akalozera m'malo amene sikungakhale nkhalango. Mizu ya udzu ndi zitsambazi ili ndi ntchito zambiri. Zina mwa izo ndi kuteteza nthaka kuti isakokoloke; kotero kuti nthaka imakocheza kumbuyo kwa maheji a udzu ndi zitsambazi. Chotsatira chake madzi amayenda pang'onopang'ono ndipo ngati mahejiwa abzalidwa pa mpata oyenera, madziwa sakokololanso nthaka.

Nthaka yokokoloka ndi mvula ndi yochuluka kodetsa nkawa. **Chithunzi cha nambala 3** chikuonetsa zitsamba ziwiri zomwe mizu yake ikuteteza nthaka kuti isakokoloke. Chithunzi chikuonetsanso momwe mungapezere kuchuluka kwa nthaka yomwe yakokoloka. Monga zikuonekera pa chithunzipa, kuchokera pa tsinde la chitsamba kufikira pomwe palekezera kukokoloka kwa nthaka pali masentimita makumi asanu. Kotero nthaka yozama masentimita makumi asanu yakokoloka pa malowa.

Chithunzi Nambala 3: Kukokoloka kwa nthaka

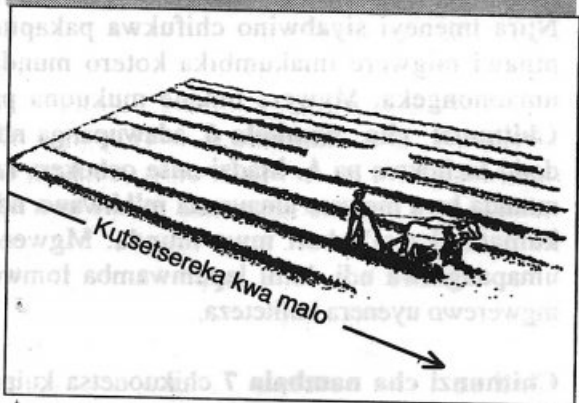


ULIMI WODALIRA MVULA

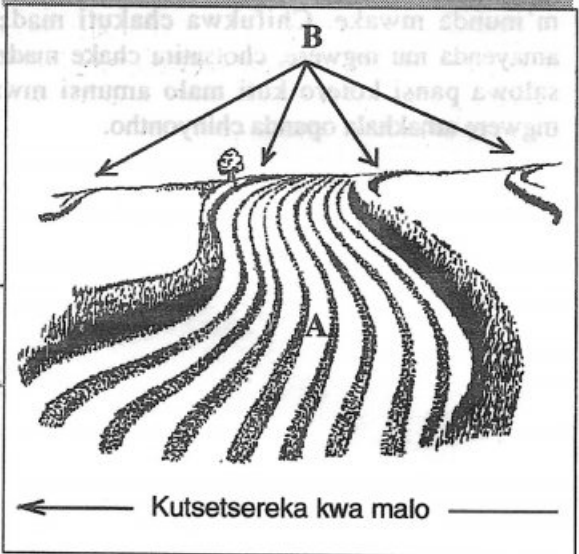
Alimi ambiri amene amadalira mvula pa ulimi wawo, amalima motsatira kutsetsereka kwa malo a munda wawo ngakhale mundawo ukhale pamalo otsetsereka pang'ono monga mukuonera pa **Chithunzi cha nambala 4**. Kulima kotere kumapangitsa kuti madzi a mvula azithamanga kotero kuti nthaka imakokoloka kwambiri. M'munda wolimidwa motere, theka la madzi a mvula salowa m'nthaka koma amathamangira ku mitsinje ndi ku madambo chotsatira chake mbewu siilandira madzi okwanira. Malo akakhala otsetsereka kwambiri madzi amathamanga kwambiri kotero kuti nthaka imakokolokanso kwambiri makamaka ngati mlimi akulima motsatira kutsetsereka kwa munda wake monga mukuonera pa **Chithunzi cha nambala 4**. Mlimi otere amathandiziranso kuti madzi a mvula asakhale m'munda mwake.

Chithunzi cha nambala 5 chikuonetsa njira yotetezera nthaka ndiponso yothandiza kuti chinyontho chizisungika pobzala udzu ndi zitsamba mu akalozera. Maheji a udzu ndi zitsamba akakhazikika salira chisamaliro chilichonse ndiponso amateteza nthaka kuti isakokoloke kwa zaka zambiri. Pa nthawiyi materasi amakhala akupangika chifukwa nthaka imakocheza ku mtunda kwa mahejiwa. Posiyanitsa ndi zomwe zimachitika pa **Chithunzi cha nambala 4**, **Chithunzi cha nambala 5** chikusonyeza mizere (A) yolimidwa polondola maheji (B) omwe ali mu akalozera.

Chithunzi Nambala 4 : Kalimidwe kachimakolo



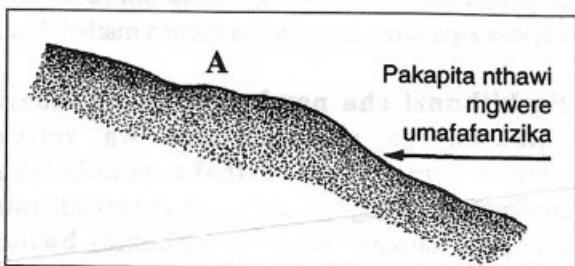
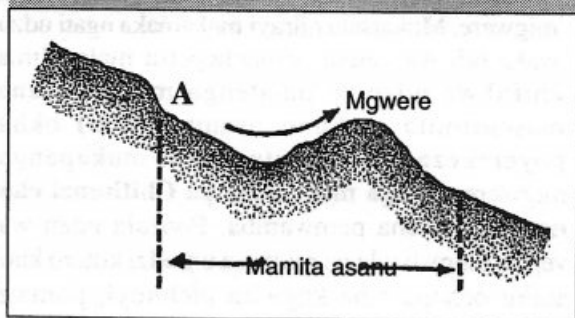
Chithunzi Nambala 5: Ulimi obzala udzu ndi zitsamba muakalozera



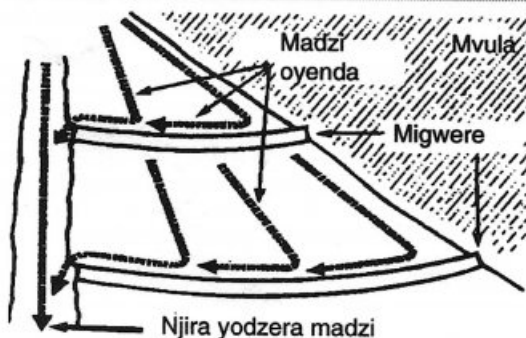
Kuyambira mzaka za m'ma 1930, alimi ambiri m'dziko lonse la pansi akhala akupanga migwere ndicholinga chochepetsa kukokoloka kwa nthaka. Njira imeneyi siyabwino chifukwa pakapita nthawi migwere imakumbika kotero munda umaonongeka. Mgwere umene mukuona pa **Chithunzi cha nambala 6**, adawupanga ndi dothi lochokera pa A. Madzi onse ochokera ku mtunda kwa mgwere amayenda m'khwawa ndi kumatayika m'mbali mwa munda. Mgwere umapangidwa ndi dothi lapamwamba lomwe mgwerewo uyenera kuliteteza.

Chithunzi cha nambala 7 chikuonetsa kuipa kwake kotsata njira imeneyi poteteza nthaka kuti isakokoloke. Madzi onse amayenda mu mgwere ndipo akafika kumapeto kwa mgwere amapanga njira yomwe mlimi sangafune kuti ikhale m'munda mwake. Chifukwa chakuti madzi amayenda mu mgwere, chotsatira chake madzi salowa pansi kotero kuti malo amunsi mwa mgwere amakhala opanda chinyontho.

Chithunzi No 6: Kupanga migwere pofuna kuteteza nthaka kuti isakokoloke



Chithunzi No 7: Momwe madzi amayendera mukapanga migwere m'munda

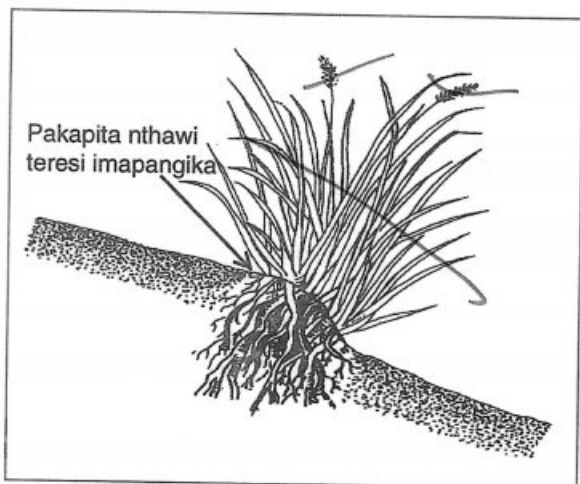
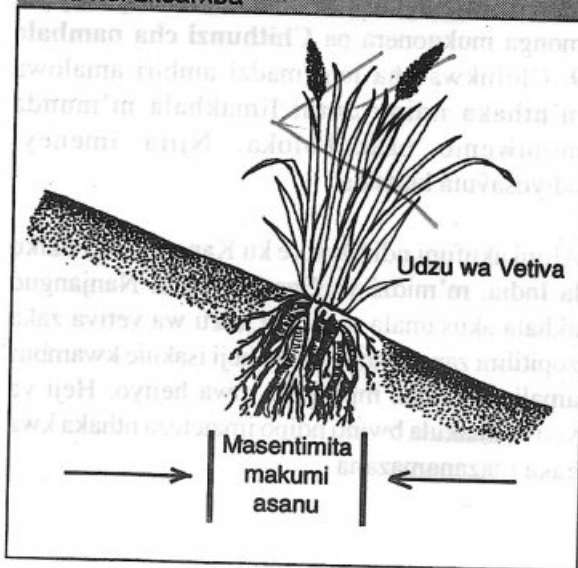


Kubzala udzu ndi zitsamba pofuna kuteteza nthaka ndikwabwino poyerekeza ndikupanga migwere. Mukatsata njirayi makamaka ngati udzu wake ndi wa vetiva, simuchepetsa malo olima chifukwa udzuwu umatenga malo okwana masentimita makumi asanu (50cm) okha poyerekeza ndi mamita asanu mukapanga migwere; monga mukuonera pa **Chithunzi cha nambala 8** cha pamwamba. Pobzala udzu wa vetiva mumabzala pa mkwasa umodzi kotero kuti anthu ochepa atha kugwira ntchitoyi, pomwe popanga mgwere mumagwiritsa anthu ambiri kapena zipangizo zina zodula monga mathelekita.

Pachithunzi cha nambala 8 cha m'munsi chikusonyeza m'mene udzu wa vetiva umatetezera nthaka. Nthaka yokokoloka imakocheza pa heji ya vetiva kotero kuti udzuwu umapeza chonde ndipo umaphukira bwino ndiponso materasi amapangika kuchokera ku nthaka yomwe yakochezayo. Materasi amakhala pa malopo mpaka kalekale.



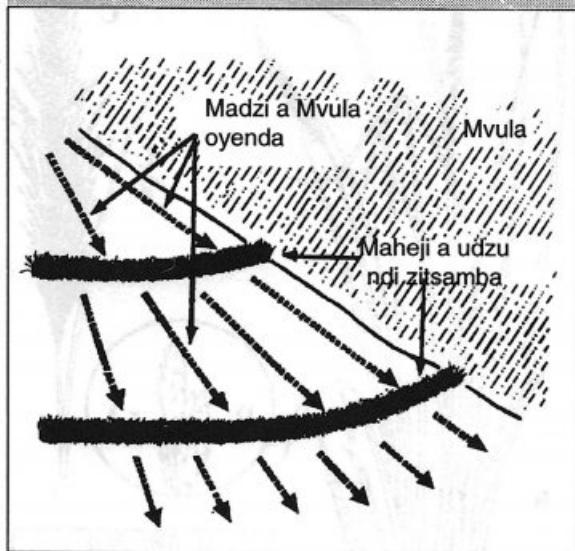
Chithunzi Nambala 8: Kuteteza nthaka pobzala udzu ndi zitsamba

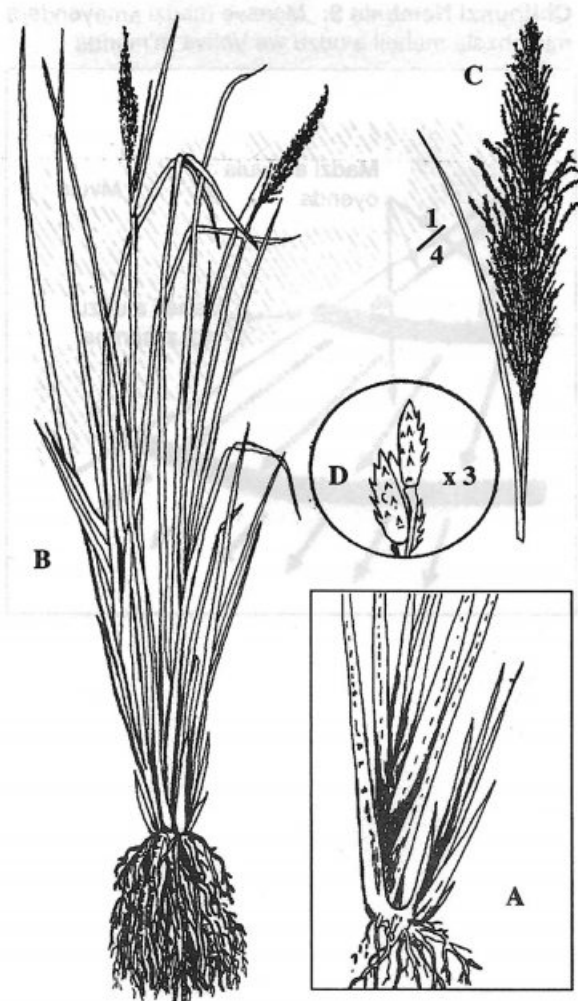


Madzi a mvula akafika pa heji ya vetiva sayenda mothamanga ndipo nthaka yonse imene inakokoloka ndi madziwo imakocheza pa hejiyo, monga mukuonera pa **Chithunzi cha nambala 9**. Chifukwa cha ichi madzi ambiri amalowa m'nthaka ndipo dothi limakhala m'munda momwemo osakokoloka. Njira imeneyi ndiyosavuta kuitsata.

Alimi akufupi ndi Mysore ku Kanartaka m'dziko la India, m'midzi ya Gundalpet ndi Nanjangud akhala akusamala maheji a udzu wa vetiva zaka zopitilira zana limodzi. Kuti heji isakule kwambiri amalima kufika mphepete mwa hejiyo. Heji ya vetiva imakula bwino ndipo imateteza nthaka kwa zaka mazanamazana

Chithunzi Nambala 9: Momwe madzi amayendera mukabzala maheji a udzu wa Vetiva m'munda





Vetiveria zizanioides

VETIVERIA

Mwa mitundu khumi ya udzu wokhwima yopezeka m' malo osiyanasiyana, udzu wa vetiva udaonetsa kuti ndi wotheadiza kwambiri poteteza ndi kusunga chinyonho m' nthaka. Udzu umenewu akatswiri pofufuza adawupatsa dzina lotchedwa "Vetiveria Zizanioides".

Mbewu ya udzu wa vetiva siimera ngati siuli pa zithaphwi, kotero siungafare m'munda. Udzuwu ulibe zikhawo koma mukabzala mizu yake kapena ziputu zimaphukira. Udzuwu umakhala ndi mizu yambiri monga mukuonera pa chithunzipo. Makwaule ake amakhala opsyapsyala, ataliatali ndi okhakhala.

Mitundu ya vetiva womera m'madzi ndi womera ku mtunda imalimba kukakhala chilala. Izi zimachitika mwina chifukwa chakuti madzi a m' masamba a udzuwu ndi a mchere ndiponso umatha kukhala masiku ambiri m'madzi koma osafa. Udzu wa vetiva umakula bwino pa nthaka iliyonse, ya chonde ndiyopanda chonde yomwe komanso m'malo ozizira.

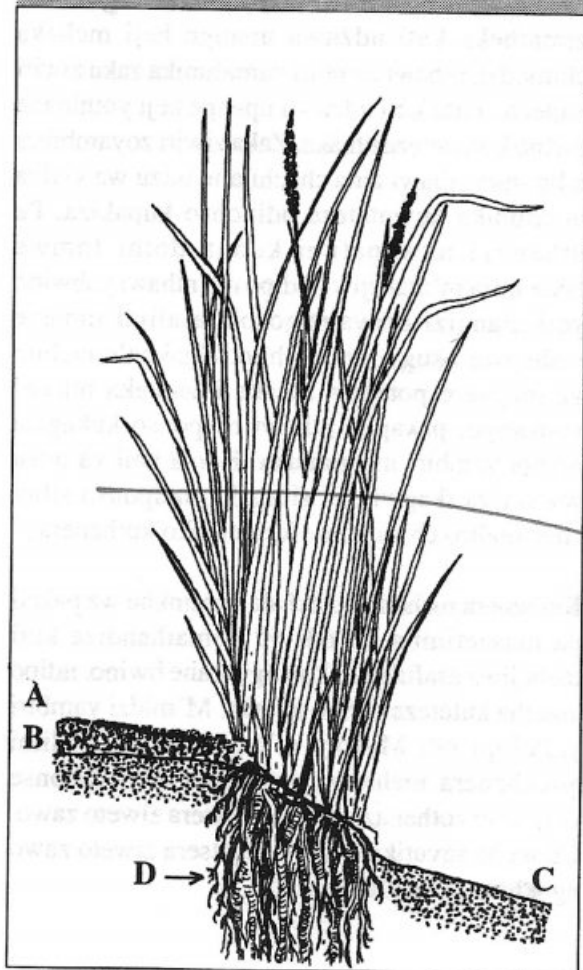
Njere za udzu wa "Vetiveria Zizanioides" sizimera wamba m'munda. "Vetiveria Nigritana" ndi udzu wa ku Nigeria womwe njere zake zimatha kumera.

MAHEJI A UDZU WA VETIVA

Chithunzi cha nambala 10 chikuonetsa mmene udzu wa vetiva umagwirira ntchito mukaubzala ngati heji. Udzuwu umachepetsa liwiro la madzi a mvula amene amakokolola nthaka monga mukuonera pa A. Dothi limeneli limakocheza pa udzuwu monga mukuonera pa B ndipo madziwa amanka nayenda pang'onopang'ono m'matsitso monga mukuonera pa C.

Mizu ya udzu wa vetiva monga mukuonera pa D, imagwira nthaka mozama mamita atatu. Chifukwa chakuti mizuyi imagwira nthaka, nthaka siichita ming'alu ndi zigwembe, ndiponso siikokoloka. Udzuwu uli ndi mafuta onunkhira omwe amapangitsa kuti mbewa ndi tizilombo tina tisadye ngakhale kukhalamo. Chifukwa chakuti mizu ya udzu wa vetiva, ndiyothinana udzu wina monga kapinga amalephera kuyaza. Alimi akufupi ndi Mysore m'dziko la India amati kulimba ndi kukhakhala kwa makwaule a udzu wa vetiva kumapangitsa kuti njoka zisapezeke mu udzuwu.

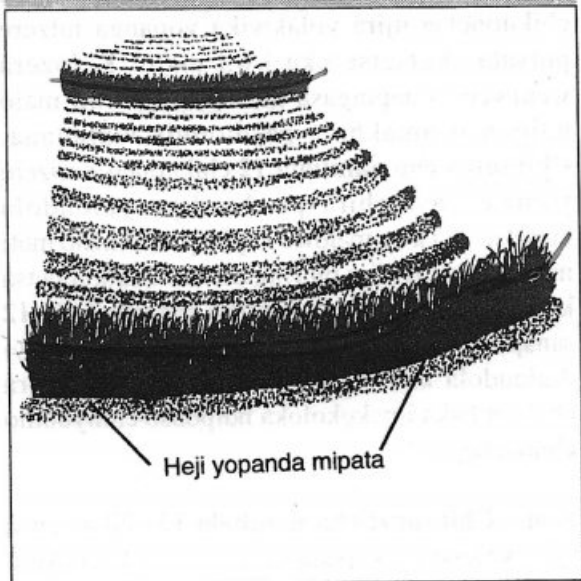
Chithunzi Nambala 10: Mbali imodzi ya heji ya udzu wa vetiva



Kuti udzuwu ugwire bwino ntchito yake yoteteza nthaka uyenera kupanga heji monga mukuonera pa **Chithunzi cha nambala 11**. Ngakhale zimatheka kuti udzuwu upange heji mchaka chimodzi, nthawi zambiri pamafunika zaka ziwiri kapena zitatu kuti udzuwu upange heji yothinana bwino kuti iteteze nthaka. Zaka ziwiri zoyambilira ndiponso nthawi zina chachitatu, udzu wa vetiva umafunika kuwuteteza ndiponso kupakiza. Pa nthawiyi nkwapafupi kuona dothi lomwe lakocheza m'mahejiwa, ndipo ndi nthawi yabwino yoti alangizi aziwalongosolera alimi mmene mahejiwa akugwirira ntchito. Ngakhale ntchito ya migwere poteteza nthaka imaoneka nthawi yomweyo, pakapita nthawi ndiponso kukagwa mvula yambiri imagumuka. Koma heji ya udzu wa vetiva ikagwirana siimatha, ndiponso silira chisamaliro chirichonse kupatulako kuthenera,

Kuthenera maheji kuti akhale a msinkhu wa pakati pa masentimita 30 ndi 50 kumathandiza kuti mahejiwa asafule ndi kuti agwirane bwino, ndipo amatha kuteteza bwino nthaka. M'midzi yambiri yakufupi ndi Mysore m'dziko la India alimi amathenera mahejiwa masabata awiri alionse ndiponso zothenzazo amakadyetsera ziweto zawo. Choncho savutika udzu wodzyetsera ziweto zawo ngakhale mvula ichepe.

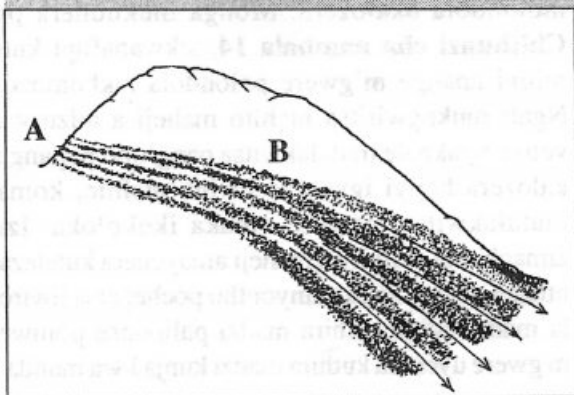
Chithunzi Nambala 11: Njira yobzala udzu ndi zitsamba pofuna kuteteza kukokoloka kwa nthaka



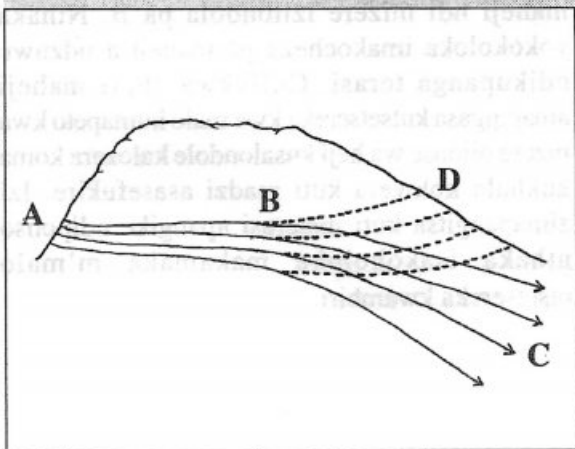
Alangizi ambiri ngakhalenso akatswiri a zakafukufuku wa za ulimi samvetsetsa tanthauzo la kalozera. **Chithunzi cha nambala 12** chikuonetsa njira yolakwika yopanga mizere potsata kutsetsereka kwa malo. Kalozera weniweni amapingasa kutsetsereka kwa malo ndiponso amakhala pa mtunda wofanana. **Chithunzi cha nambala 12** chikuonetsa mizere yomwe yayambira pa A ndipo yalondola kutsetsereka kwa malowo kupita pa C mmalo moti mizere izizungulira phirilo. Zimenezi zikuonetsa kuti kalozera wa **m'Chithunzi cha nambala 12** sanapangidwe bwino nchifukwa chake mizereyi ikulondola kutsetsereka kwa malo. Chotsatira chake nthaka imakokoloka ndiponso chinyontho chimachepa.

Koma **Chithunzi cha nambala 13** chikuonetsa njira yolondola yopangira akolozera kuchokera pa A kupita pa B, kenaka pa D, ndi kuzungulira phiri pa mtunda wofanana.

Chithunzi nambala 12: Mgwere woipa



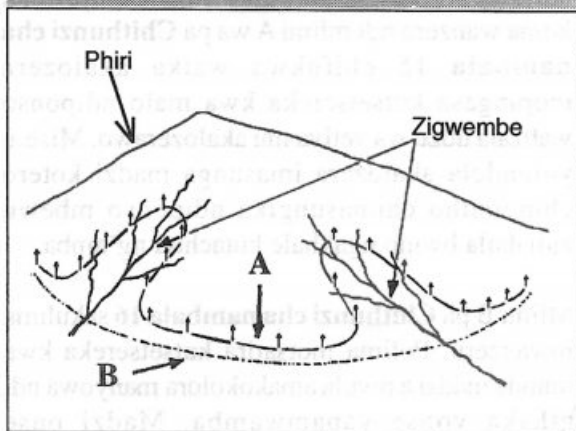
Chithunzi nambala 13: Mgwere wabwino



Cholinga cha migwere ndi kuchotsa madzi m'munda choncho iyenera kupangidwa molondola akalozera. Monga mukuonera pa **Chithunzi cha nambala 14**, sikwapafupi kuti mlimi apange m'gwere polondola zikhomozo. Ngati mukugwiritsa ntchito maheji a udzu wa vetiva ngakhale mutalakwitsa pang'ono popanga kalozera hejiyi igwirabe bwino ntchito, koma mutalakwitsa mgwere nthaka ikokoloka. Izi zimachitika chifukwa maheji amayenera kuteteza nthaka ndi kusunga chinyontho pochepetsa liwiro la madzi ndipo sathira madzi paliponse pomwe m'gwere uyenera kuthira madzi kunja kwa munda.

Mukazika zikhomo monga pa A, mlangizi ayenera kuthandiza kuti mlimi apange kalozera mosavuta monga mukuonera pa B. Kuti nthaka isakokoloke, maheji ndi mizere izilondola pa B. Nthaka yokokoloka imakocheza pa maheji a udzuwu ndikupanga terasi. Chifukwa choti maheji amapingasa kutsetsereka kwa malo kumapeto kwa mzere ulionse wa heji kusalondole kalozera koma kukhale kokwera kuti madzi asasefukire. Izi zimapangitsa kuti materasi apangike ndiponso nthaka isakokoloke makamaka m'malo otsetsereka kwambiri.

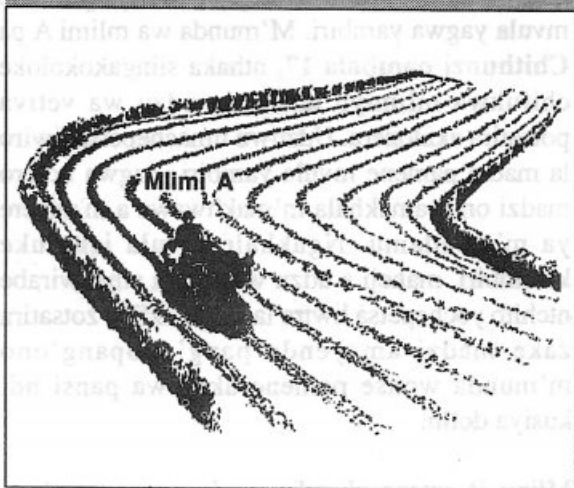
Chithunzi Nambala 14: Mgwere wabwinoko



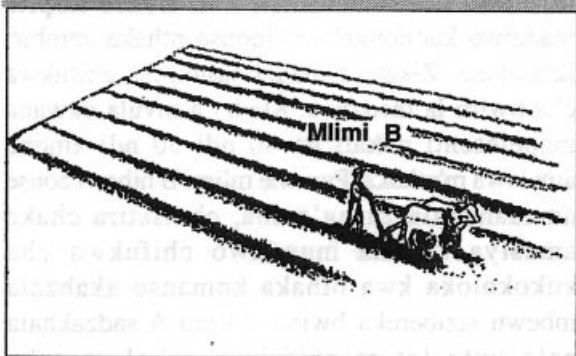
Pa **Chithunzi cha nambala 15** ndi **16** mukuona alimi awiri A ndi B. Alimi onsewa akuchita bwino, koma wanzeru ndi mlimi A wa pa **Chithunzi cha nambala 15** chifukwa waika akalozera mopingasa kutsetsereka kwa malo ndiponso wabzala udzu wa vetiva mu akalozerawo. Mizere yolondola akalozera imasunga madzi kotero chinyontho chimasungika ndiponso mbewu zimakula bwino ngakhale kutachita ng'amba.

Mlimi B pa **Chithunzi cha nambala 16** sakulima mwanzeru. Polima motsatira kutsetsereka kwa munda madzi a mvula amakokolora manyowa ndi nthaka yonse yapamwamba. Madzi onse amangopitilira ndipo salowa pansu. Mbewu za m'mundawu zimauma kukachita ng'amba.

Chithunzi Nambala 15: Munda wotetezedwa



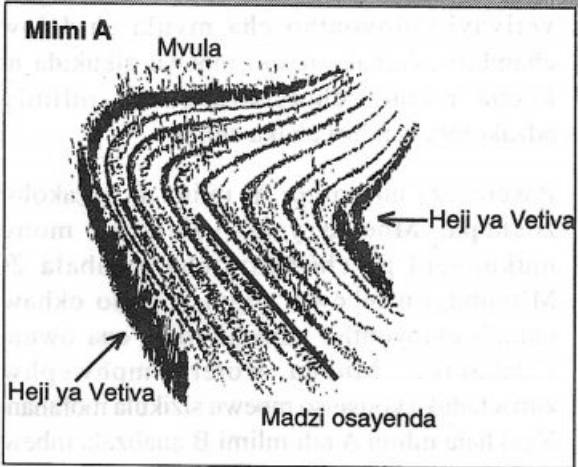
Chithunzi Nambala 16: Munda wosatetezedwa



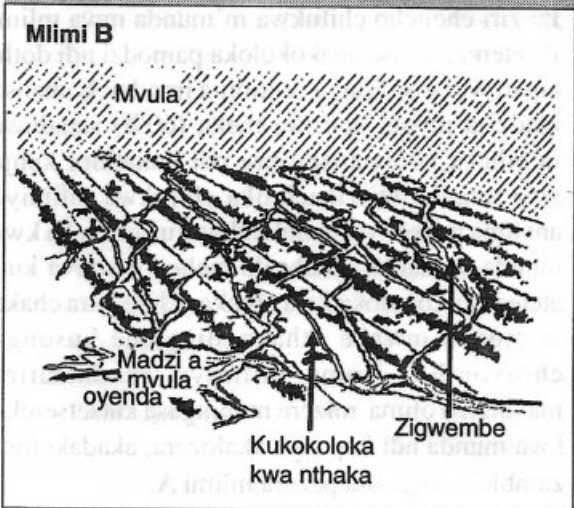
Zithunzi za nambala 17 ndi 18 zikuonetsa zomwe zimachitika m'minda iwiriyi pamene mvula yagwa yambiri. M'munda wa mlimi A pa **Chithunzi nambala 17**, nthaka siingakokoloke chifukwa mlimiyu adabzala udzu wa vetiva potsatira akalozera. Udzuwu umachepetsa liwiro la madzi pamene mvula yambiri ikugwa kotero madzi onse amakhala m'makhwawa a m'mizere ya m'mundamu. Ngakhale mvula ichuluke kwambiri maheji a udzu wa vetiva amagwirabe ntchito yochepetsa liwiro la madzi ndipo zotsatira zake madzi amayenda pang'onopang'ono m'munda wonse pamene akulowa pansu ndi kusiya dothi.

Mlimi B amene ali ndi munda wosatetezedwa, mvula ikagwa madzi amayenda mwaliwiro moti amatha kukokolora nthaka yonse yapamwamba pamodzi ndi fetereza. Kuyenda kwa madzi mwaliwiro kumachititsa kuti konse kopita madziwo kuonongeke ndiponso nthaka yambiri ikokoloke. Zikatero madzi sasungika chifukwa cha liwiro la madziwo. Madzi a mvula okwana mapelesenti pakati pa 40 ndi 50 ndi amene amalowa m'nthaka. Pamene mlimi B nthawi zonse amadandaula za ng'amba, chotsatira chake amasiya kulima mundawo chifukwa cha kukokoloka kwa nthaka komanso akabzala mbewu sizibereka bwino. Mlimi A sadzakhala nalo vuto lotere chifukwa zokolora zake zichulukirachulukirabe chaka ndi chaka.

Chithunzi Nambala 17: Madzi a mvula akusungika m'munda otetezedwa



Chithunzi Nambala 18: Madzi a mvula akuononga munda osatetezedwa



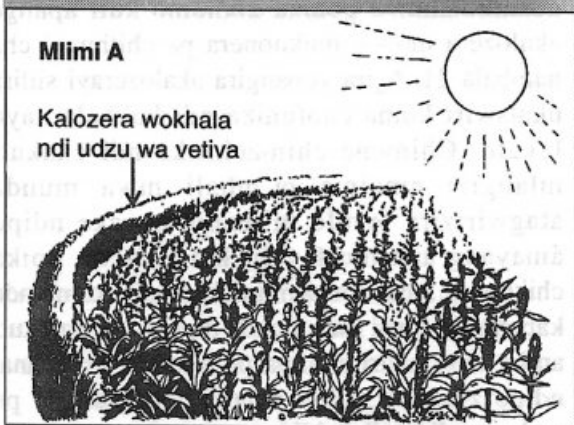
Mlimi A azithokoza kuti adabzala heji ya udzu wa vetiva zomwe zathandiza kuti mbewu zikule ndikubereka bwino. Chifukwa cha heji ya vetivayi chinyonthe cha mvula chidalowa chambiri m'nthaka ndipo mbewu zikukula ndi kucha bwino, chotsatira chake mlimiyu adzakolora zambiri chaka chino.

Poyerekeza ndi mlimi A, mlimi B adzakolora zochepe. Mbewu yake yalephera monga mukuonera pa chithunzi cha nambala 20. M'mundawu mbewu zalora m'malo okhawo munali chinyonthe pamene malo ena owuma zidakatika. Munda wotere mphwephwa zimachulukira komanso mbewu sizikula mofanana. Ngakhale mlimi A ndi mlimi B anabzala mbewu yofanana, tsiku limodzi, nathira fetereza mofanana ndipo mbewu zawo zinalandira mvula ndi dzuwa mofanana, mlimi B akolola zochepe. Izi ziri choncho chifukwa m'munda mwa mlimi B fetereza yense anakokoloka pamodzi ndi dothi lapamwamba lozama sentimita imodzi; komanso madzi a mvula opitilira theka (60%) sanalowe m'nthaka koma anapitilira ndi kukathira kunjira kwa munda. Izi zinachitika chifukwa mlimiyu analima mizere yake molondola kutsetsereka kwa munda komanso sanabzale maheji a vetiva kuti ateteze kukokoloka kwa nthaka. Chotsatira chake m'munda mwake nthaka siingathe kusungira chinyonthe. Koma mlimiyu akadatsatira malangizo olima mizere mopingasa kutsetsereka kwa munda ndi kupanga akalozera, akadakolora zambiri monga adapezera mlimi A.

Chithunzi Nambala 19: Mbewu za Mlimi A

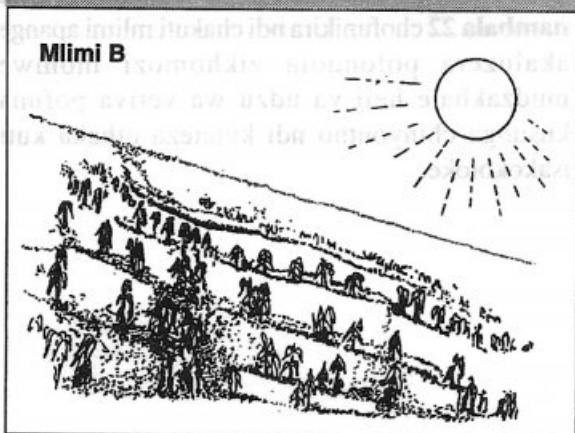
Mlimi A

Kalozera wokhala
ndi udzu wa vetiva



Chithunzi Nambala 20: Mbewu za Mlimi B

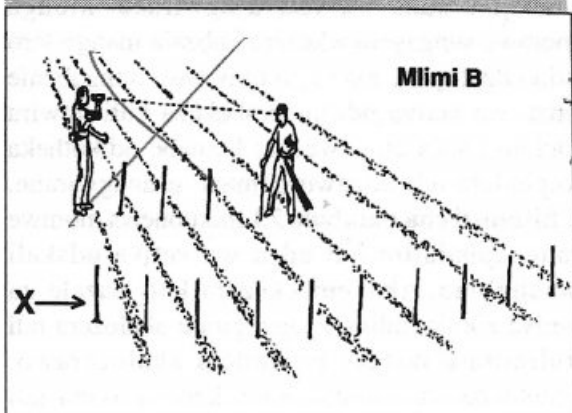
Mlimi B



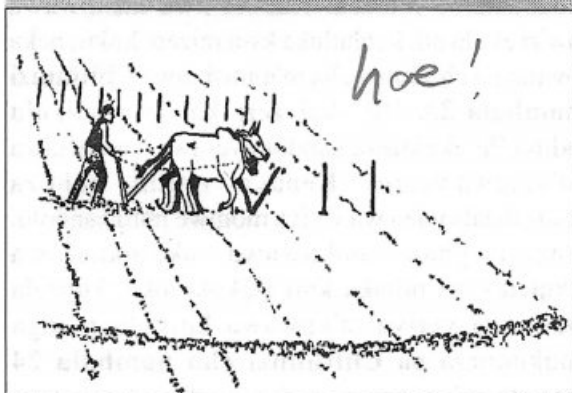
Mlimi B atazindikira kuti amachita zolakwa, adaganiza zowonana ndi mlangizi ndipo adamuthandiza pozika zikhomo kuti apange akalozera monga mukuonera pa chithunzi cha nambala 21. Njira yopangira akalozerayi siilira ukatswiri koma chofunika ndi kukhala nayo levulo. Chimene chimachitika ndi chakuti mlangizi amaima m'mbali mwa munda atagwirizira levulo m'manja mwake ndipo amayang'ana mu levulo kuti adziwe poika chikhomo. Amamuuza mlimi kuti apite kumtunda kapena kumunsi kwa munda mpaka atapeza kuti anthu onse awiri akuima pa mtunda wofanana, ndipo zikatero mlimi amaika chizindikiro pa malopo ndi kuzika chikhomo.

Pa Chithunzi cha nambala 21, X akulozera zikhomo zomwe zazikidwa popanga akalozera. Tsono monga mukuonera pa **Chithunzi cha nambala 22** chofunikira ndi chakuti mlimi apange akalozera polondola zikhomozi momwe mudzakhale heji ya udzu wa vetiva pofuna kusunga chinyonho ndi kuteteza nthaka kuti isakokoloke.

Chithunzi Nambala 21: Kuika zikhomo modutsa akalozera

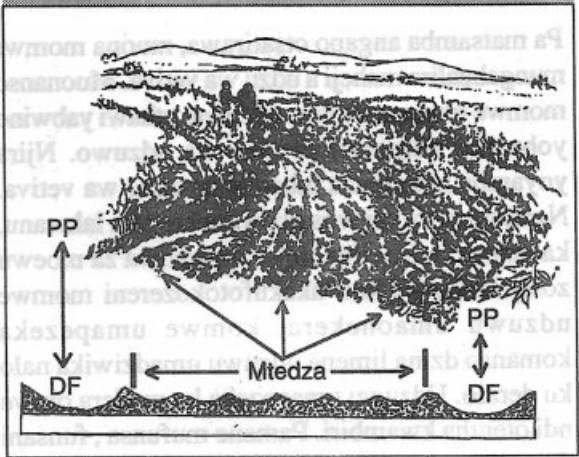


Chithunzi Nambala 22: Kupanga akalozera

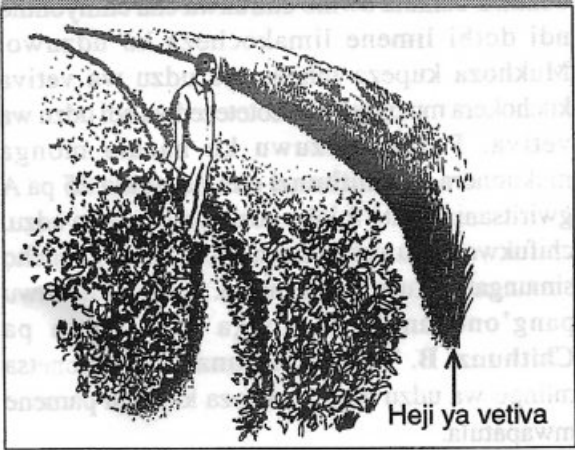


Monga mbewu iliyonse yomwe imakhala zaka zambiri, pamapita zaka ziwiri kapena zitatu kuti maheji a udzu wa vetiva agwirane. Monga momwe sungayembekezere kubzala mango lero ndikudzathyola mawa, momwenso sungabzale udzu wa vetiva ndi kuyembekeza kuti ugwira ntchito chaka chomwecho; komabe ndikotheka kupindula ndi udzuwu pamene usanagwirane. **Chithunzi cha nambala 23** chikuonetsa momwe mungapindulire ndi udzu wa vetiva udakali waung'ono. Akuyembekezera kuti nazale za vetiva zikule, mlimi anapangiratu akalozera ndi kulimiratu mizere polondola akalozera. Pamtunda wa mamita asanu kapena asanu ndi imodzi ali onse, mlimi amalimapo mizere isanu ndi umodzi ndikusiya khwawa lalikulu mbali zonse ziwiri za mizereyi. Makhwawa awiri ali pa **Chithunzi cha nambala 23** adabzalamo nandolo ndipo mizere isanu ndi umodzi ija, mlimi adabzalamo mtedza. Kukula kwa makhwawa awiri akulu ndi kuchuluka kwa mizere kukuoneka bwino pa chithunzi cha m'munsi mwa **Chithunzi nambala 23**. DF akulozera khwawa lalikulu ndipo PP akulozera nandolo yemwe wabzalidwa m'makwawamo. Kenaka mlimi akhoza kudzabzala udzu wa vetiva momwe muli nandolo. Pakali pano makhwawa akuluakuluwa akutetezabe nthaka kuti isakokoloke, kubzala udzu wa vetiva m'khwawa lalikulu monga mukuonera pa **Chithunzi cha nambala 24** kumathandiza kusunga chinyontho ndi kuteteza nthaka.

Chithunzi Nambala 23: Makwawa akulu adabzalamo nandolo



Chithunzi Nambala 24: Mowwe maheji a udzu wa vetiva amatetezera nthaka



KUBZALA MAHEJI A UDZU WA VETIVA

Pa matsamba angapo otsatirawa, muona momwe mungabzalire maheji a udzu wa vetiva. Muonanso momwe mungasamalire udzuwu, nthawi yabwino yobzalira ndiponso ubwino wa udzuwo. Njira yoyamba ndikupeza mbande za udzu wa vetiva. Ngati udzuwu uli wosadziwika ku dera lakwanu, kaonaneni ndi anthu omwe amadziwa za mbewu zosiyanasiyana kuti akakufotokozereni momwe udzuwu umaonekera, komwe umapezeka komanso dzina limene udzuwu umadziwika nalo ku deralo. Udzuwu umapezeka ku madera omwe ndi otentha kwambiri. Pamene mufunsa, funsani dzina lakuti "vetiveria zizanioides". Nazale za udzuwu ndi zosavuta kukhazikitsa. Kuika nazale za vetiva mphepete mwa ngalande za madzi, mwa mitsinje ndi m'madambo, kumathandiza kuti udzuwu uzikula bwino chifukwa cha chinyonho ndi dothi limene limakocheza ku udzuwo. Mukhoza kupeza mbewu ya udzu wa vetiva kuchokera muzigwembe zotetezedwa ndi udzu wa vetiva. Pozula udzuwu ku nazale monga mukuonera pa **Chithunzi cha nambala 25** pa A gwiritsani ntchito foloko pozula mbande za udzu, chifukwa mizu yake imayala kwambiri choncho simungathe kuzula ndi manja. Patulani udzuwu pang'onopang'ono monga mukuonera pa **Chithunzi B. Tsono Chithunzi C** chikuonetsa mlingo wa udzu woti mukhoza kubzala pamene mwapatula.

Chithunzi Nambala 25: Mbande za udzu wa vetiva



Musanapite ndi udzuwu kumunda uduleni m'masentimita okwanila khumi ndi mphambu zisanu (15) kapena makumi awiri (20) kuchokera pamene linalikezera dothi lakunazale kupita kunsonga. Mudulenso mizu masentimita khumi kuchokera pomwepo padalekezera dothipo kupita kumunsi. Izi zimathandiza kuti udzuwu usaume komanso kuti ugwire msanga. Monga mukuonera pa **Chithunzi cha nambala 26**, zinthu zofunika kwambiri podula udzuwu ndi mpeni waukulu, chikwanje kapena chisikiro ndi chikuni chodulirapo. Pa **Chithunzi cha nambala 27** mukuona momwe udzuwu umaonekera mukamaliza kudula.

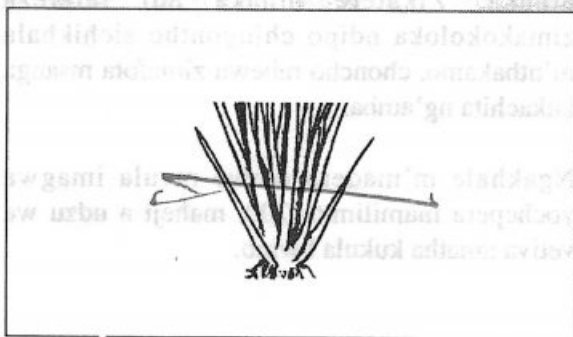
Mchitidwe obzala mbande imodzi pa phando mbewu ikachepa ndiosavomerezeka chifukwa maheji amatenga nthawi kuti agwirane. Kuthira fetereza wa DAP kumathandiza kuti mbande zikule msanga ku nazale ndiponso udzuwu ukule mofulumira ku munda. Thirani feterezayu m'maenje odzabzala udzuwu.



Chithunzi Nambala 26: Kudula makwaule a mbande



Chithunzi Nambala 27: Mbande yofunika kubzalidwa

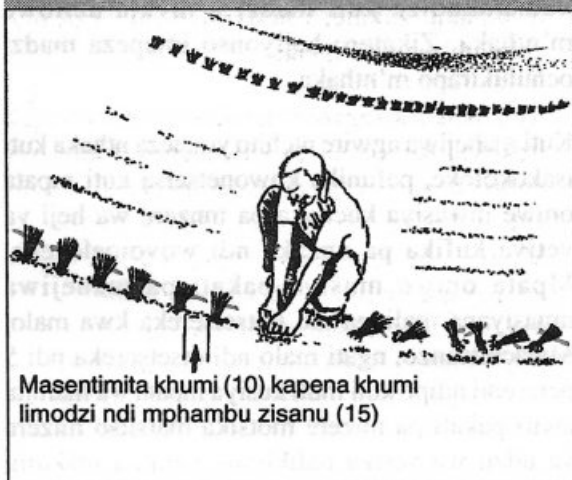


Wokani mbande za udzu wa vetiva ndi mvula yoyamba. Kawokedwe ka udzuwu sikasiyana ndi momwe mumawokera mpunga. Bzalani udzuwu m'mapando otalikirana masentimita khumi (10 cm) kapena khumi ndi mphanmbu zisanu (15 cm) monga mukuonera pa chithunzi cha nambala 28 ndipo pobzala onetsetsani kuti mizu isapindike kenaka tsenderani. Bzalani pa mkwasa umodzi ndipo ngati mubzala bwino, udzuwu umatha kukhala mwezi usanaume kukakhala ng'amba. Udzu wina umafa ndikusiya mipata zikatere pakizani. Nthawi zina mukhoza kupakiza popindira udzu wa mapando ogundizana pa phando lopanda udzu. Poto fundo za udzuwu zidzaphukira. Kuti udzuwu ugwire bwino ntchito yoteteza nthaka kuti isakokoloke uyenera kukhala othinana bwino.

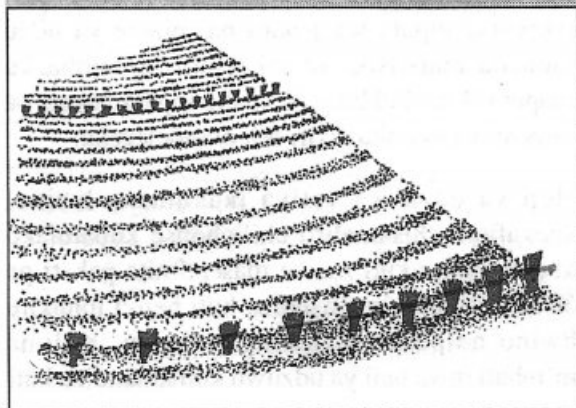
Sibwino kubzala udzuwu motalikirana monga mukuonera pa **Chithunzi cha nambala 29** chifukwa siupanga heji msanga kotero siuteteza nthaka. Zikatere nthaka ndi fetereza zimakokoloka ndipo chinyonho sichikhala m'nthakamo, choncho mbewu zimafofa msanga kukachita ng'amba.

Ngakhale m'madera omwe mvula imagwa yochepera mamilimita 200, maheji a udzu wa vetiva amatha kukula bwino.

Chithunzi Nambala 28: Kubzaka vetiva



Chithunzi Nambala 29: Musabzale motere

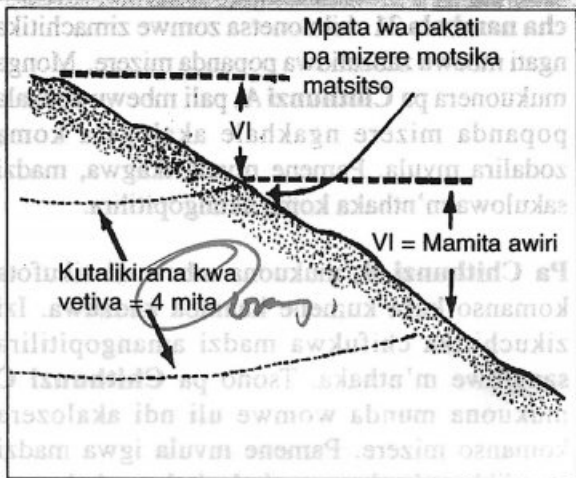


Kulima mizere potsatira akalozera ndiponso kugwiritsa ntchito maheji a udzu wa vetiva kumathandiza kuti madzi a mvula azilowa m'nthaka. Zikatero hejyonso imapeza madzi ochulukirapo m'nthaka.

Kuti mahejiwa agwire ntchito yoteteza nthaka kuti isakokoloke, pafunika kuwonetsetsa kuti mpata omwe mwasiya kuchoka pa mnzere wa heji ya vetiva kufika pa unzake ndi wovomelezeka. Mpata omwe musiyeye pakati pa mahejiwa umasiyana malinga ndi kutsetsereka kwa malo. Mwachitsanzo, ngati malo ndi otsetsereka ndi 5 peresenti ndipo kuti muli kusiyaya mpata wa mamita awiri pakati pa mizere motsika matsitso mizere ya udzu wa vetiva italikirane mamita makumi anayi (40m); koma ngati malo ndi otsetsereka ndi 2 peresenti mizere ya udzu wa vetiva italikirane ndi mamita anayi. Kuti mudziwe bwinobwino za mpata omwe mungasiye pakati pa mizere ya udzu wa vetiva malinga ndi kutsetsereka kwa malo ndiponso mpata wa pakati pa mizere ya udzu motsata matsitso, onani tebulo loyamba ku mapeto kwa bukhuli. Komabe mpata pakati pa mizere wa mamita awiri ndi ovomelezeka.

Heji ya udzu wa vetiva ikakumana bwino, siidzafuna chisamaliro chilichonse kupatulako kudula hejiyi kuti italike masentimita pakati pa 30 ndi 50. Izi zimathandiza kuti hejiyi iphukire bwino ndiponso isatchinge mbewu. Kulima m'mbali mwa heji ya udzuwum kumathandiza kuti

Chithunzi Nambala 30: mpata wa pakati pa mizere motsika matsitso



hejiyi isaphukire chisawawa ndi kulanda malo ambiri amunda.

KUSUNGA CHINYONTHO M'NTHAKA

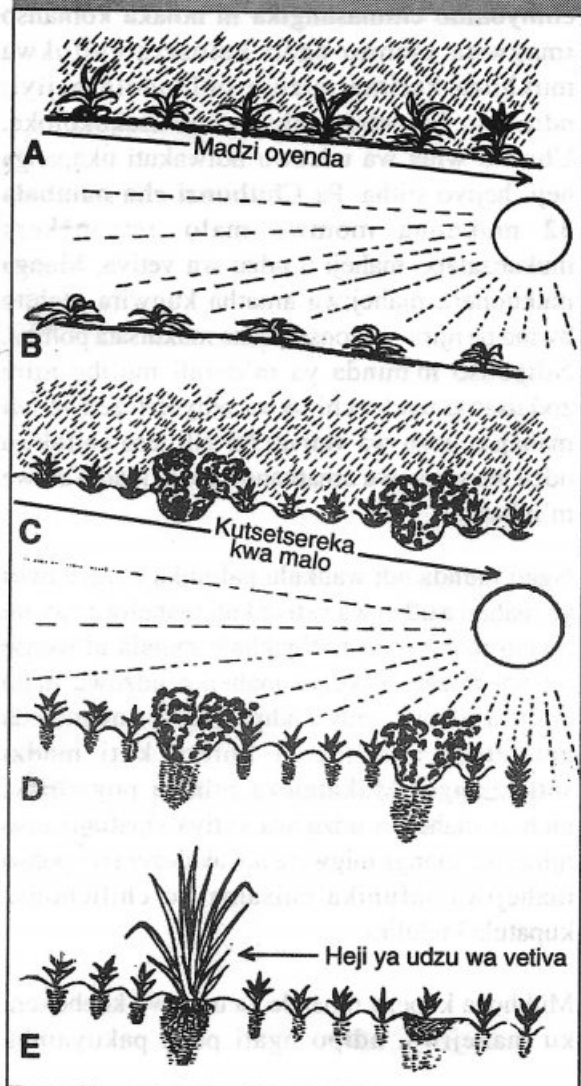
Kusunga chinyonthe m'nthaka ndi chinthu chofunika kwambiri paulimi wodalira mvula. Ngakhale ziri choncho, ndi anthu ochepa amene amachita izi. Ambiri samvetsa kufunika kwake kwa kusunga chinyonthe m'nthaka. Ngati ulimi wanu uli wodalira mvula, pafunika kupanga akalozera ndi kulima mizere polondola akalozera kuti chinyonthe chizisungika

m'nthaka. Koma ngati ulimi wanu ndi wochita kuthirira muyenera kusalaza malowo. **Chithunzi cha nambala 31** chikuonetsa zomwe zimachitika ngati mbewu zabzalidwa popanda mizere. Monga mukuonera pa **Chithunzi A**, pali mbewu zobzala popanda mizere ngakhale akalozera koma zodalira mvula. Pamene mvula ikagwa, madzi sakulowa m'nthaka koma akungopitilira.

Pa Chithunzi B, mukuona mbewuzi zikufota komanso kufa kumene kaamba kadzuwa. Izi zikuchitika chifukwa madzi amangopitilira sanalowe m'nthaka. Tsono pa **Chithunzi C** mukuona munda womwe uli ndi akalozera komanso mizere. Pamene mvula igwa madzi amadikha m'makwawa akuluakulu a akalozera. Makhwawa akuluakuluwa amagwirabe ntchito yosunga madzi poyembekezera kubzalamo maheji ya udzu wa vetiva. Madzi a m'makwawamo amalowa m'nthaka ndipo khwawa lililonse lalikulu likhoza kusunga madzi a mvula okwana mamilimita makumi asanu (50mm) kotero kuti nthawi zambiri kukagwa mvula madzi sayenda m'mundamo chifukwa amadikha m'makwawa. Iyi ndi njira yachilengedwe yosunga chinyontho m'nthaka. Pamene dzuwa liwala monga mukuonera pa **Chithunzi D**, mbewu sizifota koma zimasangalala popeza zimapezabe madzi.

Tsono pa **Chithunzi E**, mukuona udzu wa vetiva utabzalidwa m'khwawa limodzi mwa makwawa a akulu.

Chithunzi Nambala 31: Ubwino wa akalozera

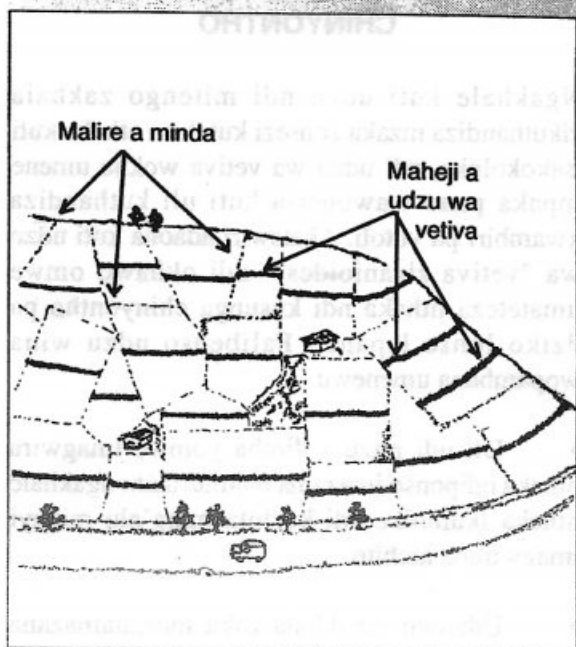


Heji ya udzu wa vetiva imasunga chinyontho m'nthaka. Pamene heji ya udzuwu yakumana, chinyontho chimasungika m'nthaka komanso imagwira ntchito ngati kalozera chifukwa mukhoza kulima mizere polondola hejiyi; ndiponso imateteza nthaka kuti isakokoloke. Ubwino wina wa udzuwu ndiwakuti ukapanga heji, hejiyo siitha. Pa **Chithunzi cha nambala 32** mukuona momwe malo amaonekera mukabzalapo maheji a udzu wa vetiva. Monga mukuonera mahejiwa amatha kugwira ntchito bwino pa njira iliyonse imene mukutsata polima. Ndiponso m'minda ya m'derali mulibe njira zodutsamo madzi chifukwa ndiyotetezedwa ndi maheji a udzu wa vetiva. Izi zili tero chifukwa udzu wa vetivawu umathandiza kuti madzi alowe m'nthaka.

Ngati munda ndi waukulu pafunika mizere iwiri ya maheji a udzu wa vetiva kuti mahejiwa agwire bwino ntchito yake. Ngakhale munda uliwonse uli ndi mizere yake ya maheji a udzuwu malo onsewa ndi otetezedwa ndipo maheji a mumtunda amateteza a m'munsi kotero kuti madzi sathamanga. Mukateteza nthaka pogwiritsa ntchito maheji a udzu wa vetiva sipafunikanso njira zina monga migwere ndi akalozera ndiponso mahejiwa safunika chisamaliro chilichonse kupatula kudulira.

Mukhoza kupeza mbande za udzuwu kuchokera ku mahejiwa, ndipo ngati pena pakuyamba

Chithunzi Nambala 32: Njira yotchinjiriza nthaka ndi udzu wa vetiva



chigwembe ndibwino kubzalapo udzuwu kuti chigwembe chisapitilire. Apa mlimi saononga ndalama.

UBWINO WA UDZU WA VETIVA POTETEZA NTHAKA NDI KUSUNGA CHINYONTHO

Ngakhale kuti udzu ndi mitengo zakhala zikuthandiza mzaka zonsezi kuteteza nthaka kuti isakokoloke, ndi udzu wa vetiva wokha umene mpaka pano wawonetsa kuti uli kuthandiza kwambiri pa vutoli. Akatswiri adaona kuti udzu wa "vetiva zizanioides" ndi okhawo omwe umateteza nthaka ndi kusunga chinyontho pa dziko lonse lapansi. Palibenso udzu wina wopambana umenewu.

- Uli ndi mizu yolimba yomwe imagwira nthaka ndiponso imazama mamita atatu ngakhale nthaka ikumbike ndi kuchita ming'alu mizuyi imagwirabe ntchito.
- Udzuwu umakhala zaka mazanamazana ndipo umafuna chisamaliro chochepa.
- Udzuwu ulibe chikhawo ndiponso njere zake sizimera potero sungamere paliponse.
- Tsinde la udzuwu liri pansu pa nthaka potero ngakhale upse kapena kudyewa ndi ziweto umaphukiranso.
- Kukhakhala ndi kuthwa kwa makwaule a udzuwu ndi kununkhira kwa mizu yake kumathawitsa njoka, mbewa ndi zina.

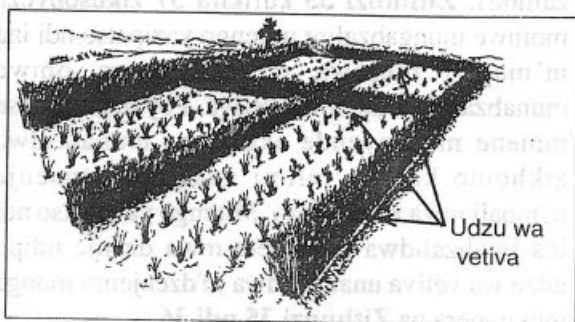
- Makwaule ndi mizu yake sizigwidwa wamba ndi matenda.
- Udzuwu ukakula ziweto siziukonda koma makwaule akakhala anthete amakhala chakudya chabwino cha ziweto.
- Alimi aku Ucaranataka ku India, adasankha mtundu umodzi mwa mitundu ya udzu wa vetiva chifukwa uli ndi makwaule ofewa ndiponso ziweto zimaukonda. Udzuwu ndiwothithikana wofewa ndiponso suferapo kukakhala kulibe mvula poyerekeza ndi mitundu ina.
- Udzuwu umamera kumtunda ndi m'zithaphwi. Suferapo kukakhala madzi ambiri ngakhale kulibe mvula.
- Udzuwu supikisana ndi mbewu. Maheji a udzuwu amathandiza kuti mlimi akolole zambiri.
- Udzuwu umathandiza kuonjezera chonde m'nthaka ndi chifukwa chake umakhala obiriwira chaka chonse.
- Maheji a udzuwu ndi osabvuta kubzala, kukula ndi kusamalira ndiponso kuchotsa ngati siukufunikiranso.
- Umamera m'nthaka yamtundu uli onse ngakhale ikhale yopanda chonde.
- Umamera malo alionse, kozizira kwambiri,

kotentha kwambiri, kwa mvula yambiri ndiponso kwa mvula yochepa.

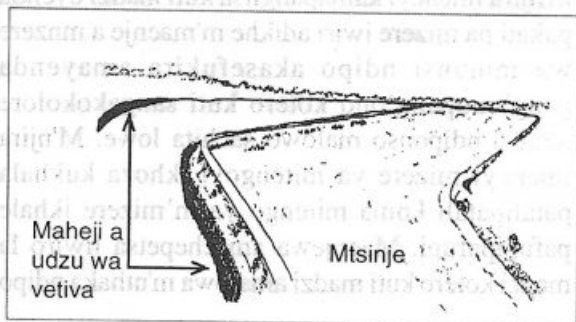
NTCHITO ZINA ZA UDZU WA VETIVA

Udzu wa vetiva uli ndi ntchito zambiri pakuonjezera kuteteza nthaka ndi kusunga chinyontho. Imodzi mwa ntchitozi ndikutchinjiriza malo, madamu, ngalande za madzi ndi mphepete mwa misewu kuti musagumuke. **Chithunzi cha nambala 33** chikusonyeza momwe udzu wa vetiva umatetezera milambala ya munda wa mpunga. Milambalayi imagumuka monga mukuonera pa chithunzi chapamwambacho chifukwa cha madzi, makoswe, nkhanu ndi zirombo zomwe zimakumba pansi. Milambala ikagumuka nthaka imakokoloka ndipo madzi amatayika kotero mbewu zimaonongeka. Udzu wa vetiva ukhoza kubzalidwa m'milambala ya munda wa mpunga monga mukuonera pa chithunzi cha m'munsi. Udzuwu umamera bwino kwambiri m'malo oterewa ndipo sufa ngakhale madzi atasefukira. Powonjezera apa mizu ya udzuwu iri ndi mafuta omwe amathawitsa mbewa. Mizu ya udzuwu siyazira m'mbali koma imalowa pansi kotero mpunga sungaonongeke ndi udzuwu ndipo mlimi amakolola wambiri. Muzimweta udzu onse chaka ndi chaka kuti usadzatchinge mbewu chaka chotsatiracho. Udzuwu umatetezanso m'mbali mwa mtsinje kuti musagumuke ndikuononga munda wa mpunga, monga mukuonera pa **Chithunzi cha nambala 34.**

Chithunzi Nambala 33: Kulimbitsa milambala ya m'munda wa mpunga



Chithunzi Nambala 34: Kutchinjiriza mphepete mwa mitsinje



M'madera otsetsereka kwambiri komwe chinyontho chimatha msanga, udzu wa vetiva umateteza kukokoloka kwa nthaka ndi kusunga chinyontho. Malo amenewa chimanga ndi mbewu zina sizikula bwino, koma mitengo ya zipatso ndi ina ikabzalidwa mu akalozera momwe mwabzalidwanso udzu wa vetiva imakula bwino. Kubzala mitengo ya zipatso ndi ina m'malo otsetsereka kwakhala kukulephereka chifukwa mitengo yambiri imafa ndiponso kusamala mitengoyi m'malo oterewa kumalira ndalama zambiri. **Zithunzi 35** kufikira **37** zikusonyeza momwe mungabzalire mitengo yazipatso ndi ina m'mapiri oterewa mu akalozera omwe munabzalidwa udzu wa vetiva. Poyamba monse mmene mudzayende akalozera munaikidwa zikhomo kenaka mlimi anakumba maenje m'mbali mwa zikhomozo. Mitengo ya zipatso ndi ina imabzalidwa mphepete mwa dzenje ndipo udzu wa vetiva unabzalidwa m'dzenjemo monga mukuonera pa **Zithunzi 35** ndi **36**.

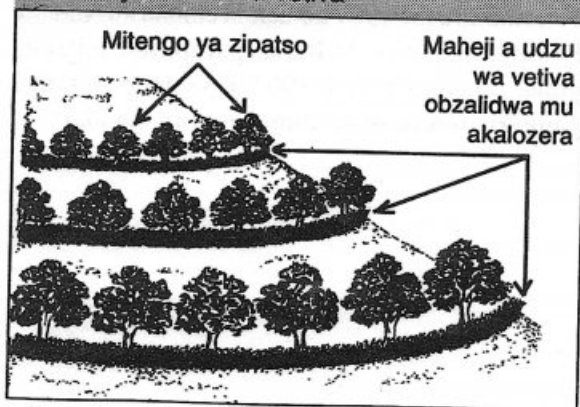
Kabzalidwe ka mitengo ndi udzu wa vetiva m'njira imeneyi kamapangitsa kuti madzi oyenda pakati pa mizere iwiri adikhe m'maenje a mnzere wa mmunsi ndipo akasefukira amayenda pang'onopang'ono kotero kuti sangakokolore nthaka ndiponso malowo sachita lowe. M'njira imeneyi mizere ya mitengoyi ikhoza kukhala patalipatali koma mitengo ya m'mizere ikhale pafupipafupi. Maenjewa amachepetsa liwiro la madzi kotero kuti madzi amalowa m'nthaka ndipo

udzu wa vetiva ndi mitengo imapeza chinyonho m'nthakamo. Maenjewa amakwiririka pakapita zaka ndipo maheji a udzu wa vetiva amakhala atakumana ndikugwira ntchito yoteteza nthaka kuti isakokoloke ndiponso kupanga materasi.

Chithunzi Nambala 35: Kusamala mitengo pogwiritsa ntchito udzu wa vetiva



Chithunzi Nambala 36: Mitengo yokula bwino m'maheji a udzu wa vetiva



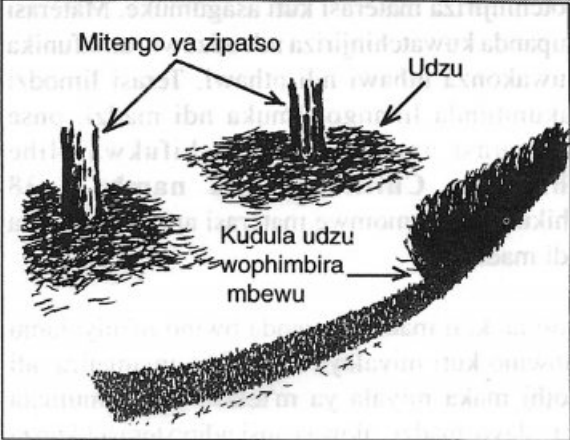
Mitengo yobzalidwa m'njira imeneyi siifunika kuthirira pazaka zitatu zoyambilira chifukwa madzi odikha m'maenje ndi maheji a udzu wa vetiva amapangitsa kuti m'nthaka muzikhala chinyonho.

Heji ya udzu wa vetiva ikakumana, mukhoza kumweta kumayambiro kwa chilimwe ndipo udzuwu mukhoza kuphimbira mitengo ya zipatso kuti chinyonho chizisungika, monga mukuonera pa **Chithunzi cha Nambala 37**. Ubwino wophimbira mitengo ya zipatso ndi udzuwu ndiwakuti udzuwu susunga tizilombo tambiri towononga mbewu ndiponso umakhala nthawi yaitali. Maheji a udzu wa vetiva amateteza mitengo ing'onoing'ono ku dzuwa ndiponso ku mphepo ya mkuntho.

Mukhozanso kubzala mitengo ina m'njira imeneyi. Kumene amatsatira njirayi mitengo yambiri siifa kukachita chilala; monga zinachitikira mu 1987 kutachita chilala ku Andhra, Pradesha m'dziko la India, pafupifupi mitengo yonse inakula bwino (90%) pamene mitengo yambiri yomwe inabzalidwa m'njira ina idafa.



Chithunzi Nambala 37: Udzu wa vetiva amaphimba mbewu

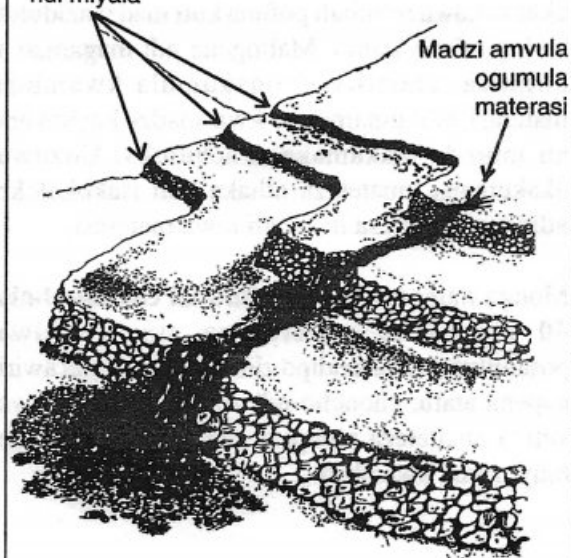


Kumapiri aku Himalaya komwe alimi akulima m'materasi omwe anawatchinjuriza ndi miyala, ayambanso kugwiritsa nchito udzu wa vetiva potchinjuriza materasi kuti asagumuke. Materasi kupanda kuwatchinjuriza ndi udzuwu, amafunika kuwakonza nthawi ndi nthawi. Terasi limodzi lakumtunda likangogumuka ndi madzi, onse akumunsi amagumukanso chifukwa alibe chitetezo. **Chithunzi cha nambala 38** chikusonyeza momwe materasi amaonongekera ndi madzi.

Pofuna kuti madzi aziyenda bwino m'miyalamu sibwino kuti miyalayo izikhala yomamatira ndi dothi maka miyala ya m'telasi. Ngati mumata miyalayo madzi salowa pansu ndipo terasi likhoza kugumuka ndipo munda wonse ukhoza kuonongeka. Ngakhale materasiwa akhala akugwira ntchito pazaka zingapo zapitazo, amachepetsa zokolera ndipo ndi ntchito yaikulu powakonza.

**Chithunzi Nambala 38: Materasi otchinjirizidwa
ndi miyala**

Zipupa za materasi
zopangidwa
ndi miyala

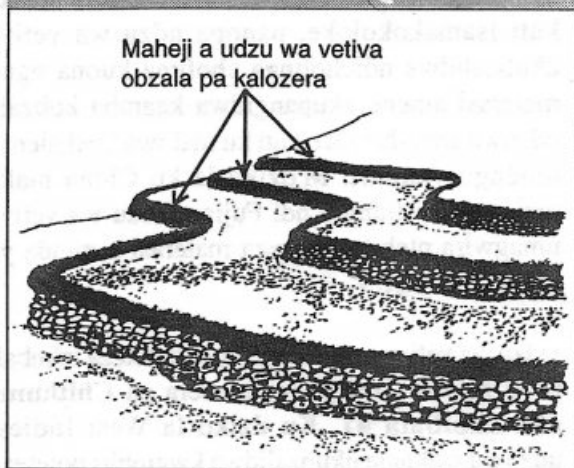


Alimi a m'mapiriwa atauzidwa za ubwino wa udzu wa vetiva, anafunitsitsa kubzala udzu paliponse. M'chaka cha 1986, a World Bank adathandiza pa ntchito yobzala udzu wa vetiva m'mbali mwa materasi kuti mizu ya udzuwu ilimbitse materasi kuti asagumuke ndi madzi a mvula.

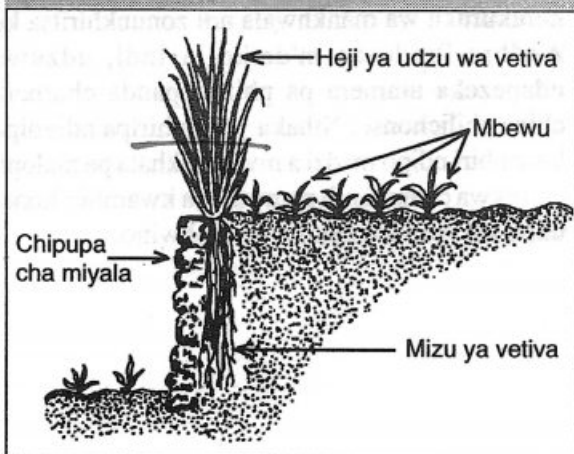
Chithunzi cha nambala 39 chikusonyeza momwe materasi amaonekera udzuwu ukabzalidwa m'mbali pofuna kuti madzi azidutsa bwino m'miyalamo. Malingana ndi maganizo a alimiwa, chomwe chimagumula kwambiri materasi ndikuthamanga kwa madzi kuchokera ku mtunda makamaka akachuluka. Udzuwu ukakumana umateteza nthaka kuti isakokoloke ndiponso kuteteza m'mbali mwa materasi.

Monga mukuonera pa **Chithunzi cha nambala 40** zipupa za materasiwa zinapangidwa posanjikiza miyala ndipo zimatalika mamita awiri kapena atatu, choncho ndi zosalimba. Udzu wa vetiva umateteza zipupazi, chifukwa mizu yake ndiyozama kwambiri.

Chithunzi Nambala 39: Kuteteza materasi otchinjirizidwa ndi miyala



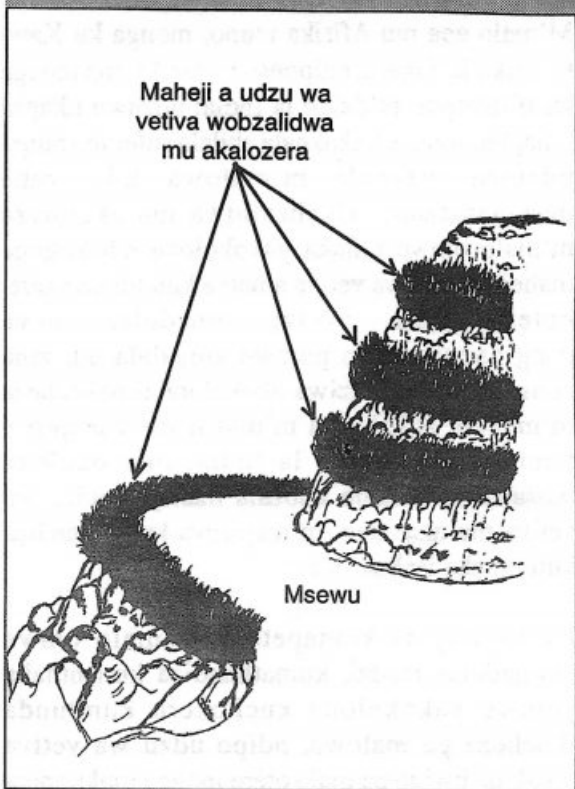
Chithunzi Nambala 40: Momwe materasi otchinjirizidwa ndi miyala amaonekera pafupi akabzalamo maheji a udzu wa vetiva



M'madera ena a kumapiri aku Himalaya m'dziko la India komwe kunalibe materasi oteteza nthaka kuti isamakokoloke, panopa udzu wa vetiva ukubzalidwa ndicholinga chofuna kuona ngati materasi amene akupangidwa kaamba kobzala udzuwu angathandize kuti ku malowa kukhalenso mitengo yambiri. M'dziko la ku China maka mzigawo za Jiangxi ndi Fujian, udzu wa vetiva umagwira ntchito yoteteza materasi a minda ya zipatso ndi tiyi.

Udzu wa vetiva umathandizanso kuteteza m'mbali mwa msewu, monga mukuonera pa **Chithunzi cha nambala 41**. Ku dziko la West Indies, udzuwu wakhala ukubzalidwa kwambiri poteteza mphephete mwa msewu ndiponso kukokoloka kwa nthaka kwa zaka zambiri. Anthu aku St. Vincent anabzala udzuwu mbali mwa njira za nyumba zawo. Udzu umamera paliponse. Kumalo ochitira kafukufuku wa mankhwala ndi zonunkhiritsa ku Andhra Pradesh m'dziko la Indi, udzuwu udapezeka utamera pa phiri lopanda chomera china chilichonse. Nthaka ya paphiripa ndiyoipa kwambiri ndipo madzi a mvula sakhala pa malopo chifukwa chakuti ndi pamwamba kwambiri koma udzu wa vetiva umakula bwinobwino.

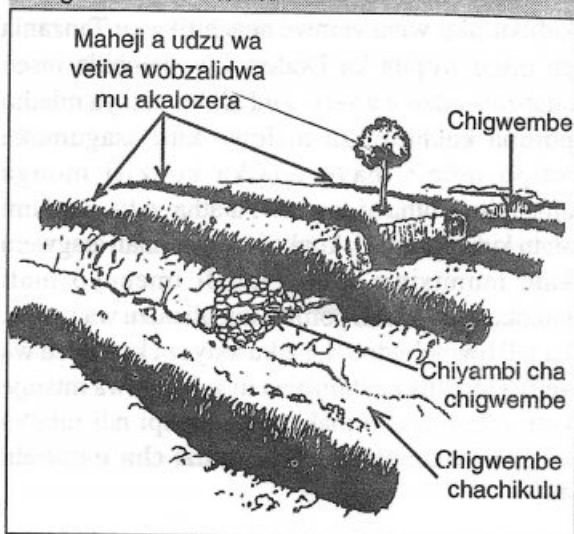
Chithunzi Nambala 41: Kuteteza m'mbali mwa misewu ndi maheji a udzu wa vetiva



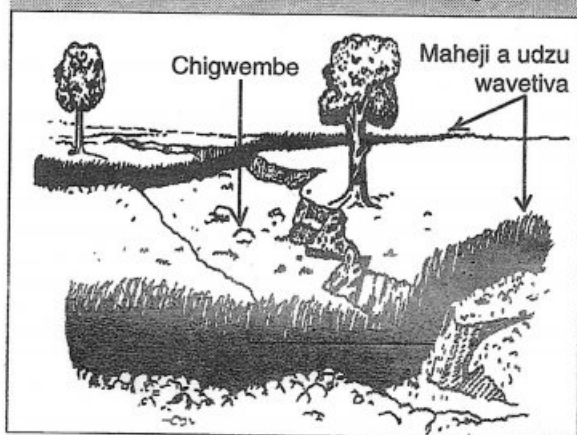
Udzu wa vetiva wakhala ukugwiritsidwa ntchito m'malo omwe nthaka idakokoloka ndikuguga ndipo wasonyeza kuti nthaka imabwereramonso. M'malo ena mu Afirika muno, monga ku Kano m'dziko la Nigeria ndiponso m'maiko ena monga ku Bharatpur, m'dziko la India; udzuwu ukapsa umaphukiranso, kukakhala chilala suferapo ndipo udzuwu wakhala m'malowa kwa zaka mazanamazana. Ukabzalidwa mu akalozera m'malo omwe nthaka yakokoloka ndi kuguga maheji a udzu wa vetiva amatha kutchinga madzi kotero kuti madzi amadutsa mwa pang'onopang'ono pomwe zinyalala ndi zina zonse zomwe madziwa akokolora zimakocheza m'mbuyo. Nthaka ya m'munsi mwa mapiri a Himalaya, m'dziko la India, imakokoloka mosavuta, choncho kubzala maheji a udzu wa vetiva mu akalozera m'mapiriwa kumathandiza kuti nthaka isakokoloke.

Kuika miyala kumapeto kwa malo omwe mumadutsa madzi, kumathandiza kuti nthaka yomwe yakokoloka kuchokera kumtunda ikocheze pa malowa, ndipo udzu wa vetiva umakula bwino pa malo otere monga mukuonera pa **Chithunzi cha nambala 42** ndiponso nthaka imabwerera. Izi zingachitikenso m'zigwembe monga mukuonera pa **Chithunzi cha nambala 43**. Vetiva akakula, nthaka siikokolokanso ndipo zigwembe zimafotsereka ndi kutha.

Chithunzi Nambala 42: Kulimbitsa maŵo osagwiritsidwa ntchito



Chithunzi Nambala 43: Kulimbitsa zigwembe

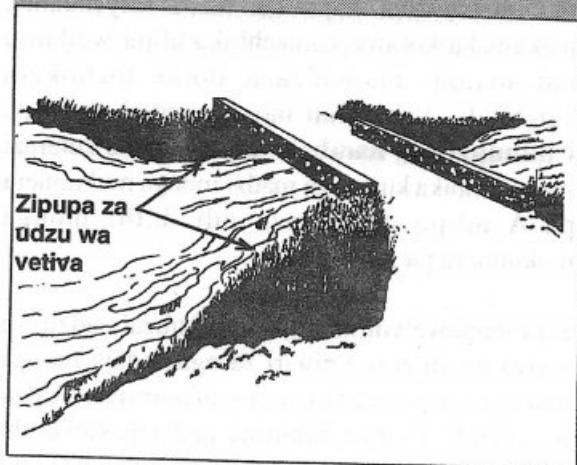


Udzu wa vetiva mutha kubzalanso m'mbali mwa mitsinje ndi m'mbali mwa ngalande. Pa kafukufuku wina yemwe anachitika ku Tanzania pa mseu wopita ku Dodoma, wolambula mseu adabzala udzu wa vetiva mbali imodzi ya mlatho pofuna kuchinjiriza malowo kuti asagumuke ndipo mbali inayo anaika konkiri monga amachitira nthawi zonse. Patatha zaka makumi atatu kufikira anayi, konkiriti yense anali atagwera kale mumtsinje ndipo mbali imeneyo inali itakokoloka. Mbali yomwe kunali udzu wa vetiva, kunali bwinobwino. Izi zikusonyeza kuti udzu wa vetiva umatha kuchinjiriza m'mbali mwa mtsinje kuti usagumukire makamaka pafupi ndi mlatho monga mukuonera pa **Chithunzi cha nambala 44**.

Chithunzi cha nambala 45 chikusonyeza momwe udzu wa vetiva ungachinjirizire m'mbali mwa ngalande zikuluzikulu kuti zisagumukire.



Chithunzi Nambala 44: Kutchinjiriza milatho



Chithunzi Nambala 45: Kutchinjiriza ngalande

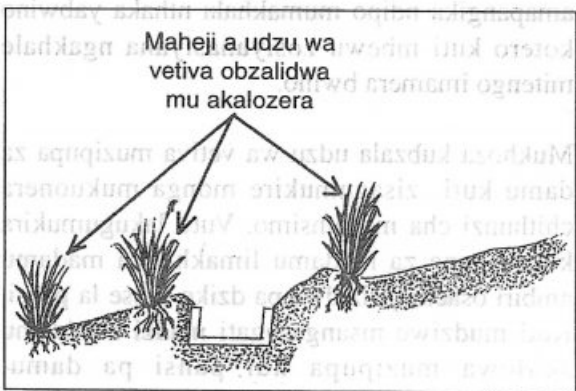
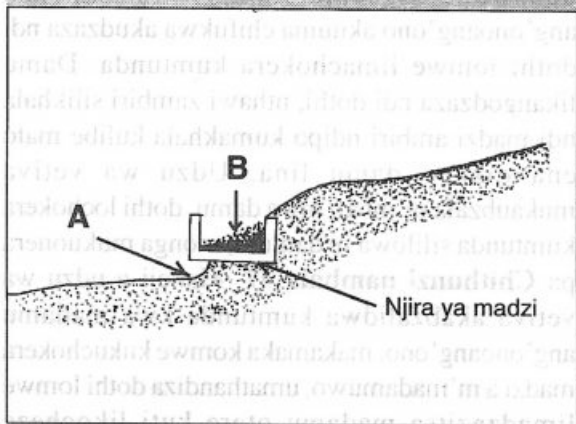


Mu ngalande za konkiriti zomwe zimamangidwa m'munsi mwa m'mapiri kuti madzi aziyendamo, makamaka komwe kumachitika ulimi wothirira ndi madzi, mumadzaza dothi lochokera kumtunda. Vutoli ndi monga mukulionera pa **Chithunzi cha nambala 46**. Ngalande zoterezi zimakumbika kunsi ndi madzi monga mukuonera pa A ndipo zimadzaza ndi dothi monga mukuonera pa B.

Kuti mupewe vutoli, ndibwino kubzala udzu wa vetiva mbali zonse ziwiri za ngalandeyi monga mukuonera pa chithunzi cha m'munsimo. Udzu wa mu mtunda umachinjiriza ngalande kuti dothi lisalowemo, ndipo wa m'munsi umathandiza kuti ngalande isakumbike kunsi kotero ngalande imakhala m'malo mwake.



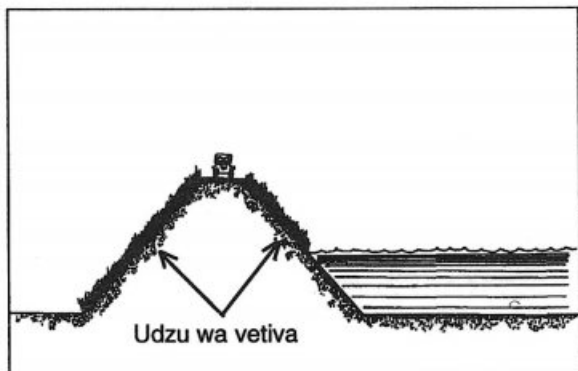
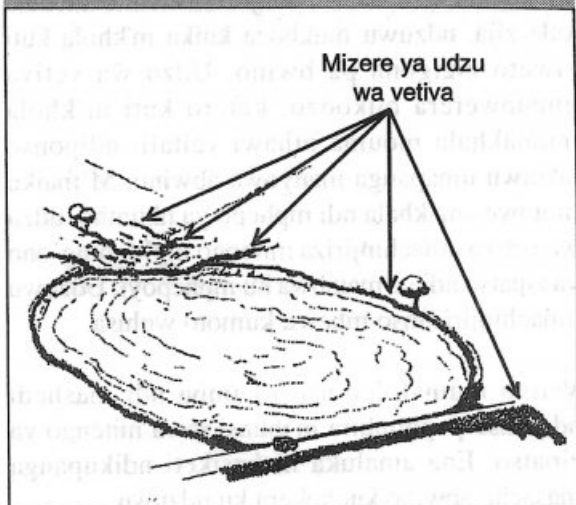
Chithunzi Nambala 46: Kutchinjiriza njira za madzi



Monga momwe mungabzalire vetiva pochinjiriza ngalande, mukhoza kutetezanso madamu pobzala udzuwu. Madamu ambiri makamaka ang'onoang'ono akuuma chifukwa akudzaza ndi dothi lomwe limachokera kumtunda. Damu likangodzaza ndi dothi, nthawi zambiri silikhala ndi madzi ambiri ndipo kumakhala kulibe malo ena oikapo damu lina. Udzu wa vetiva mukaubzala m'mbali mwa damu, dothi lochokera kumtunda sililowa m'damulo, monga mukuonera pa **Chithunzi nambala 47**. Maheji a udzu wa vetiva akabzalidwa kumtunda kwa madamu ang'onoang'ono, makamaka komwe kukuchokera madzi a m'madamuwo, umathandiza dothi lomwe limadzazitsa madamu otere kuti likocheze m'maheji, monga mukuonera pa A m'chithunzichi. Pakapita nthawi materasi amapangika ndipo mumakhala nthaka yabwino kotero kuti mbewu zosiyanasiyana ngakhale mitengo imamera bwino.

Mukhoza kubzala udzu wa vetiva muzipupa za damu kuti zisagumukire monga mukuonera chithunzi cha m'munsimo. Vuto lakugumukira kwa zipupa za madamu limakhudza madamu ambiri osachinjirizidwa pa dziko lonse la pansi. Kuti mudziwe msanga ngati madzi a m'damu akulowa muzipupa ndi pansi pa damu, ngakhalenso mbali mwa ngalande ndi bwino kuti musabzale vetiva m'malo otere.

Chithunzi Nambala 47: Kutchinjiriza madamu



Udzu wa vetiva umamera paliponse ndiponso uli ndi ntchito zambiri. Kuwonjezera ntchito tatchula kale zija, udzuwu mukhoza kuika m'khola kuti ziweto zizigona pa bwino. Udzu wa vetiva umamwerera mikodzo, kotero kuti m'khola mumakhala mouma nthawi yaitali; ndiponso udzuwu umapanga manyowa abwino. M'maiko momwe amakhala ndi mphepo ya nkuntho, udzu wa vetiva umachinjiriza mitengo ing'onoing'ono ya zipatso ndi ya matabwa ku mphepoyi. Udzuwu umachinjirizanso mbewu kumoto wolusa.

Vetiva mumafoleranso nyumba ndi mashedi ndiponso pophimbira m'munsi mwa mitengo ya zipatso. Ena amaluka mabasiketi ndikupanga masache abwino kuchokera ku udzuwu.



KUSAMALA UDZU WA VETIVA

M'bukhu loyamba la vetiva lomwe tidasindikiza, tidafunsa wogwiritsa ntchito bukhulo zamaganizo awo pa udzuwu. M'munsimu muli ena mwa maganizo omwe tinalandira.

- Vetiva akakula bwino amachepetsa kuthamanga kwa madzi ndipo madzi ambiri amalowa pansu kotero kuti madzi amachuluka m'nthaka. Mitsinje siiphwera ngati mwabzala udzu wa vetiva mumndandanda chifukwa chinyonho chimasungika m'nthaka.

- Malo okwera ndi 5 peresenti, nthawi zambiri dothi lochuluka masentimita khumi limakocheza pa heji ya udzu wa vetiva pa chaka chimodzi.

- Powonjezera pa kuteteza nthaka ndi kusunga chinyonho m'nthaka, udzu wa vetiva ndi chakudya cha ziweto, amafolera nyumba, kuphimbira mbewu, kuika m'khola la ziweto kuti zizigonapo, kutchinga mphepo, kuchinjiriza m'mbali mwa mseu ndiponso kupanga masache.

- Ngati mbewu monga fodya zalimidwa m'mizere yolondola akalozera m'malo okwera, udzu wa vetiva umateteza nthaka kuti isakokoloke maka ngati wabzalidwa motsata akalozera a m'malo okwerawa.

• Mizu yambiri ya vetiva imalowa pansi mpaka mamita atatu ndipo ina imakula cha m'mbali mpaka masentimita makumi asanu (50 cm) kuchokera pa phando. Mizuyi siipangitsa kuti mbewu zisakule bwino koma mwina chifukwa cha chinyonho chambiri chomwe chimakhala m'nthaka ya pafupi ndi heji ya udzuwu.

• Maheji a udzu wa vetiva amafunika zaka zitanu kuti ayambe kugwira ntchito yake bwino makamaka m'malo omwe mvula ndiyochepea. Ngati udzuwu mwaubzala pa mpata wapakati pa masentimita khumi (10 cm) ndi masentimita khumi ndi mphambu zisanu (15 cm), heji ya udzuwu imapangika msanga. Ngakhale m'mipata momwe udzuwu udafa, kukokoloka kwa nthaka sikuchitika, chifukwa mmene chaka choyamba chizitha mizu ya vetiva imakhala itakumana kale pansi.

• Komwe vetiva amabzalidwa mphepete mwa materasi, materasi oyang'ana kutsogolo ali bwino kuposa oyang'ana kumbuyo chifukwa ndi madzi ochepa oyenda omwe amataika ku mbuyo kwa terasi loyang'ana kutsogolo. Ndiponso chifukwa chakuti munthu akhoza kuchotsa madzi kumbuyo ndi kutsogolo kwa materasiwa malo olima amachuluka. Cholinga chizikhala kuchepetsa liwiro la madzi, ngati kungatheke ndi maheji a vetiva, kuti nthaka yapamwamba isaonongeke ndi madziwa.

- Vetiva amamera m'malo omwe kumagwa mvula yochepe kwambiri kuyambira mamilimita mazana awiri, ngakhale komwe kumagwa mvula yambiri mpaka mamilimita zikwi makumi asanu ndi imodzi (6,000) pa chaka. Udzuwu umameranso m'malo okwera kwambiri mpaka mafiti 2,600. Udzuwu umathanso kumera m'malo ozizira kwambiri ndipo umalora m'nthaka pafupifupi ya mtundu ulionse. Koma umamera bwino kumalo komwe nthaka ndiyabwino ndiponso ili ndi chinyontho chokwanira; koma ngakhale komwe nthaka ndiyoipa ndiponso mvula ndiyochepe, udzu wa vetiva umamera bwino kuposa udzu wambiri.

- M'maiko ambiri, udzu wa vetiva umakhala ndi matenda a chiwawu, koma udzuwu umakula bwinobwino ngakhale ukhale ndi matendawa. Nthawi zina dzimbiri lakuda limaoneka mu udzuwu. Ku India ngakhale dzimbiri ligwire udzuwu, silimaolokera m'mbewu zina. Ku dziko la China, udzuwu umagwidwa ndi mbozi koma zimafa zikangolowa mu udzuwu. Alimi sadandaula nazo mbozizi amangosankha ndi kubzala udzu omwe sumagwidwa ndimbozi ndi matenda.

- Pa kafukufuku yemwe anachitika ku India pa nthaka ya katondo ndi yamchenga pamalo otsetsereka ndi 2 pelesenti, atabzala udzu wa vetiva kudapezeka kuti kuyenda kwa madzi a mvula kudachepe kuchokera pa 40 pelesenti

kufika pa 15 pelesenti poyerekeza ndi pomwe sipadabzalidwe udzuwu. Kukokoloka kwa nthaka kunachepa kuchokera pa matani makumi awiri ndi mphambu zisanu (25) kufika pa matani asanu ndi imodzi (6) pa hekitala imodzi mu maheji a vetiva a zaka ziwiri. Kudapezekanso kuti m'munda momwe muli maheji a vetiva kukachita chilala, mbewu zimatha kukhala masiku makumi awiri (20) zisanayambe kufota poyerekeza ndi masiku asanu ndi awiri (7) m'munda momwe mulibe udzu wa vetiva.

- Ku China, alimi amaluka vetiva wa m'mapando oyandikana kupanga ngati mpanda poyembekezera kuti vetiva akule.

- Vetiva salira ndalama zambiri ngati mlimi afuna kubzala. Kuchuluka kwa ndalama kumasiyana malingana ndi mtengo wa mbande m'deralo. Ku India, mlimi amafuna ndalama zokwana K120 (US\$8) pa mamita zana limodzi aliwonse omwe abzale. Pa ndalamazi K90 (US\$6) ndizogulira mbande za udzu; koma ngati mlimi ali ndi nazale zake ndiye kuti satayanso ndalama pogula mbande, kotero kuti ndalama zofunika pa mamita zana limodzi aliwonse ndi K30 (US\$2) zokha. Choncho mlimi amatha kubwezera ndalama zake zonse adagwiritsa ntchito pa zaka zochepe. Komwe malo ndi otsetsereka ndi 5 pelesenti ndipo maheji a vetiva atalikirana mamita makumi anayi (40 m), pafunika vetiva wa mbewu okwanira mamita mazana awiri ndi makumi asanu (250)

pa hekitala imodzi, ndipo padzafunika ndalama za pakati pa K75 ndi K300 (US \$5-20), monga mukuonera pa Tebulo la chiwiri ku mapeto kwa kabukuka.

Kusankha mtundu wa vetiva

- Ku Karnataka, m'dziko la India kuli mitundu isanu ndi umodzi yokha ya udzu wa vetiva. Pa mitundu yonse, ndi mtundu umodzi okha womwe alimi amabzala chifukwa ndi wabwino kwambiri kuposa mitundu ina yonse. Mtundu umenewu umapanga heji yabwino, ndi chakudya chabwino cha ziweto, ndiponso sugwidwa wamba ndi matenda ndi tizilombo, komanso sufuna mvula yambiri.
- Sankhani ndi kubzala udzu omwe ukusonyeza kuti siugwidwa wamba ndi matenda ndi mbozi ndiponso omwe umakhala ndi ziphukira zambiri.
- Ngati muli ku malo oziziri kwambiri, sankhani vetiva amene sangawauke ndi mphepo.

Kupanga nazale za udzu wa vetiva

- Vetiva obzalidwa pafupipafupi m'zigwembe mukhoza kumgwiritsa ntchito ngati mbewu. Zigwembe ndi malo abwino omwe mukhoza kupangamo nazale za vetiva chifukwa nthawi zambiri mumakhala chinyontho ndipo vetiva amamera ndi kukula bwino.

• Njira ina yopezera mbande mosavuta ndi kuduladula udzuwu ndi mizu ndi kubzala pa malo amene mwasankha ndipo pomaliza mukutepo ndi pulasitiki.

• Kuti vetiva akhale ndi ziphukira zochuluka, thirani fetereza wokulitsa m'manazale makilogalamu zana limodzi ndi makumi asanu (150kg) pa hekitala imodzi. Nkofunikanso kuthirira nazale makamaka ku malo omwe mvula imachepa kwambiri.

• mbande za vetiva nzofunika kuthenera kuti zikhale pakati pa masentimita makumi atatu ndi asanu (30-50), pofuna kuti zikhale ndi ziphukira zambiri.

• Nazale zabwino zizikhala pa nthaka ya mchengachenga pomwe madzi amalowa m'nthaka mosavuta, ndiponso pa nthaka yotere kukumba udzu okabzala sikuvuta. Ndibwino kukhala ndi nazale pa nthaka ya mchengachenga pafupi ndi mtsinje omwe siukuphwa.

Kubzala udzu wa vetiva

• Vetiva akangobzalidwa nthaka ikali ndi chinyonho amagwira msanga ndipo akangogwira saferapo ngakhale kukhale ng'amba.

• M'minda ing'onoing'ono mpovuta kuti alimi abzalemo vetiva, kotero kuti nkofunika kubzala udzuwu mphepete mwa minda yao.

- Pa nthaka yokokoloka ndiyoguga, alimi abzale vetiva muzigwembe ndi m' mbali momwe. Vetiva wa m'zigwembe akakula mukhoza kudzamu-gwiritsa ntchito ngati mbande zodzabzala m' mapiri m'zaka za mtsogolo.
- Kupakiza nkofunika ndipo kuyenera kuchitika koyambirira kwa mvula. Alimi akhoza kuyesera kupakiza popindira vetiva pa phando lomwe liribe udzuwu.
- Kuti udzuwu ukhale ndi phata lalikulu ndiponso heji yaikulu, ndibwino kudulira vetiva kuti akhale pakati pa masentinita makumi atatu ndi asanu (30-50), patatha chaka chimodzi. Kudulira udzuwu m'chaka choyamba sikupangitsa kuti ukhale ndi ziphukira zambiri.
- Nyerere zomwe zimagwira udzu makamaka omwe wafa, mukhoza kuzipha pothira mankhwala a BHC okwanira kilogalamu imodzi pa mamita zana limodzi ndi makumi asanu alionse a heji ya udzuwu.
- Vetiva amagwira, pakatha mwezi umodzi mutawokera. Akagwira pangani kakhwawa kumbuyo kwa mzere wa vetiva kuti madzi a mvula asungike, kotero udzu wa vetiva umakula bwino chifukwa chinyotho chimakhala chokwanira.

MIZERE YOLONDOLA AKALOZERA

Ulimi wophatikiza mitengo ndi mbewu zina umachita bwino ngati mitengo ndi mbewu zibzalidwa pa mizere yolondola akalozera. Izi zimathandiza kuchepetsa liwiro la madzi ndi kukokoloka kwa nthaka chotsatira chake madzi amadikha. Kuti izi zichitike pafunika kuti anthu a mderalo agwirire limodzi ntchito yoika akalozera m'minda yawo komanso awone kuti mizere akulima polondola akalozera.

Kale ntchito yoika akalozera m'minda ya anthu idali ya alangizi koma lero ndiya mlimi. Izi zikhoza kuchitika powaphunzitsa alimi kaikidwe ka akalozera m'minda ndiponso pokhazikitsa makomiti oyang'anira za nthaka. Nthawi yabwino yopangira akalozera ndi ya chilimwe iyi ndi nkhani yabwino yopangira migula ndi zina zokhudzana ndi ulimi wophatikiza mitengo ndi mbewu zina.

ZOLAKWIKWA POLIMA MIZERE YOLONDOLA AKALOZERA

Chifukwa choyamba ndichakuti akalozera amatalikirana chotsatira chake ndi chakuti akalozera m'malo moti atchinge madzi amalondola kutsetsereka kwa malo. Izi zimapangitsa kuti madzi azithamanga kwambiri

ndi kukokolola nthaka kenaka chigwembe chimapangika pamalopo. Zolakwikazi zimachitika chifikwa chogwiritsa ntchito zipangizo za mitengo yokwera m'malo mogwiritsa ntchito chipangizo cha A feremu. Ubwino wa chipangizo cha A feremu ndi wakuti akalozera satalikirana, ndi chosavuta kugwiritsa ntchito ndiponso ndi chosalira ndalama zambiri. Choncho ndikwapafupi kupanga akalozera ambiri pamalo aakulu pa nthawi yochepa. Ikani ngonyeka chifukwa zimathandizanso kuchepetsa liwiro la madzi m'munda.

Cholakwika china ndi chakuti alimi ambiri amalima mizere kuyambira kumunsi kupita kumtunda kwa munda. Chotsatira chake ndi chakuti mizere yoyambirira ya kalozera wakumunsi siilimidwa bwino. Njira yabwino polima mizere ndikuyambira kumunsi ndi kumtunda kenaka mizere ikumane pakati.

'LAINI LEVULO' NDI NTCHITO ZAKE

'Laini levulo' ndi chipangizo chopangira akalozera. Chipangizochi ndi chosalira ndalama zambiri, ndichosavuta pogwiritsa ntchito ndiponso ndicholondola. Chili ndi sipiriti (spirit) mkati mwake. M'musimu tiwona mowe tingagwiritsire ntchito chipangizochi.

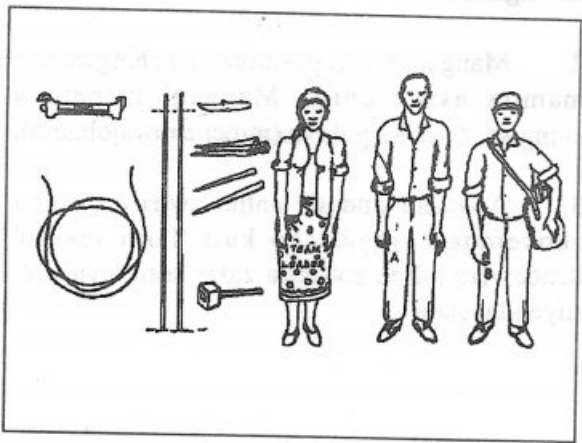
ZOFUNIKA

- 'Laini levulo' imodzi
- Chingwe chotalika mamita asanu
- Tindodo tiwiri totalika mamita pakati pa 1.6 ndi 2 towongoka kutsinde ndi kunsonga komwe.
- Mpeni umodzi
- Zikhomo zana limodzi pa munda wokwanira hekitala imodzi umene uli pa malo a thyathyathya kapena otsetseleka pang'ono, zikhomo zokwana pakati pa 150 ndi 200 pa hekitala imodzi pa malo otsetsereka ndi zikhomo zokwana pakati pa 300 ndi 400 pa hekitala imodzi pa malo otsetsereka kwambiri.
- Nyundo, mwala kapena chinthu chilichonse cholemera chokhomera zikhomo.
- Anthu atatu, m'modzi otenga laini levulo, awiri otenga zikhomo. Ngati awiriwo ndi ana, m'modzi akhale wamkulu komanso anawo asachepere zaka khumi.

KACHITIDWE KAKE

1. Imikani timitengo tonse tiwiri pa malo olimba. Tigwireni pamodzi timitengoto. Jobani ndi mpeni ka mtengo kalikonse mozungulira pa mlingo wofanana. Jobani timitengoto pa mlingo wapakati pa mamita 1.3 ndi 1.6 mulitali malingana zikhale zofanana.
2. Mangani fundo pakatikati pa chingwe cha mamita asanu chija. Mangani mapeto a chingwecho m'maguluvu (mmene mwajobamo).
3. Apatseni tindodo anthu awiri aja ndipo akokerane chingwecho kuti 'laini levulo' ilendewere ndipo zotsatira zake 'laini levuloyo' siiyendayenda.

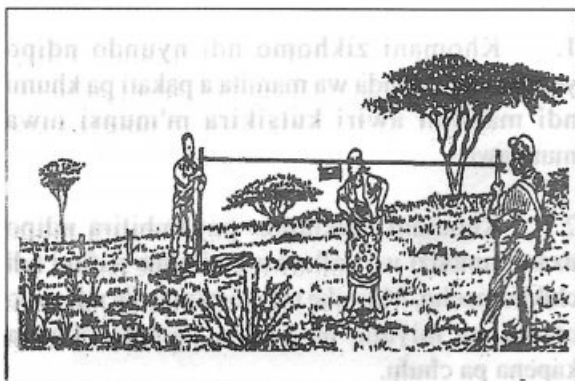
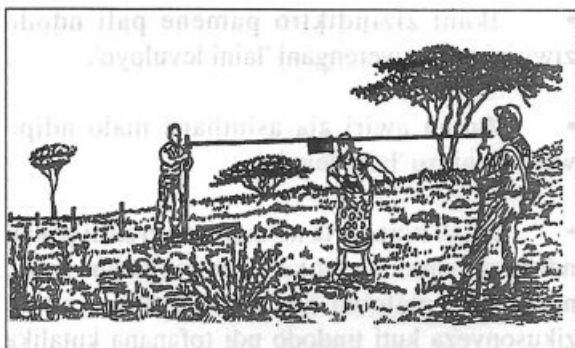
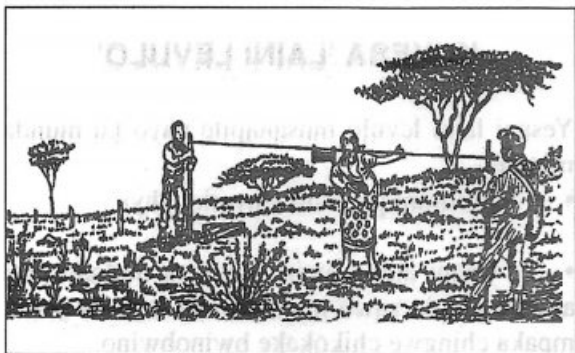
3. Apatseni tindodo anthu awiri otenga zikhomo aja ndipo akokerane chingwecho kuti laini levulo ilendewere ndipo zotsatira zake laini levuloyo siiyendayenda.



KUYESA 'LAINI LEVULO'

Yesani laini levulo musanapite nayo ku munda motere:-

- Imilirani pa malo athyathyathya .
 - Uzani anthu awiri ogwirira tindodo kuti agwire ndodo zawo motalikirana mamita asanu mpaka chingwe chikokeke bwinobwino.
 - Ikani zizindikiro pamene pali ndodo ziwirizi ndipo werengani 'laini levuloyo'.
 - Anthu awiri aja asinthane malo ndipo werenganinso 'laini levulo'.
 - Ngati timadzi ta m'laini levulo sitili pakati ndipo zimenezi zachitika kokwana kawiri konse ndiye kuti malowo ndi athyathyathya ndipo zikusonyeza kuti tindodo ndi tofanana kutalika kwake.
1. Khomani zikhomo ndi nyundo ndipo yendani pa mtunda wa mamita a pakati pa khumi ndi makumi awiri kutsikira m'munsi mwa mundawo.
 2. Khomani chikhomo poyambilira ndipo uzani mmodzi wa anthuwo kuti aime pafupi ndi chikhomocho. Musaike ndodo m'maenje ndi malo otsika, pa miyala, pa mzere, pamalo okwera kapena pa chulu.



3. Uzani winayo kuti ayende pa mtunda wa mamita asanu molunjika malo amene mukuganizira kuti kalozera ayenderako. Munthuyo aimike ndodo ija pa malo athyathyatha chingwe chili chokoleka. Fupikitsani kapena talikitsani chingwe kuti mupewe kulakwitsa.

4. Mtsogoleriyo tsono ayang'ane mu 'laini levulo' ngati ikusonyeza kuti madzi ali pa malo abwino kapena ai. Akaona kuti madzi mu 'laini levulo' sali pa malo ofunikirawo, amuuze munthu winayo kuti asunthire ku mtunda kapena kumunsi mpaka ataona kuti madzi amu 'laini levulo' ali poyenera aikepo chikhomo.

5. Oyamba uja asinthe malo akakhale kutsogolo kwa wa chiwiriyo ndipo amuuze kuti azisutha kupita kumtunda kapena kumunsi tsono akaona kuti madzi a 'laini levulo' ayima pabwino aikepo chikhomo.

6. Chitani chimodzimidzi mpaka mutamaliza munda wonse.

7. Gulu lonse lipite kukapanga kalozera wina kumunsi ndipo achite chimodzimidzi monga m'mene anachitira winayo.

Chofunika kudziwa ndichakuti malo akakhala otsika kwambiri akalozera amakhala pafupipafupi kwambiri. Mwachitsanzo, pangani akalozera pa

mpata wa mamita makumi awiri (20 m) kutalikirana pa malo athyathyatha ndi pa malo amatsitso ochepa, komanso akalozera atalikirane pa mpata wa pakati pa mamita khumi (10 m) ndi khumi ndi asanu (15 m) pa malo amatsitso ndithu ndiponso akalozera atalikirane pa mpata wa mamita asanu (5 m) pa malo otsetsereka kwambiri.

Ngati mufuna kuti muone kuti munda wanu mwayeza bwino yesani apo ndi apo kuti mudziwe ngati zili bwino.

'A' FEREMU

'A' Feremu inapangidwa ndi timitengo tiwiri ndipo maonekedwe ake amakhala ngati *lemba la A*.

ANTHU NDI ZINA ZOFUNIKIRA POPANGA 'A' FEREMU

- Chingwe cholimba ndiponso chotalika mamita awiri.
- Mwala
- Timitengo titatu, kamodzi kotalika mamita awiri ndi tiwiri totalika mamita atatu koma masinde ndi nsonga zonse zowongoka.

- Mpeni
- Thumba lonyamulira zikhomo zokwana 100 zokwanira kuzika munda wokwana hekitala imodzi pa malo a thyathyatha, zikhomo 150 zomwe zikwanira kuzika munda wokwana hekitala imodzi pa malo otsetseleka pang'ono ndi zikhomo zokwana pakati pa 300 ndi 400 zomwe zikwanira kuzika munda wokwana hekitala pa malo otsetseleka kwambiri.
- Nyundo, mwala kapena chimtengo chachikulu chokhomera zikhomo.
- Anthu ena awiri padera koma akhale okulirapo.



Person B should be behind A & have
 long bit leg

MMENE MUNGAGWIRITSIRE NTCHITO ZIPANGIZOZI

1. Tengani timitengo tiwiri tija totalika mamita atatu ndikumanga nsonga zake limodzi. Kenaka tengani kamtengo ka mamita awiri dikumangiriza ku timitengo tiwiri tija ndipo mangani pa msinkhu wa mita imodzi kuchokera pansu kuti mupange 'A' feremu.
2. Kolowekani kachingwe komangirira mwala paja pakumana timitengo tiwiri tija. Chingwecho chitalike masentimita pakati pa asanu ndi khumi m'munsi mwa kamtengo mwapingatsitsa kaja.
3. Tsono khazikani 'A' feremu pa malo athyathyatha. Ikani chizindikiro pa malo pamene chingwecho chakumana ndi kamtengo kopingatsa kaja. Izi zidzakutsimikizirani kuti 'A' feremu yanu ili bwino.

KUGWIRITSA NTCHITO 'A' FEREMU

Gwiritsani ntchito 'A' feremu ngati kulibe mphepo ya mkuntho, chifukwa chingwe chimayendayenda kukakhala mphepo yotere.

1. Khomani zikhomo ndi mahamara kapena zilizonse zokhomera ndipo lowani m'munda ndi mamita khumi kapena makumi awiri kumtunda.

2. Khomani chikhomo poyambirira ndipo ikani mwendo umodzi wa 'A' feremu pafupi ndi chikhomochi. Onetsetsani kuti miyendo ya 'A' feremu ili pa malo abwino osati muzibowo, m'malo otsika, pa miyala, pa mzere, pa chulu ndi malo ena okwera.

3. Gwiritsani mwendo umodzi kuti usasunthesunthe posuntha winawo mpaka kachingwe kakhale pakati penipeni pa kamtengo kopingasa kaja. Ikaninso chikhomo pamenepa.

4. Mwendo wachiwiri uli pa malo omwe aja mwaika chikhomo, tembenezani 'A' feremu kuti mwendo uja unali koyamba ukhale kutsogolo. Sunthani mwendowo mpaka chingwe chikhalenso pakati penipeni pa kamtengo kopingasa kaja ikaninso chikomo pamenepa. Kusunthasuntha mwendo ndikofunika chifukwa kumathandiza kuti zikhomo zikhale m'malo oyenera ngakhale chizindikiro chikhale pa malo olakwika.

5. Pitirizani kuchita izi mpaka muthe munda onse.

Tebuloli likusonyeza kutsetsereka kwa malo, mmene madzi amathamangira, ndi mpata wochoka pa mgwere kapena pa mzere kufika pa nazale.

Kutsetsereka kwa malo		Kusiyana kwa matsi-tso (gradient)	Kukokoloka kwa nthaka ya pamwamba ndi madzi
Mayendedwe a Kampasi (degree)	Kuchuluka kwake m'ma-peresenti		
1	1.7	1 in 57.3	57.3
2	3.5	1 " 28.6	28.7
3	5.3	1 " 19.1	19.1
4	7.0	1 " 14.3	14.3
5	8.8	1 " 11.4	11.5
6	10.5	1 " 9.5	9.6
7	12.3	1 " 8.1	8.2
8	14.0	1 " 7.1	7.2
9	16.0	1 " 6.3	6.4
10	17.6	1 " 5.7	5.8
11	19.4	1 " 5.1	5.2
12	21.3	1 " 4.7	4.8
13	23.1	1 " 4.3	4.5
14	25.0	1 " 4.0	4.1
15	27.0	1 " 3.7	4.0
16	28.7	1 " 3.5	3.6
17	30.6	1 " 3.3	3.4
18	32.5	1 " 3.1	3.2
19	34.4	1 " 3.0	3.1
20	36.4	1 " 2.8	3.0
21	38.4	1 " 2.6	2.8
22	40.4	1 " 2.5	2.7

manambalawa achokera pa tsamba 88

23	42.5	1 " 2.4	2.6
24	44.5	1 " 2.3	2.5
25	46.6	1 " 2.1	2.4
26	48.8	1 " 2.0	2.3
27	51.0	1 " 2.0	2.2
28	53.2	1 " 1.9	2.1
29	55.4	1 " 1.8	2.1
30	57.7	1 " 1.7	2.0
31	60.1	1 " 1.7	2.0
32	62.5	1 " 1.6	1.9
33	65.0	1 " 1.5	1.8
34	67.5	1 " 1.5	1.8
35	70.0	1 " 1.4	1.7
36	72.7	1 " 1.4	1.7
37	75.4	1 " 1.3	1.7
38	78.1	1 " 1.3	1.6
39	80.1	1 " 1.2	1.6
40	84.0	1 " 1.2	1.6
41	87.0	1 " 1.2	1.5
42	90.0	1 " 1.1	1.5
43	93.3	1 " 1.1	1.5
44	96.6	1 " 1.0	1.4
45	100.0	1 " 1.0	1.4

Manambala omwe akusonyeza kuthamanga kwa madzi ndi ochokera pa mpata wa mita imodzi (one meter vertical interval). Kuti mupeze kukula kwa mpata woti musiyepakati pa maheji a udzu wa vetiva, mutaimuse nambala yosonyeza kuthamanga kwa madzi ndi nambala yapakati pa mizere (vertical interval).