

INDLELA ECHANEKILEYO YOKUQHUBA

I AGROFORESTRY



forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA



Isingeniso

Isikhokhelo sase Mzantsi Afrika seNdlela eChanekileyo yokwenza i-Agroforestry siphuhliswe li Sebe lezaMahlathi, ezokuLoba nokusiNgqongileyo (DFFE) ngentsebenziswano ne Institute of Natural Resources (INR) nabathathi-nxaxheba abathile ngenjongo yokusabela kwimicelimngeni abalimi abasakhasayo eMzantsi Afrika ababekongene nayo ngenxa yobhubhani we-COVID-19. Lo bhubhani uphazamise kakhulu kuqoqosho lwasemaphandleni, wabhebhethekisa ngakumbi ubunzima nobubuthathaka bamafama asakhasayo axhomekeke kwezolimo namahlathi ukuze aziphilise. Ulahleko lemisebenzi kunye nezibonelelo ezinqongopheleyo, zabangela ukuba amafama asakhulayo amaninzi asokole ukugcina iinkqubo zezolimo ezinemveliso kunye nokukhusela ingeniso ngexesha lentlekele.

Ukongeza, esi sikhokhelo sijolise ekusetyenzisweni kweenkqubo ze agroforestry njenge sisombululo esisebenzayo nesizinzileyo sokuphucula ezolimo lokutya namahlathi, ukwakha ukomelela kunye nokwahluka kwemithombo yengeniso kula mafama. Ukulima imithi, izityalo, kunye nemfuyo, ngendlela eyohlukileyo yokudibanisa iimveliso ndaweni-nye ifaka ingeniso neenzuzo ezininzi njengokomeleza ukhuseleko lokutya, ukuphucula imveliso yomhlaba, ukubuyisela impilo yomhlaba, kunye nokuxhasa iindidi ngendidi zezityalo nezilwanyana eziphilayo. Ezi nkqubo zikwanegalelo ekomelezeni uqoqosho lwabalimi abakhasayo ngokubonelela ngeendlela ezizezinye zengeniso ngokulima izityalo zolimo kunye neemveliso zamahlathi. Esi sikhokhelo sikwasungula isisombululo esinobuchule ukuhlangabezana nomceli-mngeni wokuba icandelo lamahlathi laseMzantsi Afrika likhulise iinkonzo, nemveliso zalo ngendlela ezinzileyo. Ngokunyuka kweemfuno zamaplanga kunye neemveliso zamahlathi, icandelo lijongene noxinzelelo lokukhula nobunzima bokuqinisekisa ulondolozo lwendalo kunye neemfuneko zoluntu. I-Agroforestry inika ithuba elingundoqo lokwandiswa kwamahlathi ngokuzinzileyo, ivule amathuba okungena kwamafama asakhasayo kurhwebo lwezamahlathi nokuxhamla kwiinkonzo zamahlathi, ukukhuthaza ukukhula koqoqosho olubandakanyayo, kunye nokwenza igalelo kwiinjongo ezibanzi zelizwe zokusingqongileyo ezifana nokunciphisa utshintsho lwemozulu kunye nolondolozo lweendidi ezahlukeneyo zezityalo nezilwanyana eziphilayo.

Siqukunqwe ngophando nolwazi lweengcali olunzulu, udliwano ndlebe nabaninzi abachaphazelekayo, utyelelo kwiindawo zamahlathi neziye, neengxoxo namaqela athile ukuqaphelisisa Imiba engundoqo, ngoko ke esi sikhokhelo sizisa ulwazi olusebenziseka lula kwaye likhulise abo bachaphezelekayo okaye abanomdla kwi agroforestry. Lamaqela aquka abasebenzi basemahlathini, amagosa olwazi ngezolimo, noluntu jikelele elidinga ulwazi oluthe chatha ukuququzelela upapasho lolwazi phakathi kwamafama, oosomahlathi nabacebisi babo.

Ngokuxhobisa abalimi abasakhasayo ngolwazi nezixhobo ezifunekayo ukuze bamkele iindlela ezintsha zokulima amahlathi, olu xwebhu lujonge ukukhuthaza ulawulo lokusetyenziswa komhlaba oluzinzileyo, ukuphucula indlela yokuphila, kunye negalelo ekukhuleni kukonke nokomelela kwamacandelo amahlathi nezolimo aseMzantsi Afrika.

Siqulunqwe njani esi sikhokelo

Isikhokhelo seNdlela eChanekileyo yokwenza i-Agroforestry yaphuhliswa eMzantsi Afrika kulandela amanyathelo amaninzi athabathwe i-DFFE ne INR. Ibisekelwe kuphononongo lophando noncwadi engingqini. Lutyetyiswe ngokubonisana nabachaphazelekayo, utyelelo lwasendle, kunye neengxoxo zamaqela angundoqo, ukuze athathe inxaxheba ekwenziweni kwesikhokelo esifanelekileyo nesisebenzayo ngokweenkqubo zasekuhlaleni. Ngenkqubo ephindaphindwayo yophononongo lwangaphakathi kunye nophononongo lwangaphandle eyenziwe yi-DFFE-etyunjwe yakwikomiti elawulayo yeprojekthi, olu xwebhu lwaphuhliswa.

Uphononongo loncwadi lunike ulwazi olubalulekileyo ngenkqubo ye-agroforestry, ezona ndlela zchanekileyo, kunye nemiceli-mngeni enxulumene neendidi ezahlukeneyo zeenkqubo. Abathathi-nxaxheba ababalulekileyo banike ingxelo eyakhayo kunye nolwazi ngezenzo zokulinywa kwamahlathi kumasimi emithi yorhwebo (planteyshini). Utyelelo lwendawo nokuphonongwa kweendawo zasendle kuze nengxelo ebhaliweyo yezenzo ezikhoyo ngokulima amahlathi eMzantsi Afrika. Ulwazi olusemgangathweni ukuze kuqinisekisewe izindululo zesikhokelo. Iingxoxo zamaqela agxininise nama fama akhasayo kunye nabalimi bemithi zinike ulwazi lwasekuhlaleni kunye nokuqondwa kwesimo sentlalo noqoqosho eziphembelela ukwamkelwa kwe-agroforestry. Iinkqubo zophononongo lwangaphakathi zaqinisekisa ukuba umxholo ubuvakala uchane kile kwaye, ulungelelaniswe nophando lwamva nje, kwaye neendlela zokufezekisa okuqokethwe sisikhokhelo ngokolwazi lwengcali. Uphononongo lwangaphandle kunye nengxelo inikezelwe i-DFFE kunye nabachaphazelekayo bangaphandle kushishino lwamahlathi nezolimo ukuqinisekisa ukuba kukho ukuhambelana neenjongo zabo ezicwangcisiweyo. Ukusebenziseka okuneziphumo eziphathekayo kwesi sikhokelo kunye nokufaneleka komxholo waso kwisimo saseMzantsi Afrika kubalulekile ekukhuthazeni ukwamkeleka kweendlela ezisungulwayo zolimo namahlathi.

Izincomo

Abathathi-nxaxheba: Sincoma abo babe negalelo nesikhokelo kwinkqubo yonke yokuqulunqwa kwezikhokelo. Abathathi-nxaxheba bangaphakathi kwi-DFFE, abathathi-nxaxheba abaphambili bangaphandle okanye maqumrhu azimeleyo baquka I Agricultural Research Council, iSappi, iSouth African Forestry Company SOC Limited (SAFCOL), iMTO Forestry, amalungu eForestry SA, kunye nama fama KwaZulu-Natal, eLimpopo nase Mpumalanga; bonke babonelele negalelo lobuchule kuphuhliso lwesi sikhokelo.

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Ucwangciso nembonakalo no yilo: Ngaba kwa Purple Boa Creations

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linkcazelo

Abalimi abasakhasayo – ijolise Kubalimi bemithi yamaplanga abasebenzi kwindawo eqikelelwa ku 1.6 ha abanegalelo eliqikelelwa ku 3.5% wamaplanga akhuliswa eMzantsi Afrika.

Imithi enemisebenzi emininzi – ichazwe ngenge mithi engatshiyo ezikhuliselwa ukuba zisetyenziselwe indlela engaphezulu kwendlela eyodwa kwimveliso okanye kwimisebenzi yeenkonzo zomhlaba. Imizekelo yezityalo iquka amatyholo aneenkonzo asetyenziselwa ukutya kwemfuyo njenge *Sesbania sesban*.

Izityalo ezidinga unyaka wonke ukukhula – ezi zityalo zikhule ngokuphelelyo kwi xesha elibubude bonyaka. Ziyahluma, zikhule, zivelise iziqhamo/ iinkozo zide zife kwisithuba sonyaka ophelelyo. Imizekelo yoluhlobo lwezi zityalo ziquka ingqolowa, ioti, irhasi, umbona, ivatala, iertyisi, isityalo esinemidumba, ikhaphetshu, kunye nemostade.

Izityalo ezingatshiyo unyaka wonke – ezi zityalo ziziindidi ezityaliweyo ezikwazi ukuphila ixesha elide ukogqitha iminyaka emibini ngaphandle kokuba zityalwe kabutsha minyaka le. Ngokwendalo, izityalo ezilolu hlobo ziquka imithi emininzi, iziqhamo, amantongomane; imifuno nayo iyangena kolu luhlu.

Izityalo ezizinkozo – ingaba zizityalo ezikhula ngonyaka, kabini ngonyaka okanye izityalo ezingatshi ixesha elide eziveza iinkozo ezinembewu eninzi. Oluhlobo lwezityalo luquka ii alfalfa, lupines, ertyisi, ii vetches, nee lespedezas, ezinye zazo zikwazi ukugcina i nitrogen, isondlo ezibalulekileyo sezityalo.

Ii Hektare ngesilwanyana ngasinye (Ha/AU) – le yindlela yoku kala ukuba idlelo linemveliso kangani. Isilwanyana ngasinye sibalelwa ku 450 kg kwinkomo enenkonyane nee hektare nge uyinthe yesilwanayana esinye enika isikhokhelo kwinani lee hektare ezifunekayo ukondla isilwanyana ngasinye kunyaka omnye.

Ukuhambelana – oku kujoliswe kwintsebenziswano phakathi kwamacandelo enkqubo ye-agroforestry; ngoko ke, amacandelo ayancedisana kuba ubukho becandelo elinye kwandisa isivuno somnye.

Ukulungiswa kwe Nitrogen – le yinkqubo apho ummango-moya i nitrogen iguqulelwe uhlobo lwezityalo nezinye izinto eziphilayo plants ukuba zisetyenziswe, ezifana ne ammonia, I nitrate, okanye i ammonium. Izilwanyana ezininzi azikwazi kusebenzisa I nitrogen kwangoko ukuyisusa emoyeni, ukulungiswa kwe nitrogen kubalulekile ukubuyisela I nitrogen emhlabeni.

Umcebisi wezolimo – ngumntu ocebisa amafama ukuba alime njani, iimashini zefula aziphathe njani, imfuyo ayiphathe njani, njalo njalo. Uqeqesha amafama ngokuchitha ixesha nabo ebafundisa ngendlela eziphathekayo nezibonakalayo, abancedisa ngoku bhala nokulandelela inkqubo.

Umfama osakhasayo – ngumfama osebenzela kwindawo encinane kakhulu ukufumana uxhaso ngeenkonzo abazidingayo ukuze bakwazi ukukhulisa isivuno sabo.

Umgangatho ongaphantsi – umaleko wezityalo ezikhula ngaphantsi kophahla lwemithi. Oku kuquka amatyholo, imifuno, okanye izityalo ezikwazi ukunyamezela umthunzi, ezixhamla kumaqondo obushushu aloondawana esemthunzini kunye nokhuseleko olubakho ngenxa yemithi emide engentla.

Umlhlabo ophunyuziweyo nophuculwayo – yindlela yokuphumza umhlaba ngokulima izityalo eziquka imithi yeenkonzo, amatyholo nemifuno. Ezi zityalo zibuyisela ngokukhawuleza ukuchuma komhlaba kwixesha lonyaka lokulima okanye imijikelo emibini yexesha lokulima.

Umoluli wenkxaso yezolimo – ngimntu oxoxisana namafama ukuxhsa ukwenziwa kwezigqibo ngokunika ulwazi neendlela ezisisgxina zokulima. Abaxhasi ngolwazi lwezolimo zifundisa ngeendlela ezintsha, ezinegalelo nefuthe ngokuxhomekeke kulwazi lweengcali. Oku kubandakanya ulwazi nophando ngeendlela zokulima ngokusebenzisana nendalo ukwenza iziphumo ezintle ngoku nakwixesha elizayo.

Umpuhlisi wezaMahlathi – ingcali enoxanduva lokukhuthaza nokulawula izenzo namanyathelo azinzileyo amahlathi. Indima yabo ibandakanya ukusebenzisana noluntu lwasekuhlaleni, ii-arhente zikarhulumente, kunye namaqumrhu abucala ukuqinisekisa ukusetyenziswa ngokuzinzileyo, ukugcinwa kunye nophuhliso lwamahlathi.

1. INTSHAYELELO

1.1 Kutheni kuqulunqwa esi sikhokelo se Agroforestry?

- ♥ Esi sikhokelo senzelweukuphuhlisa ulwazi olusebenziseka lula olunxulumene ne-agroforestry ingakumbi ukucwangcisa kunye nokwenza iinkqubo ezisekelwe kwi-agroforestry (ngamafutshane; ulimokutya-namahlathi).
- ♥ Esi sikhokelo siqukethe iingcebiso kubasebenzisi ekujoliswe kubo ukuba babe nendlela yokudibanisa nokulawula ulimo lokutya kunye nefula ngaphakathi kweeplanteyshini (gxebe plantations) njenge nxalenye yenkqubo ye agroforestry esekelwe kwi-planteyshini.
- ♥ Esi sikhokelo senzelwe ukusetyenziswa ngabaqeqeshi bamafama, abasebenzi bezamahlathi, amafama nabalimi abasakhasayo, iingcali ze-agroforestry, amagosa ezolimo, amaziko ezemfundo ephakamileyo, kunye nemibutho ezimeleyo ethi ibandakanyeke kumahlathi kunye nakwi-agroforestry.
- ♥ Amanyathelo anikezelweyo kwesi sikhokelo aya kucebisa abasebenzisi ngolawulo lwezityalo, ngakumbi kwiinkqubo ezisekelwe kwiplanteyshini, i-plantation-based agroforestry ukutsho. Kwaye azakuncedisa nangendlela yokuphuhlisa amashishini azinzileyo kunye neendlela zokuthengisa.
- ♥ Esi sikhokhelo sibonelela ngesixhobo sokwenza izigqibo ezicacileyo kumafama okanye amafama asakhasayo, kwabamahlathi, kumagosa ezolimo ukuze basisebenzise ukukhetha inkqubo efanelekileyo ye-agroforestry ukuhlangabezana neemfuno zabo.



1.2 Kutheni kunemfuneko yenkxaso yamaFama enxulumene ne agroforestry?

Isicwangciso se-Agroforestry eMzantsi Afrika gxebe I **“South African Agroforestry Strategy”** ibona kune mfuneko yokuphuhlisa nokusasazwa kolwazi nge-agroforestry ukuze kube lula ukwamkeleka kwayo eluntwini.

Inkonzo karhulumente yokusasaza ulwazi inegalelo kupapasho lolwazi elenzelwe ukuxhasa amafama asakhasayo nabalimi beemveliso encinane, ukuba bafumane amacebo neenkukacha ezithe vetshe zokuncedisa amafama nanjengoko kubonisiwe ku Mfanekiso 1.

Ulwalo lwenkxaso kumafama luyinxalenye yendlela yokufundisa eyenziwa bucala ngaphandle kokulandela iinkqubo ezimisiweyo zemfundo.

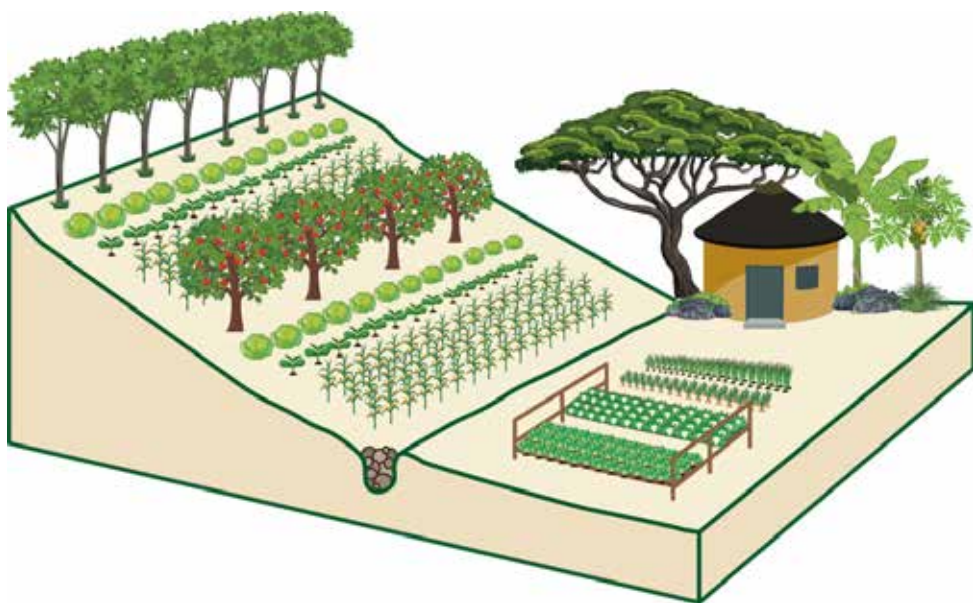


UMFANEKISO 1: Igosa lolwalo lwenkxaso kumafama lugqithisa umyalezo we agroforestry kumafama asakhasayo nabalimi beendawo ezincinane.

2. IYINTONI I AGROFORESTRY?

Ngamagama amafutshane, i-agroforestry yiyo nayiphi na inkqubo yokusetyenziswa komhlaba equka iintlobo ezahlukeneyo zemithi kunye nezityalo okanye imifuno njengoko kuboniswa kuMfanekiso 2.

Igama u “agroforestry”
lisuka kumagama
adityanisiweyo “ezolimo”
kunye “nezamahlathi”.



UMFANEKISO 2: Umzekelo obonakalisa iintlobo ezahlukeneyo zezityalo nemithi zikhuliswa ndaweninnye kwi nkqubo embaxa ye agroforestry (Xu et al., 2013).

Intsingiselo eneenkcukacha ezongeziweyo nge-agroforestry ithi “I agroforestry yindlela ekudityaniswa ngayo ulimo lwe mithi okanye amatyholo, ulimo lwezityalo, kwakunye neemveliso zolimo lwezilwanyana ngeenjongo zokuxhamla kwintsebenziswano yolondolozo lwendalo kunye nezoqoqosho (Pantera et al. 2021)”.

2.1 Amacandelo eemveliso ze nkqubo ye agroforestry

Iindidi zeenkqubo ze Agroforestry ziquka amacandelo ahlukeneyo akwaziyo ukuncedisana xa elawulwa ngendlela efanelekileyo:



Icandelo lokuqala: imithi

Imithi isenokuba yeyeziqhamo, isetyenziselwe iinkuni zokubasa, ifula, amaplanga kunye nezinye iimveliso.

Inkunkuma yamagqabi kunye nezinye iintsalela zezityalo zonyusa umxube womhlaba otyebileyo (organic matter) ochumisa umhlaba ongaphantsi. Kwaye, imithi inokuphinda isebenzise izondlo ezisuka kumanqanaba anzulu omhlaba ongezantsi ngokusebenzisa iingcambu zayo.



Icandelo lesibini: Izityalo zaminyaka le

Ezi zityalo ziquka iinkozo, iibhubhu, iingcambu, imifuno, amakhowa kunye neentyatyambo. Ukujikeleziswa kwezityalo endaweni elinywayo akuthathi xesha lide xa kuthlekiswa nexesha elide lokutyala kwemithi.



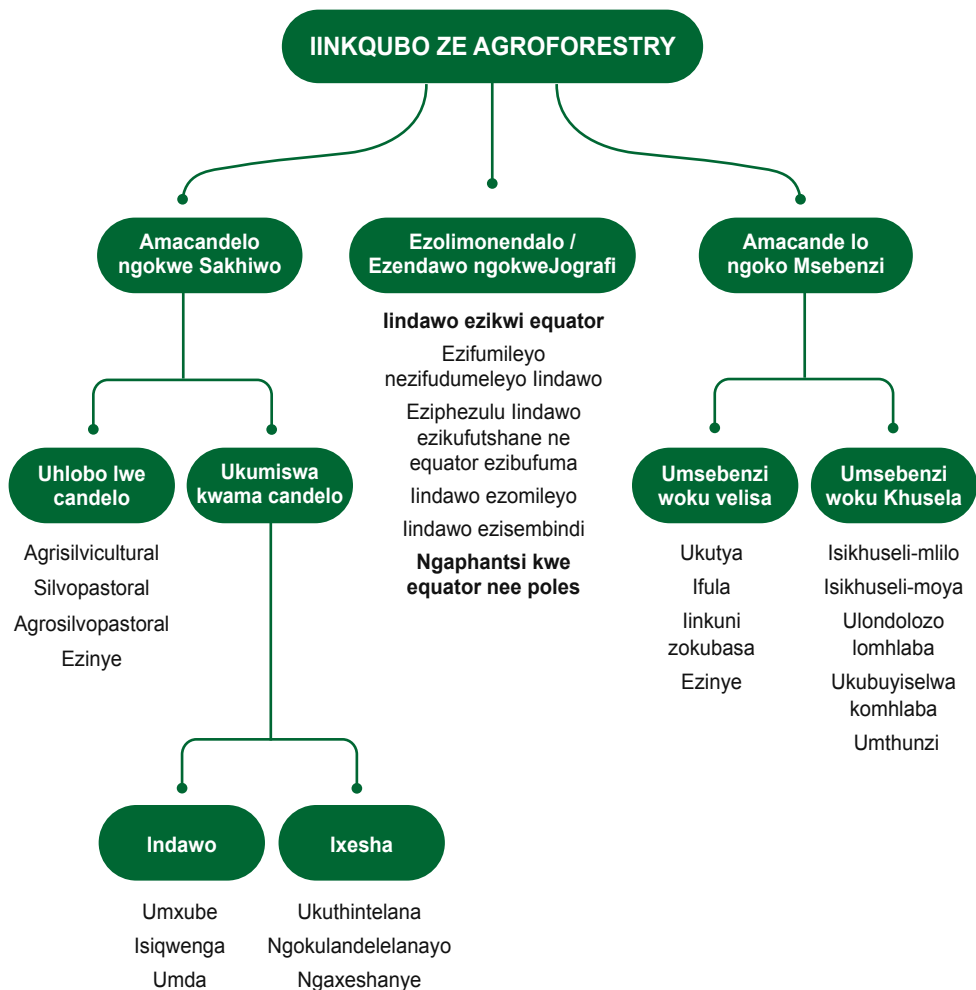
Icandelo lesithathu: Imfuyo (kuquka nokutya kwayo)

Eli candelo liquka imfuyo esetyenziselwa imfuneko ezifana nokuyila amandla, ubisi, inyama kunye nemveliso yamaqanda, nentlanzi, kunye nezinye izinto eziphilayo zokutya.

Ezinye iinkqubo ze agroforestry zinemithi esetyenziselwa izinto ezininzi eziquka isibonelelo ngokutya, iziqhamo, iinkozo ngelixa amanye amafama ekhulisa imithi ndaweni-nye namadlelo emfuyo.

2.2 Iinkqubo ze Agroforestry neendlela zokwenza

Iinkqubo ze-Agroforestry zingohlulwa ngohlobo eyakhiwe ngayo iinkqubo kwakunye nendlela amiswe ngayo amacandelo ahlukeneyo kudidi ngalunye njengoko kubonisiwe kuMfanekiso 3.



UMFANEKISO 3: *Ukwahlukwaniswa kwee nkqubo ze Agroforestry (Icatshulwe ke Nair et al. 2021).*

Kukho iindidi ezintathu eziphambili zeenkqubo ze-agroforestry ezisebenza ngeendlela ezingafaniyo. agrisilvicultural, silvopastoral, kunye ne-agrosilvopastoral. Ezi nkqubo kunye nezenzo ezinxulumene nazo zichazwe ngokubanzi kwi-tafile 1.

ITAFILE 1: linkcazelo zeenkqubo ze agroforestry ezohlukeneyo
Iintsingiselo zicatshulwe ku (Brown et al. 2018 ; Köthke et al. 2022).

Uhlobo lwe Agroforestry	Ukumiswa kwamacandelo
Agrisilvicultural: idibanisa izityalo nemithi	Ukuphuculwa kweentsimi ezingalinywanga
	Ukutyalala phakathi kwemigca ekutyalwe kuyo imithi
	Inkqubo ye agroforestry ekwi planteyshini (icatshulwe nguTaungya)
	Izityalo ezisemthunzini, ezikwakhula unyakawonke; I agroforestry enamazinga amaninzi angafaniyo
	Imithi enemisibenzi emininzi
	Izithothisi-moya, liheji, indawana esisithinteli (buffer strip)
Silvopastoral: idibanisa imithi, nemithana emifutshane kwakunye namadlelo	Imimango/ oovimba be Protein (protein banks)
	Ucingo oluphilayo olwakhiwe nge mithi yefula nee heji (hedges)
	Imithi nemithana emadlelweni
Agrosilvopastoral: idibanisa imithi, izityalo kunye nemfuyo	Izitya emizini
	Iiheji ezityiwa yimpahla emfutshane, izichumisi, umanyolo oluhlaza, ulondolozo lomhlaba
Ezinye iinkqubo	Ukufuywa kwenyosi
	Ulimo lwamahlathi emanzini
	Iindawo ezinemithi exubileyo

- i. **Agrisilvicultural** – idibanisa izityalo nemithi kunye/okanye amatyholo.
- ii. **Silvopastoral** – Idibanisa imithi okanye amatyholo kunye namadlelo.
- iii. **Agrosilvopastoral** – Idibanisa imithi, nezityalo kunye nemfuyo.

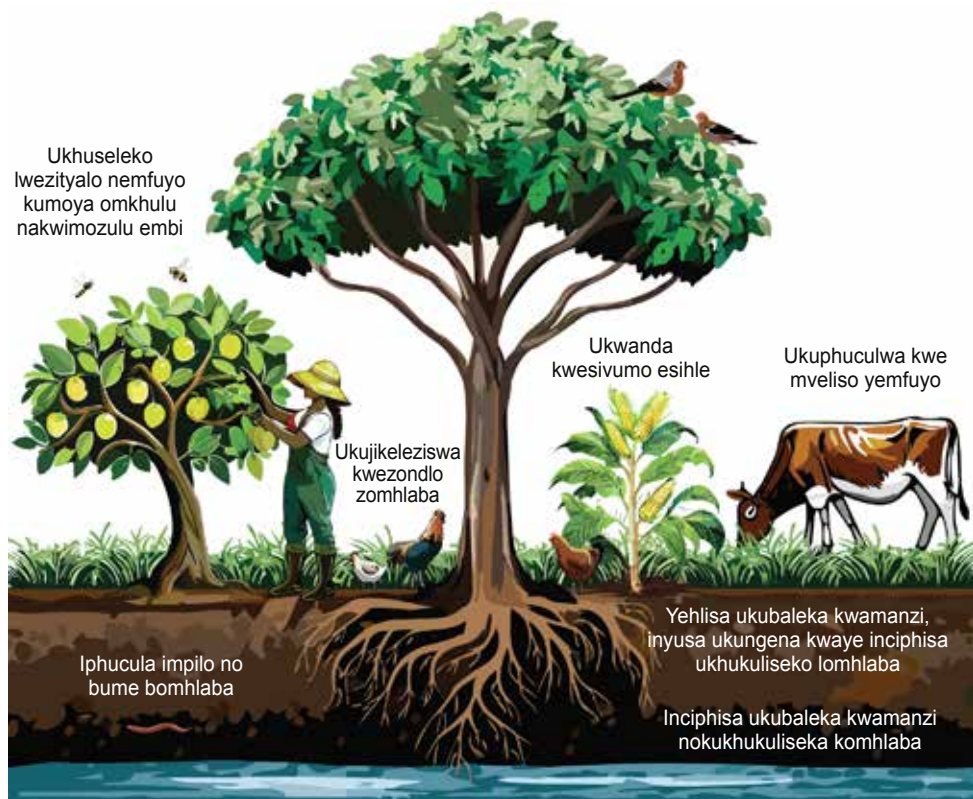
Inkcazelo emfutshane	
	Imithi/amahlahla (ingakumbi iimbotyi) ezityalwe zayekwa ukuba zizikhulele ngexesha lokuyeka umhlaba olinywayo uphumle phakathi kokujikeleziswa kwezityalo ukuze kuvuselele ukuchuma komhlaba, kuquka ukuguquguqula ukulima kunye nokuphumza umhlaba oku ejikeleziswayo.
	Ukutyalwa kwemiqolo yemithi kunye/okanye namatyholo ukwenza iindlela apho kuveliswa khona izityalo zezolimo okanye zezityalo.
	Inkqubo yokutyala izityalo ezifumaneka nyaka-wonke phakathi kkwee planteyshini ngexesha lokumilisa phambi kokuba imithi ikhule ngokuxineneyo kumagqabi ayo aphezulu kuvaleke imiqolo. Amaxa amaninzi umhlaba ngokasomahlathi othile ovumela amafama ukuba alime kuloondawo.
	Izityalo ezingatshiyo ezisithwe ngomthunzi wemithi umz. Ikofu/ikhokho esithiweyo, ukudityaniswa kwamanqanaba amaninzi ezityalo.
	Imithi etyalwe nezityalo yonke indawo emasimini.
	Imithi/amatyholo ajikeleze umhlaba ekulinywa kuwo ukukhusela umhlaba, umzekelo njenge zithinteli-moya, kuquka izithinteli zomlambo phakathi komhlaba otyaliweyo kunye nemithombo yamanzi/imilambo.
	Imithi esetyenziselwa iinjongo ezininzi (imithi ye-fula ene-protayin echumileyo) ityalwa kwiindawo ezizifama okanye ezijikeleze iifama kunye namasimi ahlukeneyo ukuze asikwe kwaye athwale imveliso yefula ukuze ihlangabezane neemfuno zesondlo semfuyo ngexesha lokunqongophala kwefula yazo ebusika.
	Imithi esetyenziselwa ukutya kwemfuyo ilinywa ibe lusingo ukukhusela indawo kwizilwanyana ezihamba nje nezinganobungozi okanye ezinye izinto ezinokuphazamisa.
	Imithi eyahlukeneyo namahlahla ityalwe yonke indawo ngokungalandelelani okanye ngokulandela indlela ethile ukuze ikwazi ukuxhasa ekutyeni kwe mfuyo.
	Imithi eminizi elinywa ndaweni-nye ngamanqanaba ahlukeneyo kudityaniswa nezityalo zokutya ezityeni emizini, nemfuyo ingakho okanye ingabibikho.
	Iiheji ziyakhathalelwa zilungiselelwe imisebenzi emininzi efana nokutya kwemfuyo, ukogquma umhlaba, isikhuthazi zetzityalo.
	Imithi edla ngoku tyelelwa ziinyosi rhoqo ilinywa kumda wentsimi yokulima.
	Iintlobo ezahlukeneyo zemithi kunye nezihlahla ezithandwayo ziintlanzi zityalwa kumda kwaye zijikeleze amanzi namachibi eentlanzi. Amagqabi emithi asetyenziswa kutya kweentlanzi.
	Imithi esetyenziselwa izinto ezininzi ikhuliswa ixutywe okanye ityalwe ngokwahlukeneyo ngeenjongo ezahlukeneyo ezifana nokufumana iinkuni, ifula, ukulondoloza umhlaba, nokulungisa umhlaba, nezinye njalo njalo.

2.3 Kutheni sikhuthaza i agroforestry?

Agroforestry offers a range of environmental, economic, social and ecological benefits that a farmer or grower can take advantage of to achieve a diverse and sustainable farming enterprise.

2.3.1 Sizuka ntoni kwi agroforestry?

Njengoko kubonisiwe kuMfanekiso 4, i-agroforestry yinkqubo embaxa equka amacandelo ahluka-hlukeneyo adityanisiweyo ukuze umfama, ezolimo, nendalo esingqongileyo ngokubanzi ixhamle. Umzekelo, ukufakwa kwemithi kwiinkqubo zokulima, kuzisa umthunzi kwizityalo ezingaphantsi komthi, kukwa zisa ukhuseleko lomoya kunye nokulawulwa kokufuma, okuchaphazela kakuhle izivuno zezityalo kunye nempilo yemfuyo.



UMFANEKISO 4: *linzuzo ezifumaneka kwii nkqubo ze agroforestry.*

2.3.2 Iimpawu zenkqubo ze agroforestry ezilulutho

Iinkqubo ze-Agroforestry kufuneka zibe nezi mpawu zilandelayo ukufezekisa izibonelelo ezikhankanywe kwiphepha elingaphambili:



IBHOKISI 1: IINZUZO KWINDALO NAKOKUSINGQONGILEYO

- ♥ **Umhlaba okwisimo esiphucukileyo:** ukutyala imithi kunciphisa ukhukuliseko-mhlaba. Isakhiwo somhlaba siyatshintsha, kubekho umhlaba ovundileyo. Iingcambu ziyawubamba umhlaba uzinze kube lula nokujikeleza kwe zondlo.
- ♥ **Ukuphucuka kwendiini zendalo:** Iinkqubo ze Agroforestry azifani, zivumela iindawo ezingafaniyo ukuba zixhase izityalo, izilwanyana, nezona zilwayanyana zicinane kutsho konyuke iisibalo sendidi zezinto eziphilayo kulofama.
- ♥ **Ukuthomalalisa ifuthe lwemozulu:** Iimithi ibuyisela ikhabhoni emhlabeni, yehlise ukutshintsha kwemo yezulu. Iyapholisa ngomthunzi wayo kwiindawana ezingaphantsi kwayo. Yehlisa amaqondo obushushu nengqele emandla kwaye ngokuhamba kwexesha kutshintshe izinga lokuguquka kakhulu kwemozulu.
- ♥ **Ulawulo lwaManzi:** Imithi incedisa kakhulu ekubambeni Amanzi angene emhlabeni kwehle ukhukuliseko lomhlaba nezityalo, kubekho Amanzi aneleyo ukugcwalisa nemithombo engaphantsi komhlaba.



IBHOKISI 2: IINZUZO NGOKWEZENTLALO

- ♥ **Ukukhuseleka kokutya nesondlo:** I-agroforestry iyakwazi ukuvelisa ukutya okunempilo nesondlo kwimfuyo. Oku kubaluleke ngakumbi kwiindawo ezisemaphandleni nakwiindawo ezikwazi ukuvelisa nje iizityalo ezimbalwa, yaye ezidla ngokuba nesondlo esishokoxekileyo.
- ♥ **Ukunciphisa iindleko zemveliso:** kuba amacandelo e agroforestry ayasebenzisana kwaye anenzuzo abelana ngayo, igalelo lokuqala ukutyala nexabiso lokukhulisa imveliso (umz. Ukuthenga izichumisi) kungehliswa.
- ♥ **Ingeniso eyahluka-hlukeneyo:** i-agroforestry inika amafama ithuba lokufumana ingeniso eyongezelelweyo ngamaplanga, iziqhamo, amantongomane, kunye nezinye iimveliso zemithi. Oku kwahluka kunciphisa umngcipheko wezoqoqosho kwaye kwandisa uzinzo lwezemali
- ♥ **Ubumbano loluntu:** i-agroforestry inokuxhasa ubumbano loluntu ngolawulo olwabelwanayo kunye neenzuzo ezininzi. Umzekelo, eminye imithi ye-agroforestry ibonelela ngeziqhamo okanye amayeza ekwabelwana ngawo ngokukhululekileyo anegalelo ekudibaniseni abantu ekuhlaleni (uBuntu).

2.4 Imveliso ephezulu (ukonyuka kwemveliso kuwo nawuphi umhlaba okhoyo)

Inkqubo ye-agroforestry iya kunika iimveliso ezininzi. Oku kufaka izibonelelo zexesha elifutshane kunye nexesha elide kwaye zifika amacandelo ezityalo eziphila unyaka onyakeni okanye ezo zingatshiyo ixesha elide. Kusenokubakho ukucutheka okuncinci kwimveliso yamacandelo ngamanye ngenxa yokhuphiswano ngokutya, kodwa inkqubo iyonke ilindeleke ukuba ibe nemveliso ngakumbi xa iqhathaniswa kunokuba kulinywe uhlobo lwesityalo esinye kuphela.

Umzekelo, ukudibanisa umbona kunye ertyisi zejuba kunokukhokelela ekuncipheni kwesivuno sombona, kodwa kusenokungabizi kakhulu ukuvelisa ngenxa yo mongo-moya i-nitrogen enikelwa zii ertyisi. Ukongeza, kuya kubakho isityalo sombona kunye nokutya kwemfuyo okuvela kwi ertyisi zejuba.

2.5 Uzinzo kokusiNqongileyo ngokwendalo

Kwiinkqubo ze-agroforestry, ukugcinwa komhlaba kunye namanzi kuhanjiswa ngemiphumo enenzuzo ye-woody perennials (ingakumbi iintlobo ze-nitrogen-fixing). Iinkqubo ze-Agroforestry zinokuphinda zisebenzise izondlo kwaye zigcine ukuchuma komhlaba. Ezi nkqubo zikwaphucula iintlobo ngeentlobo zezinto eziphilayo kuba kukho izityalo ezininzi ezilinywa kwindawo enye yomhlaba.

2.6 Ukwamkeleka

Iinkqubo ze-Agroforestry ziyadinga ukubalula ukuze amafama azamkele. Ngaphandle kokufaneleka kweemeko zomhlaba nokuphilayo ezifama, kufuneka amafama aqwalasele noku:

-  Imiba yencubeko nentlalo: Ukuba iinkqubo zifuna ukuba abantu batye izityalo ezitsha okanye benze izinto ezingafanelekanga ngokwenkcubeko nezithethe zabo, zisenokungamkelwa.
-  Ukufikeleleka: Ukuba ukuseka nokulawula iinkqubo kitya kakhulu ezipokothweni zamafama, oku kunokunciphisa ukwamkelwa. Umzekelo, ukuba izinto zokutyalazenzakubo kufuneka zithengiwe kwaye zibiza kakhulu.
-  Iimfuno zabasebenzi: Ukuba abasebenzi banqongophele okanye bayabiza, ngoko ke amafama /abalimi abasakhasayo akunakwenzeka lula ukuba bamkele iinkqubo ezineemfuno eziphezulu zabasebenzi (ezifana nokuvunwa rhoqo kweeheji ukubonelela ngefula okanye amahlahla okogquma umhlaba)

2.7 Xa intle kangaka I agroforestry, kutheni ingasetyenziswa jikelele?

Izinto eziphembelela izigqibo zama-fama kunye nokukhethwa kweendlela ezithile zokusebenza ziquka:

2.7.1 Ukufikeleleka komhlaba nokhuseleko lwawo

Ubukho bomhlaba bubo obumisela ama-fama ukuba anganalo na ithuba lokufaka imithi kwiifama zawo.

Kukho iintlobo ngeentlobo zokungakhuseleki kwindlela umhlaba oqeshwa ngawo ngabasebenzisi bawo. Kwiimeko ezininzi, ama-fama aqeshileyo, ngakumbi abafuduki, abakwazi kutyala okanye balawule imithi kuba iimveliso zemithi zezomnikazi womhlaba. Xa abantu bengenayo itayitile yomhlaba, umbono kudla ukubakho umbono wokuba akukho sizathu sokutyala-mali kuwo ngohlobo lokukhulisa imithi, kuba iinzuzo zayo zidinga kwaye zithatha ixesha elide ukogqitha ixesha umqeshi-ndawo akwazi ukulihlala apho.

Iiprojekthi ezininzi ze-agroforestry aziphumelelanga ngenxa yokuba abantu abanawo amalungelo ngokupheleleyo okanye abana lungelo kwaphela kumhlaba abahlala kuwo. Ingqesho yomhlaba engakhuselekanga okanye engaqondakaliyo, eqhelekileyo kumazwe asakhasayo, ibhidanisa amalungelo, ukubekwa kwemida nokuchazeka komhlaba. Amalungelo omfama kwimithi anokwahluka kumalungelo omhlaba, kwaye ukungakhuseleki kwengqesho-mhlaba nemithi kunokutyhafisa abantu ekuqaliseni iindlela zokulima ngokwenkqubo ye agroforestry.

2.7.2 Izimo ezingalungelani ne agroforestry kumhlaba nendalo

Iimeko zendawo nendalo yayo nkqu nemozulu, uhlobo lomhlaba, ukuthambeka kunye nokufumaneka kwamanzi kunokuchaphazela impumelelo yenkqubo yezolimo lwe agroforestry. Umzekelo, kwiindawo ezineqabaka kakhulu ebusika, iintlobo ezininzi zemithi ezisetyenziselwa iinjongo ezahlukeneyo kwiinkqubo ze-agroforestry eMpuma Afrika ziyoyisakala ukuphila.

2.7.3 Ukungabikho kwe nkxaso yobugcisa bezolimo

Kukho ukunqongophala kwenkxaso yobugcisa (umz. iinkonzo zamagosa olimo) ukukhokela ama-fama kunye nabalimi abasakhasayo ngokuphathelelene nomxube wezi zinto zilandelayo-iindidi zezityalo, ukufikelela kwizinto zokutyala kunye neendlela zokulawula indibaniselwano yezityalo nemithi.

2.7.4 Ukungabikho kokufikeleleka kwee marike.

Kuqhelekile nje ukuba abalimi abasakhasayo bakwazi ukufikelela kwiimarike ezisesikweni ukuthengisa amaplanga abo, okona kuyingxaki ngakumbi kubo kukuthengisa iimveliso zamanye amacandelo enkqubo ye-agroforestry (anjenge izityalo zokutya).

Imiceli-mngeni enxulumene nokufikelela kwiimarike ibandakanya umgama omde ukuya kumaziko asezidolophini, iindlela zeenqwelo ezingekaphuhliswa okanye ezingekho mgangathweni, ukunqongophala kolwazi lwemarike kunye nokusilela ukuhlangabezana neemfuno zeemarike ngokobungakanani okanye umgangatho wemveliso. Oku kukwangenxa yokuba amafama/abalimi abasakhasayo baye bathande ukusebenza ngokuzimela bangayithandi ncam eyokusebenza bengamaqela.

2.7.5 Ukufaneleka kwenkqubo neenjongo zamafama

I Agroforestry I ixhomekeke kakhulu kwimeko ethile yendawo ukuze i isebenze ngendlela eyiyo. Amagosa enkxaso ngezolimo kufuneka akwazi ukunika isikhokhelo sokuyisebenzisa le nkqubo ye agroforestry ngaphandle kokuthintela ezinye iindlela amafama nabalimi abasakhasayo abangasebenza ngazo.

Amafama kufuneka axhotyiswe ngolwazi ukuze ayile iinkqubo zawo esebenzisa ulwazi olufana nobume bomhlaba, imozulu kunye nenjongo zabo ngenkqubo leyo ezifana (ezinje ngokubonelela ngokutya, ifula, amayeza, njalo njalo) kunye nomlinganiselo womsebenzi odingekayo kubo ukufezekisa ezoo njongo.

3. I AGROFORESTRY EMZANTSI AFRIKA

Ekufundeni nasekuqondeni iinkqubo ezahlukeneyo zokwenza I agroforestry kwimeko yase Mzantsi Afrika, esi sikhokelo sohlukanisa Agroforestry ngokwenkqubo ezizindidi ezimbini. Oluhlobo lokwahlukanisa lususelwa kuhlobo lomthi olusetyenziswayo ngokwe candelo lomthi olukhoyo umzekelo, kwi nkqubo ye agroforestry kukho udidi olusekwe kwimithi yemveliso eyodwa (planteyshini), kuphinde kubekho olusekwe kwimithi esetyenziselwa izinto ezahlukeneyo.

3.1 Inkqubo ye-agroforestry ngokwemithi enemisebenzi eyahlukeneyo

Imithi esetyenziselwa izinto ezininzi yeyona ndlela eqhelekileyo/indala kwiinkqubo ze Agroforestry, isebenza ngokudibanisa imithi ezindidi ezininzi, nezityalo zokutya kwakunye namadlelo, kuyo sivuza isivuno esihle, ifula nomhlaba ophilileyo. Kuneenkqubo ezininzi zoluhlobo lwe agroforestry lubandakanya imithi eyahlukeneyo, ukubala ezimbalwa kukho i silvopastoral, agrosilvopastoral, ne agrisilvicultural yaye zohluka ngendlela ezisebenza ngazo.

3.1.1 Silvopastoral

Iinkqubo zeSilvopastoral ziquka imithi okanye amahlahla kunye namadlelo. Omnye umzekelo uquka ingca yefula kunye ne-pigeon peas. Ingca iyakwazi ukutyiswa okanye ivunwe kwaye i-pigeon peas ingabonelela ngokutya okuziinkozo, kunye nomthombo weproteyini ephezulu yamagqabi anokuthi avunwe, aphiwe imfuyo omisiwe okanye eluhlaza.



UMFANEKISO 5: Iiheji ze ertyisi yeJuba ezisekwe ku 90 cm (ekhohlo), iiheji ezingasikwanga (phakathi) and ukukhula kwengca okungamandla ngezantsi kwemithi yee ertyisi ze juba (ekunene).

Omnye umzekelo yimithi/izihlahla ezityebileyo ezineprotheyini ezininzi ezityalwe kwindawo okanye ezingqonge iifama kunye namathafa apho ifula iveliswa khona isikwe ithwalwe (lertyisi yejuba yohlobo i Pigeon okanye i *Sesbania sesban*).

3.1.2 Agrosilvopastoral

Izitya ezisemizini ekulinywa kuzo izityalo ukuze kutye abantu nemfuyo ifumane ifula ngumzekelo wenkqubo ethandwayo yohlobo i-agrosilvopastoral esetyenziswayo kakhulu apha eMzantsi Afrika. Nanjengoko kubonisiwe kuMfanekiso 6, lenkqubo iquka ukulinywa kwemithi eyahlukeneyo (umzekelo, imithi yeziqhamo), amatyholo nezityalo zokutya, nefula kwakunye nokugcinwa kwemfuyo kwiindawo ezisemaphandleni.

Kwizityalo zokutya ezilinywa unyaka wonke, ezona zixabisekileyo yimifuno e nezakhamzimba ezininzi nesondlo kakhulu (umzekelo iingcambu, imifuno enamagqabi ezivelelayo lula) etyiwa kakhulu ekuhlaleni. Zonke izityalo eziphantsi kwemithi ezinesondlo kakhulu zilulutho nakwi mfuyo equka linkomo, iigusha okanye iibhokhwe umzekelo.

Iintlobo zemithi zingafakwa egadini ngeendlela ezahlukeneyo, umzekelo:

- ♥ Zingakhuliswa njengocingo olujikelezayo lwegadi ukuze kugcinwe imfuyo ngaphandle.
- ♥ Zingakhuliswa njengezithinteli zokunqanda umoya.
- ♥ Ezinye izityalo kunye ne mifuno zinokulinywa ngaphantsi kwazo ukuze kusetyenziswe indawo.



UMFANEKISO 6: Izityalo ezahlukeneyo ezilukhuni kuqukwa kuzo imithi, amatyholo nezityalo zokutya kufuphi nemizi emaphandleni.

3.1.3 Agrisilvicultural

Iindawo eziphunyuzeiweyo zaphuculwa, ukutyala imiqolo ephakathi kwemithi kunye neziqwigangana/ibhanti lekhusi zezona zixhaphakileyo iinkqubo ze-agroforestry eMzantsi Afrika (jonga iibhokisi ezibhaliweyo 3-5).



IBHOKISI 3: UKUPHUCULWA KOMHLABA ONGALINYWANGA

Ukuphumza umhlaba yindlela yokulima apho umhlaba olimekayo uyekwa ungatyalwanga nto kugqithe ixesha okanye umijikelo omnye nemibini yokufaka imbewu ukuze umhlaba uphole/uchache, ubuyisele izivundisi zemveli kuwo, ugcine ukufuma kuphazamiseke iintsholongwane nomnqa wobomi bezitshabalalisi ezifumaneka emhlabeni.

U mhlaba ongalinywanga uphucuka xa kutyala kuwo uhlobo lwemithi olukhawulezayo ukukhula nolukwaziyo ukuthabatha I nitrogen eninzi, lutsho luchumise umhlaba.

Umhlaba ophunyuzeiweyo no phuculwayo usisisombululo sexesha elifutshane logama umhlaba ophunyuze ngokuqhelekileyo usisisombululo sexesha elide. Xa uphucula ukuphumza kulicebo ukusebenzisa uhlobo lwemithi okanye izityalo ezibonelela ngeenzuzo ezithile eziquka ukutya okuziinkozo, ifula kwaye ngaxeshanye ziphucula initrogen/impilo yomhlaba. Olu hlobo lokulima ludla ngokusetyenziswa ngamafama asakhasayo angakwaziyo ukuthenga oomatshini okanye izichumisi zekhemikhali.

Iindlela zokuphatha emaziqwalaselwe:

- ♥ Imithi iyasuswa emva kweminyaka eyi 2 okanye 3, kulandele iminyaka eyi 2 okanye 3 yokutyalwa

Iinzuzo ezibalaseleyo:

- ♥ Ukuphucula impilo yomhlaba nokuchuma kwawo
- ♥ Ukwanda kwemveliso yezityalo ezilandelayo
- ♥ Ukuhluthwa nokugcinwa kwekhabhoni
- ♥ Iziganeko ezinciphileyo zokhula, izitshabalalisi kunye nezifo
- ♥ Ukulondolozwa komhlaba nokongiwa kwamanzi.



UMFANEKISO 7: Ii ertysi ze juba zikhuliswa njengoko kuphuculwe ifusi KwaZulu-Natal.



IBHOKISI 4: UKUTYALWA KWEMIQOLO

Ukutyalwa kwemiqolo okanye iindlela kwenzeka xa imithi ityalwe ngendlela eyimigca (okanye iheji) kube sekutyalwa izityalo zokutya phakathi kwemithi leyonxesha elinye, nanjengoko kubonisiwe ku Mfanekiso 8.

Imityhi emikhudlwana noko phakathi kwemigca yemithi okanye amatyholo ivumela ukuba kuhlukaniswe ukuphathwa kwemithi nezityalo nokutyalo. Ukuvuleka kweendlela ichaphazela isivuno sezityalo ezikhula kulo mqolo ezaziwa ngokuba “yimifuno yimiqolo”. Imigca yezona zityalo zikufutshane kwii heji ikhuphisana ngamanzi, ukukhanya nezondlo. Ngokuqhelekileyo, isivuno sezityalo sikhula kakhulu xa ububanzi beendlela buvuleka nanjengoko izityalo zingakhuphisani nemithi. Inkqubo iyonke inenzuzo nangona imithi iyichaphazela imifuno.

Iindlela zokuphatha ezifuna ingqwalasela:

Amatyholo kufuneka athenwe ukunciphisa ukhuphiswano njengoko kubonisiwe ku Mfanekiso 8 okanye zityalwe kwiminyaka yonke xa kulungiswa umhlaba, okuyeyona ndlela ii ertyisi zejuba eziphathwa ngayo e Tanzania. Iintsalela zemithi etheniweyo isetyenziswa ukuphucula ukujikeleziswa kwezondlo (ngexesha lokuna kwemvula) okanye ukwandisa ukutya kwemfuyo/ ifula (ngexesha lokunqongophala kwemvulo).

Iinzuzo ezinkulu:

- ♥ Ukwahlukaniswa kwemveliso zasefama
- ♥ Uphuculo lwempilo yomhlaba nokuchuma kwawo
- ♥ Isivuno esikhulu semveliso
- ♥ Ifula lemfuyo elisezingeni eliphezulu ngexesha lokoma.

Ukutyalwa kwemiqolo kukutyalwa kwemigca yemithi okanye amatyholo ukwenza iindlela apho izityalo zokutya okanye izityalo zokuhombisa ziveliswa khona.



UMFANEKISO 8: Ukukhuliswa ko mbona kwisigcina-kufuma esenziwe ngamahlala athenwe kwi Sesbania.



IBHOKISI 5: AMABHANTI EKHUSI

Amabhanti ekhusi ngamaqela emithi atyalelwe ukukhusela imveliso izityalo zezolimo kunye nokusebenza njengendawo yokuhlala yemfuyo.

Maxawambi imithi ityalwa ngemigca kwiindawo ezisekugqibeleni kwe kweegadi/ yemithi yeziqhamo ukuze sifumane iinzuzo zoqoqosho, indalo nentlalo-ntle ezivelayo xa imithi iqukwa kwinkqubo yolimo, njengoko kubonisiwe ku Mfanekiso 9.

Amabhanti ekhusi angumgca wemithi okanye amatyholo alinywe ukukhusela indawo/intsimi kwi mozulu imbi.

linzuzo ezinkulu:

Amafama asebenzisa iizithinteli-moya ukufumana ezi iinzuzo:

- ♥ Ukulawulwa kokhukuliseka komhlaba
- ♥ Ukukhuselwa kwamasimi kukhukuliseko lomhlaba ngenxa yomoya
- ♥ Ukhuselo lwemfuyo
- ♥ Nciphisa ukulahleka kokufuma komhlaba nezityalo ehlotyeni nase kwindla
- ♥ Nciphisa umonakalo owenziwe ngumoya
- ♥ Imveliso yezityalo nemfuyo
- ♥ Ubuhle bendalo nendawo yokuhlala izilwanyana zasendle
- ♥ Umthunzi wemfuyo xa kushushu
- ♥ Amahlahla angavunwa kutyiswe imfuyo ebusika
- ♥ Yehlisa izitshizi zegad.



UMFANEKISO 9: Izityi ze-citrus zihlala zinezithinteli zomoya ukunciphisa umonakalo weziqhamo.

3.2 linkqubo ye agroforestry esekelwe kwii planteyshini

I-agroforestry esekelwe kwii planteyshini izoba okanye ibonisa imeko engaqhelekanga yalapha eMzantsi Afrika yendlela yokusebenzisana phakathi kwamafama/abalimi abasakhasayo kunye noosomahlathi ukonyusa ixabiso leentsimi nee planteyshini zamaplanga. Oku kwenziwa ngokutyala izityalo zemali umz. iimboty zeswekile, amantongomane, kunye neBambara kwiindawo ezisandula ukugawulwa amaplanga de imithi ikhule ibe nophahla olupheleleyo.

Ezi nkqubo zichaziwe apha ngezantsi.

3.2.1 Silvopastoral

Kwiinkqubo ezisekelwe kwii planteyshini, ingca ikhula ngokwendalo ngezantsi kwemithi ye planteyshini. kwezityalo. Njengoko kubonisiwe ku-Umfanekiso 10, oku kunika amathuba okufaka nemfuyo edlayo kule nkqubo, kodwa kufuneka kwenziwe ngo nonophelo ukuze kuthintele ukonakala kwemithi. Umonakalo wemithi unokuthintelwa ngokuqinisekisa ukuba iinkomo ziziswa kuphela xa imithi yomelele ngokwaneleyo ukuba imelane nokuphazanyiswa yimfuyo.



UMFANEKISO 10: *linkomo zitya ngaphakathi kwi planteyshini e lalini yakwa Sokhulu, KwaZulu-Natal.*

Kwiinkqubo ezisekwe kwii planteyshini, imithi inika umthunzi nokhuseleko kwizilwanyana, ngelixa imfuyo ifaka igalelo ekujikeleziseni izondlo ngo mgquba wazo, imithi izuze ukukhula ngamandla no mhlaba uchume.

Kwiilali ezinee planteyshini, le yenye yeendlela zokungenisa umvuzo, ingakumbi xa imithi yamaplanga iselula kusekho nengca eninzi phantsi kwemithi.

Ukulungelelanisa amandla okusebenza komhlaba

Kwinkqubo ye-silvopastoral, ukulingana phakathi kwemveliso yezilwanyana kunye nokuzinza komhlaba kubalulekile. Oku kubandakanya ukuqwalasela umthamo inkqubo enokumelana nawo ukuze ibe yimpumelelo, equka imithi, amadlelo, izityalo zefula nemfuyo.

Izinga lokufuya, ukuxinana kwemithi, kunye nokumiswa kwemithi kufuneka kulawulwe ngononophelo ukuze kuthintelwe ukutyiswa kwemfuyo okugqithisileyo, ukugangatheka komhlaba, ukuphela kohlaza nezityalo, kunye nokunwenwa kokhukuliseko.

Iindlela zokutyiswa kwemfuyo ngokujikeleza idlelo zivumela ixesha lokuphumla kunye nokubuyisela idlelo, ukugcina imveliso yefula kunye nempilo yengca kunye nemithi.

Isithuba phakathi kwemithi sibalulekile ukuze kuqinisekiswa ukuba ukukhanya kwelanga kuyafikelela kwizityalo ezingaphantsi kwayo, logama zinika izilwanyana umthunzi nekhushi.

Kufuneka aqwalaselwe amaxesha onyaka nendlela achaphazela ngayo imveliso yefula ukuthintela ukufuywa nokutyisa kakhulu ngexesha lemveliso ephantsi yedlelo.

Amandla edlelo okutyisa imfuyo ayahluka kakhulu, ngokuxhomekeke kwimeko yedlelo elo. Ngolawulo olululo, umthamo wedlelo oyi-2.5 hektare kwi-AU nganye ungasetyenziswa. Nangona kunjalo, kwinkqubo ye-silvopastoral apho isiqwenga somhlaba esinye kwabelwana ngaso phakathi kwemithi namadlelo, i-1.24 yeehektare nge-AU nganye kufuneka isetyenziswe.

Isimo samanzi akhoyo sikwabalulekile ekudityanisweni kwemithi nemfuyo. Ulawulo olululo lwamanzi luyimfuneko ukuze kuthintelwe inkqubo ekubeni ibe noxinzelelo olugqithisileyo ngenxa yoku shokoxeka kwamanzi.

Imithi inokomeleza ugcino lwamanzi emhlabeni, iphucula umthamo wenkqubo wokuthwala imfuyo ngokwenza amanzi amaninzi afumaneke ukukhulisa ukutya kwemfuyo okanye ifula. Nangona kunjalo, kubalulekile ukuqinisekisa ukuba amanzi ahanjiswa ngokulinganayo emhlabeni kwaye angasetyenziswa kakhulu yimithi kuphela.

3.2.2 Agrosilvopastoral

Abalimi abasakhasayo (ingakumbi abantu abahlala kufutshane namasimi) banakho ukudibanisa imithi yamaplanga, iintlobo ngeentlobo zemithi, izityalo kunye nezilwanyana kwindawo enye yomhlaba, edla ngokuba kufutshane nezindlu; inkqubo ye-agroforestry eyaziwa ngokuba ziigadi zasekhaya ezibandakanya izilwanyana (jonga Umfanekiso 11).

Le nkqubo ibonelela ngezinto zokuziphilisa njengokutya, amayeza, iinkuni, iipali (izinto zokwakha), iziqhamo, umthunzi kunye nefula yemfuyo.

Inkqubo ye-agroforestry inegalelo ekuphuculweni kokufumaneka kokutya oku nesondlo, ukutya okuziindidi ezininzi, ukuphuculwa kwemveliso yemfuyo, ukucutha ubungozi bemozulu kunye nokwanda kwezivuno.

3.2.3 Agrisilvicultural

Enye yee nkqubo ze agroforestry yohlobo lwe agrisilvicultural agroforestry esetyenziswayo kakhulu apha eMzantsi Afrika kwiipilanteyshini zamaplanga yi **Taungya** (Umfanekiso 12). Kule nkqubo, amafama okanye abalimi abasakhasayo bahlakulela izityalo zonyaka ngexesha lokusekwa kwehlathi okanye ukukhula kwehlathi kwisihlandlo esilandelayo.

Kuba amafama ayazihlakulela izityalo zawo, le nkqubo ivumela oosomahlathi ukuba bakhulise imithi yamaplanga ngamaxabiso aphantsi okuhlakula. Okubalulekileyo kukuba abalimi banokulima kuphela izityalo zokutya kunyaka wokuqala wokulima (okanye emva kokuvuna amaplanga okokuqala).

Emva kokuvaluka kophahla lwemithi (iinyanga ezi-6), amafama anikwa iziza ezitsha kwimigca engaphakathi kwemithi yehlathi. Isityalo somthi ke sikhula isithuba seminyaka esi-7-8 phambi kokuba sivunwe. Emva kokuvuna, izityalo zokutya ezikhuliswa minyaka le zinokuphinda zilinywe kwiindledlana eziphakathi kwemithi.

Le nkqubo ikhuthaza uphuhliso loqoqosho nentlalo yamafama akhasayo ahlala kufutshane namasimi emithi.

Kubalimi abasakhasayo abanezabo iipilanteyshini, ikwabonelela ngomthombo wengeniso yethutyana kunye nokutya ngelixa abalimi belindele ukuba imithi yamaplanga ikhule kakuhle.

Abanye abalimi batyala kumtyhi ovulwayo ongqonge iipilanteyshini ukuyikhusela emlilweni.



UMFANEKISO 11: *Umzekelo wenkqubo ye agroforestry edibanisa imithi oluhlobo olulodwa, izityalo ezohlukeneyo, imifuno nezilwanyana.*



UMFANEKISO 12: *I Agrisilvicultural agroforestry equka imithi yamaplanga nezityalo zokutya zaminyaka le (Eucalyptus and neemboti eziqhelekileyo).*

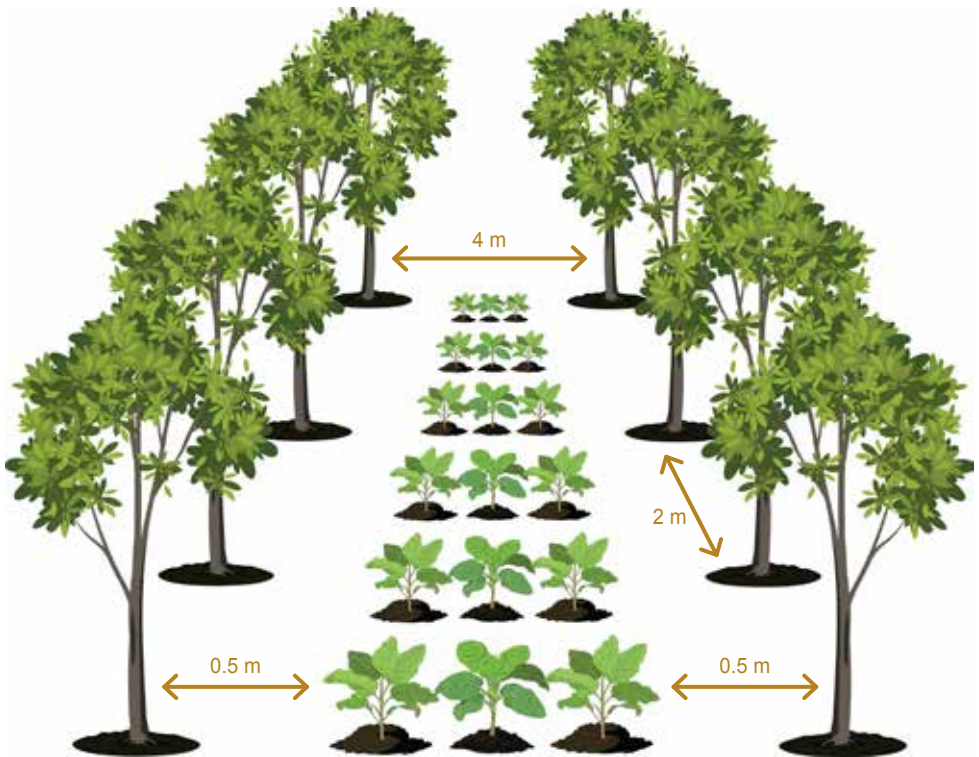
Ukulandelaniswa kwamacandelo emithi kwi nkqubo i Taungya

Ukulungiswa kweenxalenye ezahlukeneyo ze-agroforestry (amalungu emithi nawezinye izityalo ezingengo mithi) anxulumene noku:

- (1) ixesha lokutyalwa kwezityalo ezahlukeneyo, kunye
- (2) ukulungiswa 'ngokwendawo' (indlela ezibekwe ngayo emhlabeni).

Kucetyiswa ukuba inkqubo iyilwe ngalendlela iboniswe kuMfanekiso 13:

- ♥ lindidi zamaplanga kwii planteyshini zikholisa ukutyalwa kwindawo ephakathi kwe-4 m x 2 m, kwaye izityalo zezolimo kufuneka zikhuliswe phakathi kwezondlela.
- ♥ Isithuba esicetyiswayo phakathi komthi wamaplanga kunye nesityalo yi-0.50 m ukunciphisa ifuthe lomthunzi.



UMFANEKISO 13: Indlela yokutyalwa kwemithi nezityalo zokutya.

Izinto ezithathelwa ingqalelo xa kukhethwa izityalo zokulima

Xa kumiselwa indawo ye planteyshini, ukukhethwa kweentlobo zemithi efanelekileyo linyathelo elibalulekileyo elifuna ukuqwalaselwa kwenjongo ecetywayo (umzekelo, amaplanga, ipulpwood, kunye ne-bioenergy), iimpawu ezingwenelekayo (ezifana nokukhula ngokukhawuleza, ukunyamezela izifo kunye nesivuno esikhulu somthi), ukuhambelana nemozulu yendawo kunye neemeko zomhlaba kunye nemarike.

Umlimi uyacetyiswa ukuba afumane isikhokhelo kwabo abacebisi ngolimo lwezamahlathi kulo ndawo. Eyona ntlobo ixhaphakileyo kwii planteyshini zamaplanga eMzantsi Afrika yi *Eucalyptus* kunye ne Phayini. Kweli candelo i-*Eucalyptus* yiyo eya kusetyenziswa njengowona mzekelo.

Ukukhuliswa kwe mithi ye *Eucalyptus* kwiindawo zokukhulisa izityalo

Ukukhuliswa kwe *Eucalyptus* kungafezekiswa ngeendlela ezohlukeneyo njengezi:

- ♥ Ilmbewu – eyona ndlela yokwenza ethembekileyo ithutha iinyanga ezi 7–8 months ukuze iimbewu zifikelele kwisigaba esifanelekileyo sokukhula
- ♥ Ukusika – kukhuliswa iziqumpu ezisikiweyo kwixesha leenyanga ezine.
- ♥ Ukwandisa izityalo – ngendlela yokuziqhamisa ngendlela esebenzisa amalungu okudubula ezityalweni.

Ukufumana amalungu ezityalo kwindawo ezikhulisa izityalo

Ngaphambi kokuthenga izithole, umlimi wehlathi okanye umlimi osakhasayo kufuneka agqibe ukuba zingaphi izithole azifunayo ngokusekelwe kubungakanani bendawo aceba ukuyityala. Isicelo sokuthenga izithole kufuneka sifakwe kwangethuba ukuze kuqinisekiswa ukuba indawo yocino lwezityalo ivelisa izityalo zokutyala ezaneleyo kubo bonke abalimi.



UMFANEKISO 14: Izithole ze *Eucalyptus* kwindawo yokukhulisa izityalo.

Uhoyo lwezithombo ngaphambi kokuba zityalwe

Ukuqinisekisa izithole ezisempilweni, zinkcenkceshele xa ufika, zityale ngokukhawuleza, kuphephe ukuzigcina phantsi komthunzi, zinkcenkceshele ekuseni kuphela naxa zibunile, qinisekisa ukuba iiplagi zeengcambu zimanziswe, kwaye uzinkcenkceshele kakuhle phambi kokutyala.

Ukulungisa umhlaba

Ukutshiswa kweentsalela ze planteyshini emva kokuvuna

I-slash okanye imfumba/inkunkuma yezityalo ezifileyo eshiyeka emva kokuvunwa kwemithi kwi planteyshini kufuneka inonophelwe indlela ephathwa ngayo ukuze ingabeki ihlathi esikhundleni sokutsha okanye yenze kube nzima ukutyala kwakhona. Eziintsalela kufuneka zibekwe kwimiqolo okanye zibe ziimfumba phambi kokuba zitshiswe. Qinisekisa ukuba bonke abammelwane kunye nombutho wokhuselo lomlilo banolwazi ngokutsha okucwangcisiweyo.

Kubalulekile ukuba kutshiswe ngomlilo ongenafuthe elikhulu lobushushu ukuze umhlaba ungonakaliseki. Umlilo ophilileyo utshiswa xa amaqondo obushushu (bemozulu aqala ku 10 ukuya ku 20 °C); nomoya omncinane kwaye xa kunethile umhlaba ufume kancinane.

Emva koko ukuba kuyimfuneko, ukukrazulwa kunokwenziwa ukulungiselela ibhedi elungileyo eya kuvumela imithi ukuba ikhule kakuhle.

Ukulungiswa kwendawo neemfuneko zentlobo ezahluka-hlukeneyo zomhlaba

Kwithafa elingalinywanga nto; ukulima ecaleni kwemigca yokutyala kuyakhuthazwa, nangona ukulima ngekhuba okanye ipiki kuyenye indlela; nangona kunjalo, zonke izityalo ezikwi sangqa esivuleke ngo1 m ububanzi ngeenxa zonke kumngxuma kufuneka zisuswe. Ukulungiselela umhlaba wokutyala, sebenzisa isitshizi sangaphambi kokutyala.

Ukuba umhlaba wawusetyenziselwa ukulima izityalo zokutya ngaphambili, kuyacetyiswa ukuhlakula, ngoomashini bokuphethula, ukusebenzisa ikhuba okanye ipiki nako kwamkelekile. Ukuba umhlaba ubutyalwe emithini ngaphambili, ukugqoboza yeyona ndlela ikhethwayo.

Ukumakisha iimingxuma

Intambo yentsimbi yokuphawula intambo egqunywe ngeplastiki isetyenziselwa ukuphawula imigca yemithi kunye neendawo. Iimpawu ezikhethekileyo zetsimbi zifakwe kwimigama echanekileyo, ebonisa indawo yokutyala umthi. Kusetyenziswa iintambo ezimbini ezinezikhewu zokumakisha ezahlukeneyo, kunye nentambo esisiseko ebonisa iindawo zemigca kunye nentambo yokumakisha imigca yomthi.

Ukumakisha iindawo zokutyala

Izithuba zokumakisha ziquka ukuseta 'isiseko' ngapha kwethambeka okanye ukwahlulahlula

kumacandelo amane. Intambo yesiseko inamanqaku ayi-3m emigodini yokutyala, ngelixa intambo yokumakisha eyi-2m iphawula umgca osisikwere' kwii-engile ezichanekileyo kwintambo yokuqala. Iqela liya kumanqaku alandelayo kunye nentambo yesiseko, ibambe isiphelo ngasinye kunye nabanye abaphawula imingxuma. I-3m intonga kwelinye icala kunye no-3 m uphawu kumgca wesiseko kwelinye icala liqinisekisa ukuba ikhebula lokumakisha lihambelana nomgca wesikwere.

Isityalo-ukuya-kutyalwa kunye nemigama yomqolo ukuya kumqolo

Ukubeka izithole ngendlela eyiyo kuqinisekisa ukuxinana kwezityalo okuchanekileyo. Umzekelo, ukuba umlimi wehlathi okanye umlimi okwizinga eliphantsi ufuna ukufikelela kwizityalo ezixinanana kakhulu ngoko banokukhetha isithuba se-1.5 m x 1.5 m (4, 444 izityalo ngehektare nganye (ha)) okanye 2 m x 2 m (2, 500 izityalo ngehektare nganye).

Abalimi abakhuthaza i-agroforestry okanye abalimi abakhasayo abakwi-agroforestry banokukhetha isithuba esibanzi se-4 m x 2 m (1250 izityalo/ha) okanye 5 m x 1.5 m (1333 izityalo/ha).

Izityalo ezifana namantongomane, amantongomane aseBamabara, iimbotyi okanye izityalo zamayeza zingalinywa kwiindledlana ezenziwe yimiqolo yemithi.

Ukumba imingxuma

Ukugrumba kukwemba isityana esincinci sokutyala isithole ngasinye nokulungisa umhlaba oza kutyalwa. Kubandakanya ukuqhekeza umhlaba kunye nokuvumela amanzi ukuba angene ngaphakathi.

Ngokuziqhelanisa, susa yonke into kwindandatho ye-1 m kwaye usebenzise ipiki ukukhulula umhlaba kwaye uqhekeze amagada ukuya ngaphantsi kwe-3 cm. Umngxuma kufuneka ube yi-25 cm ubunzulu kwaye ube yi-50 cm ububanzi ukuze umiswe, kodwa ube yi-35 cm ububanzi ukuze umiswe kwakhona.

Ukutyalwa kwezithole zemithi yamaplanga

Izithole zingatyalwa ngamanzi (amanzi agalelwe emngxunyeni), i-hydrogels (ivumela ukutyala ngexesha lemvula elibazisekileyo) okanye ukutyala okomileyo (okt ukutyala ngaphandle kwamanzi - kufuna imvula efanelekileyo yokufunxa).

Ngaphambi kokutyala, qinisekisa ukuba umngxuma awunalukhula kunye nezityalo ezifileyo.

Amanyathelo athatyathwayo xa kutyalwayo:

- i) yomba umgxuma ka 10 cm ububanzi, 20 cm ubude umngxuma ngeisixhobo sezandla,
- ii) Bamba isityalo ngasinye (xa uzikhupha kwi treyi yezityalo) usibeke ngononophelo kufutshane nomngxuma wokutyala ngaphambi kokutyala,
- iii) sebenzisa iincam zeminwe nentende yeso sandla ukungqalisa iingcambu zesityalo

ngeplagi yazo zingene emngxunyeni wokutyala ze ngesinye isandla esi singaphethanga, ugcwalise umngxuma usebenzisa i-trowel yokutyala,

iv) ntywilisela umntla weplagi yeengcambu ngobunzulu obulingana neminwe emithathu ngaphantsi komhlaba ukunqanda ukuba ungafudumezi okanye womiswe, wandule wenze oku,

v) Tyala isithole sime nkqo kumbindi womngxuma.

Xa ugqiba ukulandela lamanyathelo, kufuneka kubekho isitya esibubunzulu obufutshane esenzekayo, sirhangqe isithole ukuze sikhongozele amanzi. Ukuvala izithuba (ukutshintsha izithole ezifileyo ufake ezitsha ukuqinisekisa ukuba akukho mingxunya ingenanto) kufuneka kwenzeke kwisithuba seeveki ezimbini ukuya kwezine zokutyala ukuze imithi ikhule ngokulinganayo.

Ukuphathwa komhlaba nokuwuchumisa

Ukuhlola umhlaba

Ukuhlolwa novavanyo lomhlaba lubalulekile ukujonga ipH yomhlaba kunye nobume bezondlo. Oku kuqinisekisa ukuba amazinga okuchumisa alingene neemfuno zemithi kulo ndawo. Abalimi bamahlathi okanye abalimi abakhasayo kufuneka bathumele iisampulu zomhlaba kwezona nkonzo zikufutshane nabo njenge Fertiliser Advisory Services (FAS).

Ukulungisa I pH yo Mhlaba

Imithi efana ne gumtree okanye *Eucalyptus* zithanda iindawo ezinomhlaba one acid ukuya kumhlaba onamazinga e pH a neutral. Xa iziphumo zovavanyo lomhlaba zibonisa amazinga e pH angentla okanye engezantsi koko okulindelekileyo, xa sekulungiselelwa umhlaba ukulima, I pH yomhlaba izakuxhaswa ilinganiswe ngezikhuthazi ezifana ne lime (xa iphezulu I acid) okanye I sulphur (xa I acid) yomhlaba isezantsi)

Ukufaka izichumisi

Ukuqinisekisa ukuba imithi yomelele isemincinane kwaye iyakhula ngokukhawuleza, ungafaka isichumisi esincinane, zingaphelanga iiveki ezimbini kutyaliwe. Ungasifaka Isichumiso xaku lixesha leemvula usebenzisa isixhobo ezithile okanye ngezandla uqinisekise ukukala isichumisi sobunzima esichanekileyo kumthi ngamnye. Ufake isisichumisi eso ngokumbaxa-mbini kwindawo engu 15-20 cm kwicala ngalinye lesithole.

Ukuhlakula

Ukuhlakula ukhula ngokusebenzisa amandla okanye ikhemikhali kubalulekile ukuqinisekisa ukuba izithole zemithi ziyakhula. Ukuhlakula rhoqo kwiminyaka emibini ukuya kwemithathu, kubalulekile ingakumbi kwindawo esisangqa sika 1m ukujikeleza umthi ngamnye.

Abanini-mahlathi abavumela amafama ukuba alime ukutya phakathi kwee planteyshini

zabo ngendlela eqhelekileyo, abachithi mali ukuhlakulela izityalo. Ukuhlakula kwenziwa ngamafama ngexesha lokulima ukuze kuxhamle isityalo sokutya kunye nomthi.

Ukuthena

Injongo yokuthena kukukhuthaza ukumila nokuphuhla kwesiqu esinye esondlekileyo emithini kwaye siphuhlise ezinye iziqu ezixabisekileyo ezingenamaqhina.

Kuthenwa nini

Ungaqala ukuthena ukuhlumisa isiqu esinye ukusukela xa imithi ineminyaka emibini. Imithi emitsha ononyaka omnye ukuya kwemithandathu yeyona idla ngokuthenwa ekupheleni kobusika, kufutshane nethuba lokuvuleka kwentloko yentyatyambo, ukuze iindawo ezikwe xa kuthenwa zihlume ngokukhawuleza ngokuqala kokukhula okumandla entwasahlobo. Imithi emidala inokuthenwa ehlotyeni okanye xa ingasebenziyo.

Kuthenwa ntoni

Xa uthena imithi kubalulekile ukuba ungabunanzi ubudala bomthi, koko wenze oku kulandelayo:

- i) susa onke amasebe afayo, aphukileyo, agulayo okanye afileyo;
- ii) sebenzisa isiqu esiphambili okanye esikhokeleyo, nawaphi na amasebe aya kukhuphisana naso, jonga izikhondo ezikhuphisanayo ngobukhulu ususe ezinye zazo;
- iii) susa amalungu asezantsi, okanye amasebe anamandla akhulayo ukuya phezulu kwi-canopy, kwaye
- iv) susa naliphi na isebe elisuka kumzantsi wesiqingatha somthi elikhule laya kutsho kumntla wo phahla lwemithi.

Izixhobo zokuthena

Ngokobude nobubanzi begatya lomthi eliza kuthenwa, usomahlathi okanye umlimi anagasebenzisa izixhobo ezifana nezichebi ezisetyenziswa ngezandla, izitheni zeepali, iisarha zezandla okanye iisarha zamandla ukuthena imithi. Kwii planteyshini ze agroforestry ezinemithi egqageneyo (iiplanteyshini ezingashinyananga) ithawa yokuthena okanye ikhetshi edumayo ingasetyenziswa ukuthena.

Ukuvuna

Vuna imithi ngexesha elifanelekileyo ukwandisa imveliso yamaplanga. Iphayini kufuneka ivunwe kwiminyaka eyi-20-25, ngelixa i-eucalyptus kufuneka ivunwe iminyaka eyi-8-10. Amahlathi akwizinga eliphantsi asenokukhetha ukuvuna okukhethekileyo, ngelixa ukugawula kusetyenziswa ukuphinda kuhlwayelwe. I-*Eucalyptus* iyakwazi ukuba isiphunzi sikhule kwakhona ukuya kutsho kwimijikelo emithathu, apho iipali okanye iinkuni zivunwa ngaphandle kokuphinda kuhlwayelwe.

Uzikhetha njani izityalo zokulima

- ♥ Ukulinywa kwezityalo ezichuma unyaka wonke ingakumbi iinkozo zeembotyi phakathi kweendlela nemiqolo kuyakhuthazwa.
- ♥ Ezona nkozo zeembotyi zithandwayo, eziboniswe ku Umfanekiso 15, ziquka:
 - Amantongomane
 - Amantongomane ohlobo lweBambara
 - Iimbotyi eziqhelekileyo.
- ♥ Izityalo ezinyuka ngezinye (ezifana ne nezambani eliswiti) azikhuthazwa kuba zichaphazela ukukhula kwezithole zemithi.
- ♥ Umbona nawo awukhuthazwa kuba uthandwa yimfuyo nezilwanyana zasendle.



UMFANEKISO 15: Iinkozo zokutya ezineembotyi ezifumaneka unyaka wonke (ukusuka ekhohlo) intongomane leBambara, intongomane neembotyi eqhelekileyo etyalwa ngokuqheleleyo kwiinkqubo ze agroforestry ezisekelwe kwii planteyshin.

Indlela yokukhetha iintlobo ngeentlobo zembewu yeembotyi

Xa uthenga imbewu, kubalulekile ukubuza umthengisi wembewu ukuba acebise ukuba yeyiphi imbewu elungele loo ndawo izakutyalwa kuyo.

Ukukwamkeleka

- ♥ Amafama mawakhethe uhlobo lwembewu elikwaziyo ukumelana neemeko ezikhoyo.
- ♥ Olona hlobo lwembewu lufanelekileyo yeyona enokuba nemveliso ebhetele ukogqitha leyo engafanelekanga kwindawo ekhula kuyo.

Ukumelana nembalela, izitshabalalisi, nezifo

- ♥ Uluhlu lwezimbuzane kunye nezifo zinokuhlasela izityalo kumanqanaba ahlukeneyo okukhula kwazo. Ngoko ke umlimi kufuneka akhethe uhlobo olunokunyamezela izitshabalalisi kunye nohlaselo lwezifo oluxhaphakileyo kulo ndawo alima kuyo.
- ♥ Abalimi kufuneka basebenzise iindidi ezikwaziyo ukumelana nembalela.

Ubude bexesha lokuba isityalo sikhule ngokupheleleyo

Izityalo ezikhula ngokukhawuleza ngexesha elifutshane zezona zifanelekileyo kwiinkqubo ze agroforestry. Ngenxa yezi zizathu zibini:

- ♥ Imozulu ayiqikeleleki lula kunjalo nje iyatshintsha-tshintsha inyanzelise ke ukuba umfama alinde imvula ngaphambi kokuba atyale.
- ♥ Eyona nto elungileyo kukuba umfama aphephe ukuhuphiswano phakathi kwezityalo nemithi ngokuqinisekisa ukuba imifuno leyo ivunwa ngokukhawuleza kangangoko kunokwenzeka.

Ukuphatha inkqubo esekwe kwi planteyshini eyi agrivisilvicultural

Ubudlelwane kumthi nesityalo

Imithi ye-*Eucalyptus* ikhula ngokukhawuleza kwaye inokudala uphahla lwemithi olushinyeneyo kwiinyanga ezintandathu emva kokutyala (Umfanekiso 16), nto leyo ekhokelela ekubeni umthunzi phakathi kweendledlana ekutyalwe kuzo ubemkhulu kakhulu. Umthunzi unokunciphisa ukukhula kunye nemveliso yezityalo kwezi ndledlana. Ukumelana neempembelelo zomthunzi umfama angalima umijikelo omnye kuphela, emva kokuvuna imithi yamaplanga.



UMFANEKISO 16: Imithi emincinane eneenyanga ezintandathu ye *Eucalyptus* enamahlala axineneyo phezulu, kwi planteyshini yase Palm Ridge.

Ukulungiswa kwendawo nomhlaba

Iiplanteyshini zorhwebo zohlukaniswe ngokweendawo ezibizwa amacandelo.

Izityalo zokutya zikhuliswa kumacandelo ngexesha lesigaba sokubuyisela imithi kwakhona (eli lixesha eliphakathi kokuvuna amaplanga kunye nokuvalwa kwe-kophahla lwemithi).

Isigaba sokubuyisela siquka ukulungiswa kwendawo, ukuqoqwa kwemfumba eshiyeke emva kokuvuna, ukufakwa izichumisi nokuhlakula ukhula.

Oosomahlathi babela amafama asakhasayo umhlaba kumacandelo agawulwe imithi ukuze amafama atyale kuwo imifuno (jonga Umfanekiso 17).

Nanjengoko kubonisiwe ku Mfanekiso 17, kukho imfumba eshiyekileyo emva kokuvunwa kutshiswe ebizwa ngokuba yi 'slash' ngokuqhelekileyo.

Ukuphathwa kwe slash yenye yezinto ezibalulekileyo xa kulungiswa indawo yokutyala kuba inokuchaphazela kakubi ukukhula kwemithi nezityalo zokutya.



UMFANEKISO 17: *Icala elisandulwa kugawulwa kwi hlathi lwemithi yamaplanga elilungele ukuba lwabiwe iiploti zokulima kumafama*

Emva kokwabiwa komhlaba kwiindawo esezivuniwe kwi planteyshini, imfumba yeentsalela zokuvuna eseleyo kubalulekile ukuba ibekwe kwemiqolo ukuthintela umonakalo kwiizithole zamaplanga (Umfanekiso 18).

Kuba imithi yamaplanga iqhele ukutyalwa kumtyhi okwi 4 m x 2 m, ukulungiswa komhlaba ngezandla ukuze kutyalwe izityalo ngezantsi kwemithi akunako ukwenzeka kuba iiteletele zingatshabalalisa izithole zemithi ezityaliweyo.

Iziphunzi zemithi ezishiyekileyo emva kokuvunwa kwemithi yamaplanga nazo zingenza kungabi lula ukuba khambe oomashini abalungisa umhlaba (Umfanekiso 19). Ngoko ke kucetyiswa ukuba umhlaba ulungiswe ngamagaba ezandla.



UMFANEKISO 18: I *Eucalyptus* slash ibekwe ngononophelo ecaleni kwemiqolo yemithi.



UMFANEKISO 19: Indlela ecociweyo eneziqu zemithi ezifileyo eza zishiyeke emva kokuvuna I *Eucalyptus*.

Ukuphathwa nokukhuliswa kwezityalo

Iindledlana kufuneka zabelwe amafama nje emva kokuvunwa kwamaplanga.

Ukutyalwa kufuneka kwenziwe xa kuqala iimvula ngokukhawuleza emva kokwabiwa kweendledlana.

Ukuze umsebenzi ube lula, amafama angasebenza kumaqela aquka abantu abemba imingxuma, ukufaka imbewu kunye nabo bavala imingxuma ukogquma imbewu (jonga Umfanekiso 20).



UMFANEKISO 20: *Iqela lamafama asakhasayo lityala ukutya lisebenzisa inkqubo ye agroforestry ekwi planteyshini*

Izityalo zityalwa kakuhle zilandele imiqolo ethe nqo ukuze kufakwe izityalo ezininzi ezizokwenza ukuhlakula nokuvuna kube lula.

Sebenzisa iintambo ezinamanqaku (okanye amaqhina) ohlulwe kakuhle ngokulinganayo ukuqinisekisa ukuba imigca yezityalo ibekwe ngokufanelekileyo, kwaye imigca yezityalo ikumgama ochanekileyo xa iqelelene.

Itafile 2 inika isishwankathelo seendlela ezicetyiswayo zokulima izityalo zokutya kwiindledlana ezenziwe yimiqolo yemithi kwinkqubo yokulima amahlathi.

Itafile 2: Iindlela ezivunyiweyo zokuvelisa izityalo zokutya ngaphakathi kumahlathi asetyenziselwa uhlobo olunye lwemithi kwi nkqubo ye agroforestry

	Intongomane	Intongomane le Bambara	Imbotyi eyomileyo/ exhaphakileyo
Intsuku zokukhula	160 - 200 Kuxhomekeke kuhlobo lwembewu	110 - 150 Kuxhomekeke kuhlobo lwembewu	Ixesha elifutshane: 85 - 94 Ixesha eliphakathi: 95 - 104
Amazinga obushushu afanelekeliyo ukuhlwayela	18 °C - 30 °C	30 °C - 35 °C	17.5 °C - 27 °C
Amazinga obushushu afanelekileyo ukumila	20 °C - 35 °C	20 °C - 28 °C	18 - 24 °C
Imvula efunekayo ngonyaka	500 - 700 mm	500 - 1200 mm	400 - 500 mm
Ixesha elifanelekileyo lokutyalwa	Okthobha ukuya ekuqaleni ku Novemba	Okthobha ukuya ekuqaleni ku Disemba emva kweemvula ezintle	Iindawo zeqabaka: Novemba ukuya phakathi ku-Januari Iindawo ezingenamkhence/ iqabaka: NgoMatshi nangoAprili
I pH yomhlaba	5, 5 - 7, 0	5,0 - 6,5	5, 5 - 7, 0
Ubunzulu bemingxuma yokuhlwayela	5 - 7.5 cm	Umhlaba osindayo: 2,5 - 3,0 cm Nzulu kumhlaba onesanti: 5,0 - 7,5 cm	2,5 - 7 cm
Umythi phakathi kwezityalo	20 - 35 cm kwimiqolo, 30 - 50 cm phakathi kwemiqolo	10 - 15 cm kwimiqolo 30 - 50 cm phakathi kwemiqolo	25 cm kwimiqolo 45 cm phakathi kwemiqolo
Umythi phakathi komthi wemveliso nesityalo	50 cm	50 cm	50 cm
Ixesha elifanelekileyo lokuhlakula	Iintsuku eziyi 21 - 28 emva kokutyala	Iintsuku eziyi 21 - 28 emva kokutyala	Iintsuku eziyi 14 - 21 emva kokutyala

Isantya sokuntshula kwembewu nokuntshula emhlabeni sixhomekeke kubunzulu bezityalo, ukufuma komhlaba namaqondo obushushu. Ngoko ke:

- ♥ Tyala emva kokuna kwemvula xa umhlaba usafumile.
- ♥ Tyala ngeenyanga ezishushu.
- ♥ Tyala imbewu kubunzulu obuphindwe kabini kobukhulu bembewu.
- ♥ Ukukhula kwesityalo esifanayo, gcina ubunzulu bemingxuma ibufana.

Kubaluleke kakhulu ukulawula ukhula kumanqanaba okuqala okukhula kwesityalo ukuthintela ukhuphiswano nezinye izityalo ngezondlo, ilanga namanzi.

Amafama anengeniso eyenye evela ngaphandle kwefama angafaka amachiza ekhemikhali okutshabalalisa ukhula ebhaliselwe ukusetyenziswa kwizityalo zawo; kodwa kufuneka balumkele ukungonakalisi imithi yamaplanga. Oku kunokufezekiswa ngokuthintela ukukhukuliseka ngokusebenzisa umnqwazi wesitshizi ukulawula inkungu ephuma kwisitshizi.

Kucetyiswa ukuba abalimi basebenzise amagaba ezandla ukuhlakula kwiiveki ezi-3 ukuya kwezi-6 emva kokutyala, njengoko kubonisiwe ku-Umfanekiso 21.



UMFANEKISO 21: *Ukulawulwa kokhula ngamagaba esandla.*

4. ISIXHOBHO SOKUXHASA UKWENZIWA KWEZIGQIBO KWI AGROFORESTRY

Isixhobo sokuxhasa kokwenziwa kwezigqibo ze-Agroforestry kuncedisa abo baqeqesha amafama, abasebenzi kwezamahlathi, abaxelengi kwi agroforestry, abancedisa ngeenkono zolwazi ukufikelela kumafama, amaziko emfundo ephakamileyo, kwakunye nemibutho yabucala ukucebisa amafama ukuba enze izigqibo ezivakalayo ngendlela ezizizo zokulima nge agroforestry.

Inkqubo ye agroforestry ekhethwa ngumfama iye ixhomekeke kwiinjongo zomfama nezixhobo noxhaso analo ukwenza umsebenzi.

Umzekelo, inzuzo efaneka kwiinkqubo ze Agroforestry ezisekwe kwii planteyshini ziye zohluka kwezo zisekwe kwinkqubo yemithi etyalelwe imisebenzi eliqela. Kwaye, amanye amafama anganomdla wokufaka nemfuyo kwiinkqubo zawo, xeshikweni amanye engayikhethi loo nkqubo ixubileyo.

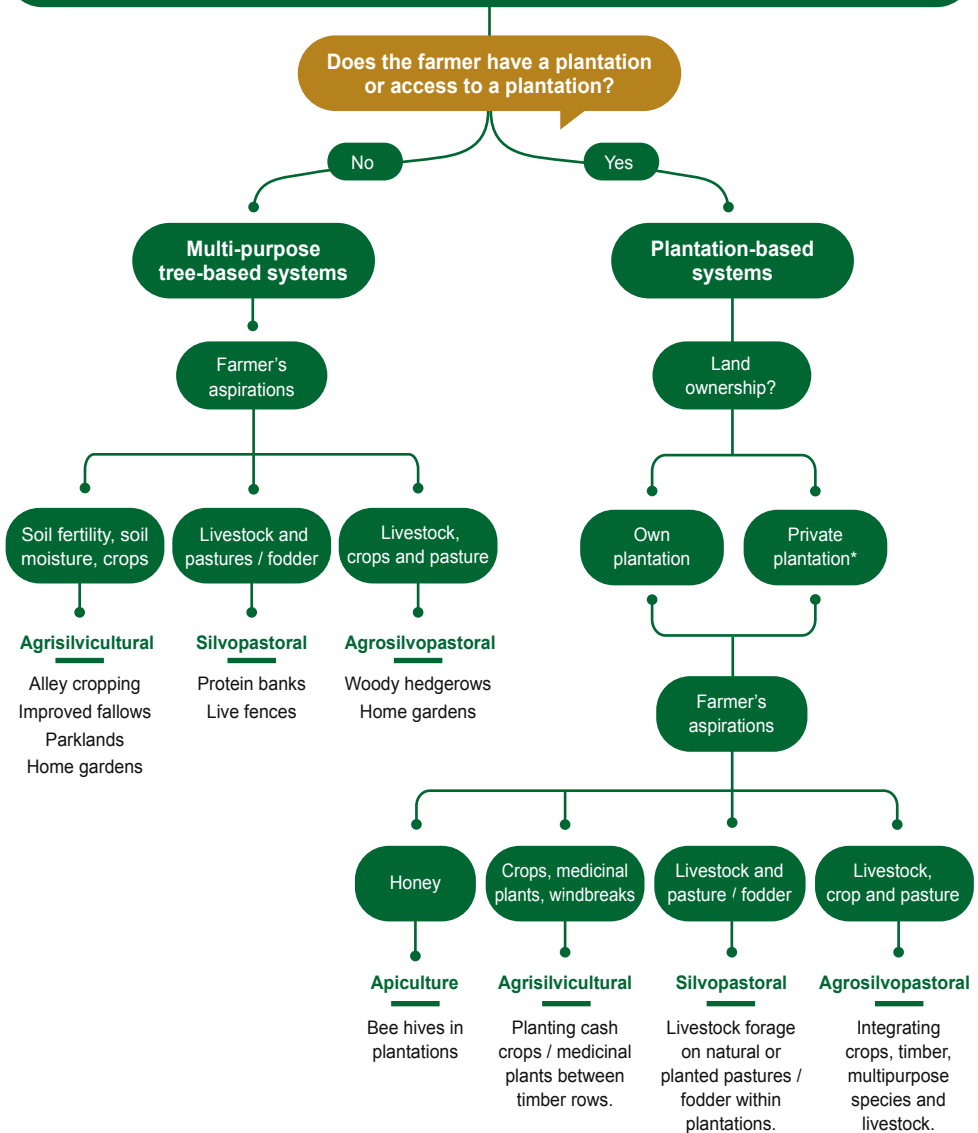
Ngoko ke, abacebisi nge agroforestry kumafama kunyanzelekile edlene indlebe namafama, evumelene athathele ingqalelo zonke izinto eziye zichaphazele indlela yokulima eyeyona ifanelekileyo.

Umfanekiso 22 (iphepha 40) iveza indlela enokulandelwa ukukhetha eyona nkqubo ye agroforestry efanelekileyo on their specific context and goals. Lo Mfanekiso wenzelwe ukubonisa iinkqubo ezimbini ze Agroforestry ezisetyenziswayo eMzantsi Afrika ezi zezi, i nkqubo esekwe kwi planteyshini (imithi iyafana, inomsebenzi omnye) nenkqubo esekwe kwimithi esetyenziselwa izinto ezininzi.

Isixhobo sokuxhasa ukwenziwa kwezigqibo siqala ngokubuza umbuzo obalulekileyo othi, **“yintoni umfama afuna ukuyifezekisa nge agroforestry?”**. Lo ngumbuzo ongu ndoqo kuba uzakuncedisa umfama ukufumana eyona nkqubo ye agroforestry imlungelweyo yena ukuyisebenzisa.

Umzekelo: kwi nkqubo esekwe kwi planteyshini, umfama/umlimi anganomdla wokulima izityalo zokutya ekhayeni lakhe kwakunye nezo zokuthengisa enze ingeniso. I-planteyshini ingayeyo mfama/ mlimi okanye ibeyeye nkampani ezimeleyo yamahlathi. Ngoko ke, eyona nkqubo echanekileyo enokukhethwa apha inga yi nkqubo ye agrisilvicultural (Taunyga).

DECIDING ON A SUITABLE AGROFORESTRY SYSTEM IN SOUTH AFRICA



* (Sappi, Mondi, MTO, SAFCOL, KOMATILAND).

UMFANEKISO 22: *Isixhobo sokuxhasa amafama nabcebisi ukwenza izigqibo ze agroforestry.*

5. UKUPHUCULWA KWEENDLELA ZOKUZIPHILISA NGE AGROFORESTRY ESEKWE KWI PLANTEYISHINI

Iindlela zokuziphilisa zamafama asakhasayo zingaphuculwa ngokuvelisa iindlela zokulima ze Agroforestry. Amafama angaphucula indlela axhamla ngayo ngoku tshintsha indlela yokupapasha nokuthengisa imveliso, kwanokusebenza imveliso buqu ukuze lenyuke ixabiso layo.

5.1 Ukuphucula ixabiso lemveliso

Phambi kokuthengisa, ixabiso yeemveliso ezingezizo ezamahlathi lingaphuculwa ngokuvuna ngendlela echanekileyo nangokuyiphucula ngokuyicikida gxebe processing, ngokusebenzisa iipakethe ezifanelekileyo.

Ukucikidwa kwezityalo ingakumbi ezimila ngaphantsi komhlaba ii legumes ngelasemzini, kuquka amanyethelo afana nokomisa, ukuqhekeza, ukucoca, ukukhethwa nokusila. Amantongomane aluhlobo lwe groundnuts kunyanzelekile achutywe amaqokobhe akhethwe ngaphambi kokucikidwa nanjengoko kuveziwe kumfanekiso 23.



UMFANEKISO 23: Ukususwa kwamaqokobhe namaxolo (ekhohlo) noku ukukhethwa (ekunene) kwa mantongomane phambi kokucikidwa.

Kuhlobo lwamantongomane ii groundnuts, ziyacikidwa zithengiswe ziluhlaza, ziziinkozo ezomileyo okanye ziphekiwe, ziyi oli okanye ibhotolo.



UMFANEKISO 24: Ukucikidwa kwamantongomane ii groundnuts kuquka ukukhutshwa amaqokobhe, ukuqhotsa, ukubiliwa nokwenziwa kwe bhotolo ne oli.

Kubalulekile ukuba imveliso ipakishwe ngobuchule kwiipakethe ezinomtsalane nolwazi olwaneleyo kuzo ngemveliso leyo. Iipakethe aziphuculi kuphela ixesha imveliso elihlalayo ingonakali, kodwa ikhuthaza nabathengi ukuba bayithenge imveliso.

Kubalulekile ukufumanisa ukuba zeziphi iinkcukacha ezidingekayo kwipakethe xa imveliso iza kuthengiswa kwi suphamakethi/ivenkile ezinkulu. Umzekelo, ipakethe kufuneka iqukethe iinkcukacha ezifana negama lemveliso, igama lomzi-mveliso ne dilesi yakhe; ubunzima bemveliso esikalini, izithako ezingaphakathi, isixa esifanelekileyo xa usitya, isondlo nezakhamzimba kwi sixa ngasinye, usuku lokupakishwa kwemveliso nokuphelelwa kwayo lixesha.



UMFANEKISO 25: Imizekelo yemveliso zee nuts ezipakishwe kakuhle

5.2 Ukuvuleleka kwii Marike

Intengiso iquka wonke amanyathelo athathwayo ukususa imveliso kumfama ukuya kumthengi.

Intengiso eyiyo iqinisekisa ukuba iimveliso ziziswa ngokweemfuno zabathengi umzekelo, ngexesha, ngenani nangokomgangatho ofunwa ngabathengi.

Amafama nabalimi abaninzi abasakhasayo bakufumana kunzima kwaye kulixabiso eliphezulu ukuthutha iimveliso zabo bazise kwiindawo ezise zidolophini apho benokuzithengisa ngamaxabiso abhetele. Abaninzi babo baxhomekeke kwii zithuthi zika wonke-wonke ukuhambisa iimveliso zabo ezidolophini nakwi marike ezisemthethweni. Kunjalo nje, akukho kuqinisekisa ukuba iimveliso ziza kuthengwa kusini na xa zifika emarikeneni.

5.3 Ukwenza amaqela

Ukuxhamla kwingeniso kungalula xa amafama asakhasayo okanye abalimi beendawo ezincinane benokusebenzisana ngokwamaqela, hayi ngokwamntu-nganye:

- ♥ Bangasebenzisana ukuphuhlisa nokupakisha imveliso yabo
- ♥ Banga dibana bapapashe kwaye bathengise imveliso yabo.



UMFANEKISO 26: Amaqela amafama asakhasayo ethengisa iimveliso kwi marike yamafama.

Ukusekwa kwamaqela amafama kungavula iingcango zamagosa axhasa abalimi ngolwazi nangezinye iinkonzo zikarhulumente namacandelo axhasa uphuhliso lwezoshishino.

Ukusekwa kwamaqela amafama kungancedisa amafama akwazi ukumelana neemfuno zabathengi aqhubeke azise imveliso. Ingalula noku boleka isithuthi sokusebenza kunye ukuze bangaxhomekeki kwii nqwelo zika wonke-wonke.

Esinye sezizathu sokuxhamla kumaqela amafama sesokuba amafama anamandla okukhokela iingxoxo zamaxabiso nabathengi. Loonto ingabenza “ababeki bamaxabiso” hayi “abamkeli bamaxabiso” abekwe ngabathengi.



UMFANEKISO 27: *Izityalo neemveliso zihanjiswa kuvimba wemalike e phithizelayo.*

6. ISIKHOKHELO

Isikhokhelo Sendlela Echanekileyo Yokwenza I-Agroforestry isinika umkhombandlela ukuxhasa ukusetyenziswa kweenkqubo ze agroforestry eMzantsi Africa, ingakumbi uxhaso lwama fama nabalimi abasakhasayo. I-Agroforestry izisa isisombululo esizinzileyo ekuphuculweni amandla okuvelisa komhlaba, ukuncedisa indalo, nokukhuthaza amandlanezoqoqosho kweli.

Isikhokhelo siqulunqwe ngokulandela amanyathelo aquka uphando loncwadi, udlwano-ndlebe namaqela anomdla nachapazelekayo, uphando endle neengxoxo namaqela akhethekileyo, ngoko ke I miselwe kwimigaqo-siseko yehlabathi kwakunye neyesi simo sentlalo, uqoqosho nendalo singaqhelekanga salapha eMzantsi Afrika.

Abathathi-nxaxheba ababe negalelo kwesi sikhokhelo baquka u Sappi, SAFCOL, MTO Forestry, i ARC, namaqela endawo, iqinisekisa ukuba konke oku kwelixwebhu kuyasebenziseka, kuyenzeka, kwaye kuhambelana nezicwangciso zesizwe.

Esi sikhokhelo sixhobisa iingcali ngolwazi kunye namanyathelo anokuthatyathwa ukukhetha izityalo ezifanelekileyo, kulawulwe umhlaba, kuphuculwe ukufikeleleka kwee marike, ukulandelwa kweendlela esizinzileyo zolimo-mahlathi kuxhamle indalo, okusingqongileyo neendlela zokuziphilisa eluntwini. Ukukhula kwe agroforestry kuya kubaluleke ngakumbi ukumelana nokuguqu-guquka kwemozulu, ukhuseleko lokutya, kunye nemiceli-mngeni yezoqoqosho. Lomqulu usebenza njengesixhobo esibalulekileyo sokukhokela uphuhliso lweenkqubo zokulima amahlathi ezomeleleyo nezikwaziyo ukumelana neenguqu ezikhawulezileyo.

Xa ulandela lomhlamhlandlela ukhutshwe kwesi sikhokhelo, amagosa nababhexeshi bezamahlathi, bezolimo, I arhente ezizimeleyo, neengcali kwezemfundo zingaqhuba impumelelo ekholise ekwakheni iindawo zokulima ezizinzileyo nezomeleleyo nezikulungele ukunceda izizukulwana ezizayo.

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