



Ekitabo  
ky'abatendesi

# Endabirira Y'ettaka Mu Bulimi Obutuufu Obw'obuwangaazi

Amos Wekesa ne Madeleine Jönsson



Vi Agroforestry

## **VI AGROFORESTRY**

Vi Agroforestry kibiina eky'e Sweden ekikola emirimu gy'okukulaakulana nga kirwanyisa obwaavu n'oku kiyita mu kusimba ennyo emiti kilung'amy'e obutonde bw'ensi. Mu kaweeefube ono tukolera wamu n'ebibiina by'abalimi mu bitundu ebyetoolodde ennyanja Nnalubaale (Victoria) mu buvanjuba bwa Africa. Omusingi gwa Vi Agroforestry guli mu kutabaganya obulimi n'eby'ebibira – okusimba ebirime wakati w'ennyiriri z'emiti. Enkola eno eyongera ku bungi bw'amakungula g'emmere era ne eyongeza ku nfuna y'omulimi ate nga bwekendeeza akabenje k'enkyuukakyuuka mu mbeera y'obudde (*climate*). Bukya kitondebwaawo, ekibiina kino kisobozesezza okusimba emiti egisukka mu bukadde 100 era nekiwagira abantu abasukka mu bukadde 1.8 okubbula embeera zaabwe.

## **WE EFFECT**

We Effect (edda ekyayitibwanga Swedish Cooperative Centre) kibiina ekikolerera okukulakulana obuyita mu bweegasse; mu mirimu gyaakyo egyatandika mu 1956, kibadde kigoberera enkola elengera ewala nga kiruubirira okuleeta enkyuukakyuuka. Okusingi gw'enkola n'emirimu gyaakyo mu nsi 25 ku nkalu nnya, kwe kuwagira abo abafaabiina okweeyamba bo bennyini. Okusinga, emirimu gya We Effect gissa essira ku nkulaakulana mu byaalo, obuzimbi bw'ennyumba, omwenkanonkano mu basajja n'abakazi, n'abantu okufuna ettaka. We Effect kikolagana n'ebibiina ebyegassi, ebirala ebigoberera enkola y'obwenkanya, n'ebibinja ebitali bya nkalakkalira (*informal groups*) ebikolerera ebirubirirwa ebifaanagana.

## **OKULANGIRIRA N'OKUSIIMA**

SIDA y'ewadde obuwagizi n'obuyambi obusobozesezza Vi Agroforestry ne We Effect okukuba ekitabo kino mu kyaapa. Kyokka, ebyo byonna ebiwandiikiddwa mu kitabo kino birowoozo by'abawandiise baakyo bennyini awamu n'abakugu abaabayambako okukilung'amy'a. N'olw'ekyo, ebikirimu ssi bigambo oba ebigendererwa oba endowooza ya SIDA.

## **OBWANNANNYINI BW'EKITABO**

Vi Agroforestry ne We Effect bebannannyini kitabo kino n'ebikirimu. Tokkirizibwa kuddamu kukikuba mu kyaapa wadde okunokolamu kyonna ekikirimu nga tosabye n'okuweebwa olukusa oluva mu Vi Agroforestry ne We Effect.

Obwannannyini: © We Effect ne Vi Agroforestry.

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# Ebikulembedde

**ENKYUUKAKYUUKA EZITABULATABULA** embeera y'obudde nebutasoboka kulagulwa bakakensa kye kimu ku bizibu by'omulimi w'abulijjo mu buvanjuba bwa Africa. Vi Agroforestry ekolera wamu n'abalimi n'ebibiina byabwe okubayigiriza n'okubabangula mu bikwaata ku butonde bw'ensi, okubayamba okukyuusa mu nkola yaabwe okugeraageranya n'enkyuukakyuuka zino.

Endabirira y'ettaka ewagira obulimi bw'obuwangaazi (*Sustainable Agriculture Land Management*), oba SALM, y'enkola esobozesa abalimi okukyuuka ng'embeera y'obudde bw'eba yeetagisa olwo amakungula gaabwe galeme kusereba olw'ekizibu kino. Ezimu ku nkola n'obukodyo bwa SALM busobola okulongoosebwamu nebukozesebwa mu bibuga; okugeza mu bulimiro obutono mu mpya z'abantu, okukola amasannyalaze, okulembeka n'okutereka amazzi obulungi, wamu n'okumalawo kasasiro n'obujama. Mu ngeri eyo, ekitabo kino kiwa amagezi ku bintu ebisaamusaamu era ebyangu omulimi by'asobola okwekolera yennyini olwongera ku makungulage n'enfunaye.

Ekgendererwa ky'ekitabo kino kulung'ama n'okuyamba abalimi bayige era bakozese enkola ez'omulembe mu kulabirira ettaka n'ebirime. Ekitabo kirimu ebitundu bingi ebyamasomo ebyeemalirira, okugeza nga okusimba emiti mu nnimiro, okukozesa obulungi ebigimusa, okulabirira ebirime awamu n'ebisolo n'endabirira y'amazzi n'ettaka. Buli kimu ku bitundu ebyo kiwa amusomi ekifaananyi ekyawamu (*overview*), nekittottola mu bujjuvu enkozesa y'obukodyo bwekiyigiriza era nekiwa n'ebibuuzo ebiyamba omusomi okujjukira by'ayigiddemu.

Eitabo kino eky'entendeka ya SALM kitegekeddwa Vi Agroforestry ne We Effect. Madeleine Jönsson, We Effect, Amos Wekesa, ne Vi Agroforestry tusiima nnyo engeri gye kitegekeddwamu. Era twebaza nnyo Linda Andersson ne Roselyne Omondi abayambye ku mirimu gyaffe gino. Twagala n'okusiima abaami Martin Yiga Matovu ne Umaru Ssenkubuge abatapuse ekitabo kino mu Luganda.

Katusuubire nti ekitabo kino kijja kuyamba kinene okubangula abalimi n'ebibiina byabwe okugonjoola obulimi nga bayita mu nkola ya SALM kibasobozese okutuuka ku bruubirirwa mu motto yaffe egamba nti *"Endabirira y'obutonde bw'ensi eyamba okugoba obwaavu n'kulung'ama embeera z'abantu."*

Arne Andersson

Omukulu w'ekitundu

Vi Agroforestry, Ekitebe ekikulu mu Afrika y'ebuvanjuba (*East Africa*)

## Endagiriro

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## Endagiriro

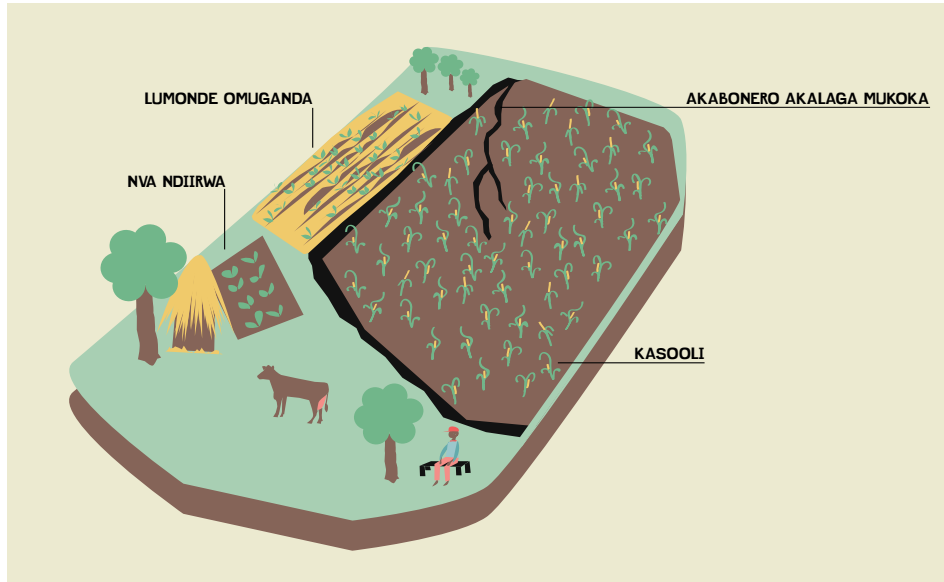
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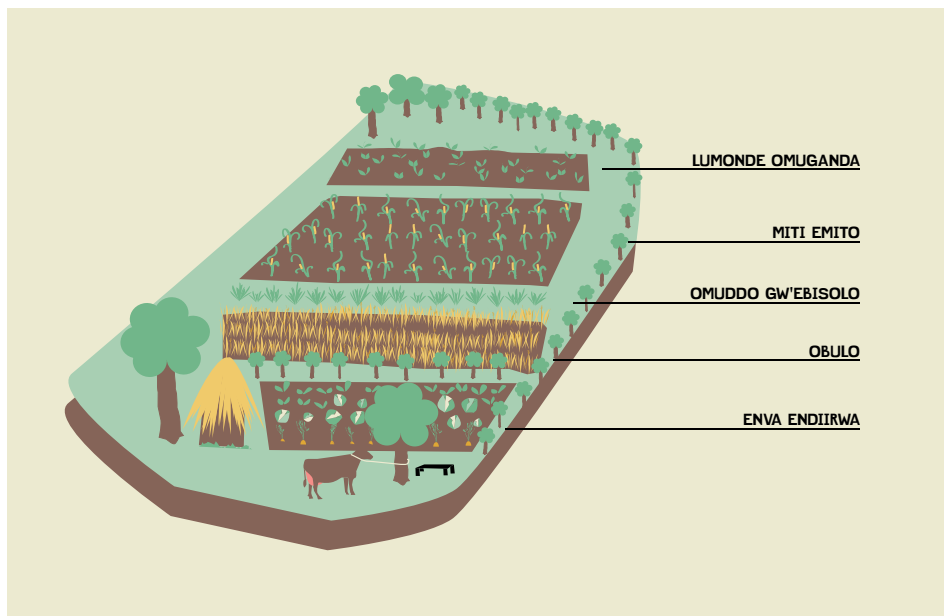
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## Enkulaakulana y'essamba (*farm*) mu myaaka gyegivuddeko

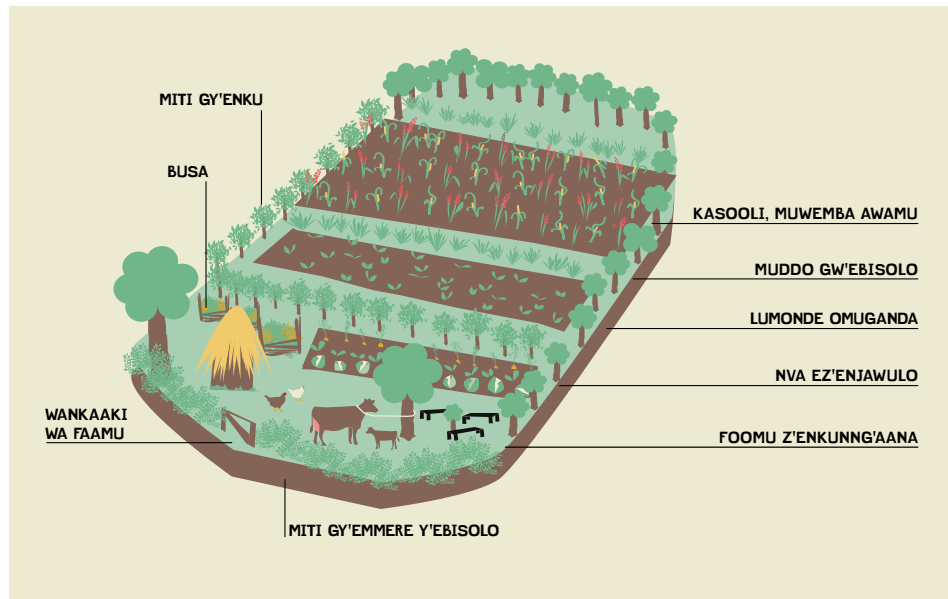
Embeera nga ennima ey'obwegendereza tennatakibwa ku ssamba



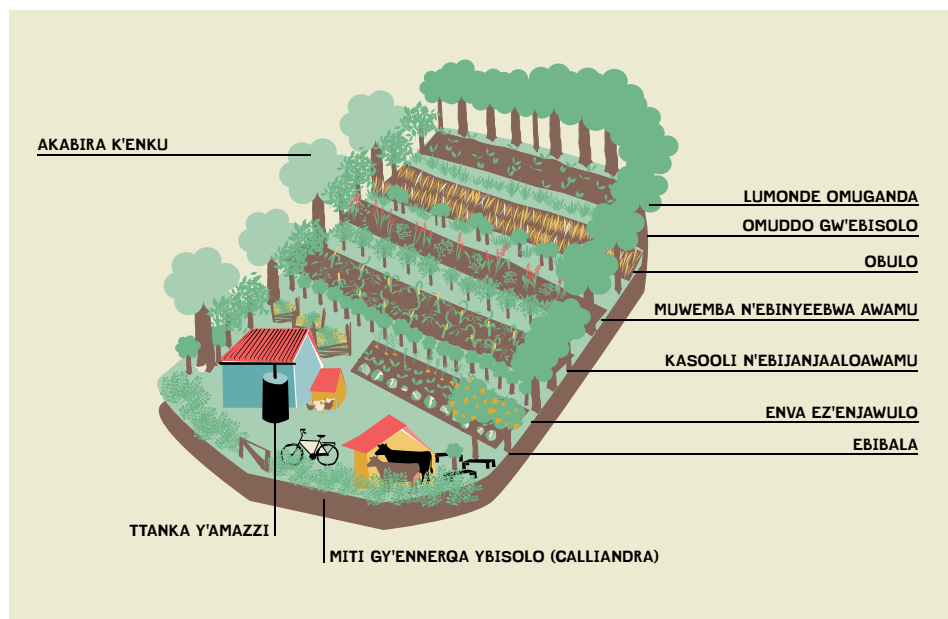
Essamba y'emu oluvannyuma lw'omwaaka ogusooka



## Essamba y'emu oluvannyuma lw'emyaaka ebiri



## Essamba y'emu oluvannyuma lw'emyaaka munaana



# 1. Enkyuukakyuuka y'embeera y'obudde n'engeri y'okugyetegekera n'okugikendeeza

## Ennyanjula

Enkyuukakyuuka y'embeera y'obudde kye kimu ku ebyo ebireeta ankyuukakyuuka mu bungi bw'ebikungulwa. W'onamalirako essomo lino, ojja kuba nga oyongedde okutegeera amakulu ga kyetuyita "Enkyuukakyuuka y'embeera y'obudde" era ojja kuyiga angeri ez'enjawulo enkyuukakyuuka zino gye zikendeezebamu awamu n'engeri gye zikwaatagana n'embeera yo (obulamu n'enfuna) ggwe wennyini.

## Essomo lino lijja kwetaaga essaawa 2

### 1.1 Enkyuukakyuuka z'embeera z'obudde kye kiki?

Enkyuukakyuuka zino zitegeeza nti embeera y'obudde mu bitundu bingi ekyuuka. Ebikolo eby'embeera y'obudde bitabuka nebiyitirira nga n'oluusi abakugu bituuka okubatabula mu ndagula. Entabuka eno etwaala wakati w'emyaaka 30 ne 35. Ebilolo ebyo y'enkuba, ebbugumu, ebyeeya, omuyaga, omuzira, amazzi g'omumpewo, n'enkyuuka y'obudde mu mwaaka (*seasons*).

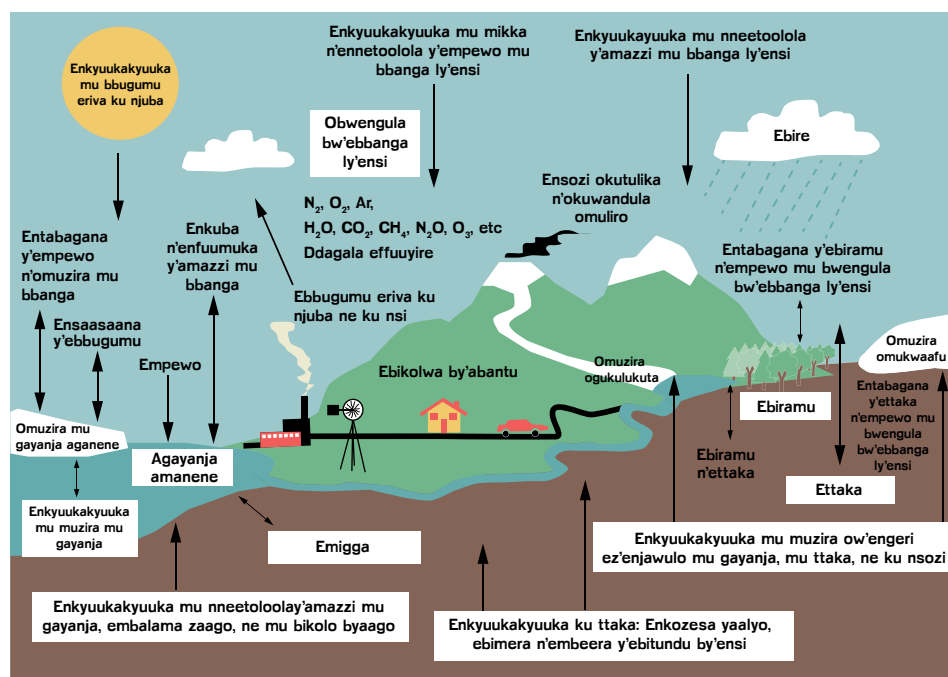
### 1.2 Biki ebireeta enkyuukakyuuka z'embeera z'obudde?

Enkyuukakyuuka ezo zibaddewo kuva edda mu butonde bw'enso ate nga zireetebwa n'ebikolwa by'abantu eb'enjawulo, naddala ebyo ebivaamu omukka oguleetera ensi okubuguumirira. Ebikolwa bino birimu okuzimba amakolero, okutema emiti okuyitiridde, okwoonoona embeera y'ebitundu by'ensi – "*ecosystems*" – (okugeza, entobazi, ennyanja, emigga, n'okuyigga ebisolo okususse), okulima n'okulunda okw'obulagajjavu, ebidduka, enkozesa y'enku n'ebirara ebikwaata omuliro, obujama, ebiguga okukula ku mbiri ezisukkulumye, ebizimbe ebingi ennyo, n'enkozesa y'ettaka.

Emikka egibuguumiriza ensi bwe giyitirira gibuutikira ensi ebbugumu eriva kun juba nerisibirwa wansi okumpi n'ettaka n'embeera y'ensi nayo ebuguma ekuyitiridde. Ensi gy'ekoma okubuguma n'embeera y'obudde nayo ekyuuka era n'etabuka. Obukosefu obuva mu nkyuukakyuuka zino era ezisingira ddala kwonoona obulimi zireeta ebyeeya n'enjala, omuzira, omuyaga n'amataba ebitatadde. Ebizibu enkyuukakyuuka mu embeera z'obudde byezireetera obulimi businga kweeyoleka mu ppereketya w'omusana, obudde okunnyogoga ekisusse, ekbeera y'obudde okutabuka buli mwaaka nga tekyaalagulwa, ebyeeya aebiwavvu ebitata, omuyaga, amataba wamu n'ebizibu ebyo okwoonoona ebirime n'okuleetera abalunzi obuzibu mu bisolo byaabwe.

| EBIKOLO            | ENKYUUKAKYUUKA Z'EMBEERA Y'ENSI KYEZIBIKOLAKO                    |
|--------------------|------------------------------------------------------------------|
| Amazzi             | Ebbula ly'amazzi oba amazzi okumala.                             |
| Ettaka ly'ennimiro | Ettaka okwoononeka (mukoka, okuggwaamu ebiriisa, okutobatobana). |
| Emmere             | Ebbula ly'emmere, emmere okuvunda, bbeeyi y'emmere okulinnya.    |

| EBIKOLO                                   | ENKYUUKAKYUUKA Z'EMBEERA Y'ENSI KYEZIBIKOLAKO                                |
|-------------------------------------------|------------------------------------------------------------------------------|
| Embeera y'ebitundu by'ensi – “ecosystems” | Ebitonde n'ebibira okukendeera, n'entobazi okukala.                          |
| Eby'obulamu bw'abalimi                    | Endwadde z'okulya obubi, enjala, n'abantu okufa.                             |
| Ebirime n'obulunzi                        | Ebiwuka n'endwadde z'ebisolo okweyongera n'ebirime okufa.                    |
| Eby'entambula, empulizaganya, n'obutale   | Enguudo, enfukirira y'ebirime, obutale, n'amaterokero g'emmere okwoonooneka. |
| Amasannyalaze                             | Amasannyalaze obutamala n'amakolero agalongoosa ebirime okukendeera.         |



Ebimu ku biva mu nkyuukakyuuka z'embeera y'ensi (Kyaakubibwa: Elijah Njenga)

### 1.3 Mikka ki mu bbanga ly'ensi egibuguumiriza ensi?

Emikka egy'obutonde egibeera mu bbanga; emikka gino gisika amannyi agebbugumu okuva ku njuba negifulumya ebbugumu mu bbanga.

*Emikulu mu mikka gino ye:*

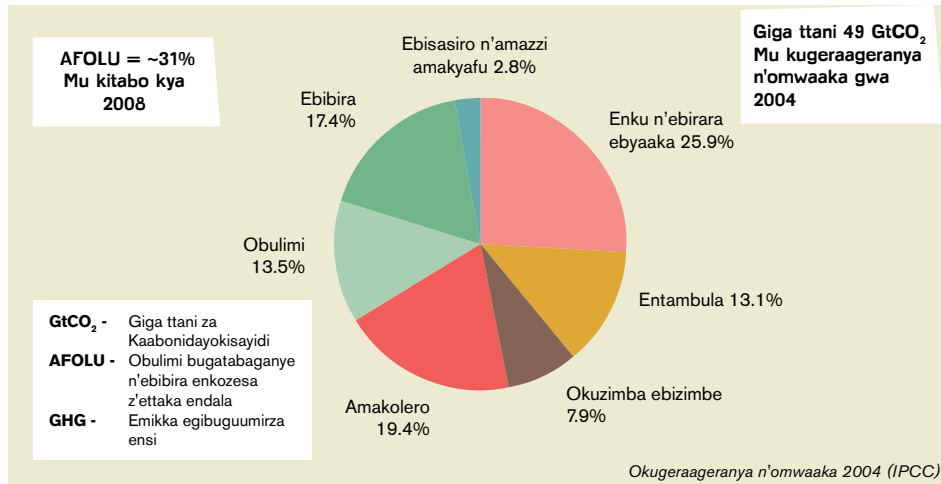
- Kabondiyokisayidi ( $\text{CO}_2$ )
- Mitheni ( $\text{CH}_4$ )
- Naitulaasi okisaidi ( $\text{N}_2\text{O}$ )
- “Hydrofluorocarbons” (HFCs)
- “Perfluorocarbons” (PFCs)
- “Sulfur hexafluoride” ( $\text{SF}_6$ )

### 1.4 Okubuguumiriza ensi kitegeeza ki?

Obutonde bw'emikka egibuguumiriza ensi bugisobozesa okuwamba n'okukuuma ebbugumu eringi eriva wansi ne ku njuba n'okulita amangu ebuugumu mu bbanga ly'ensi neryeyongera.

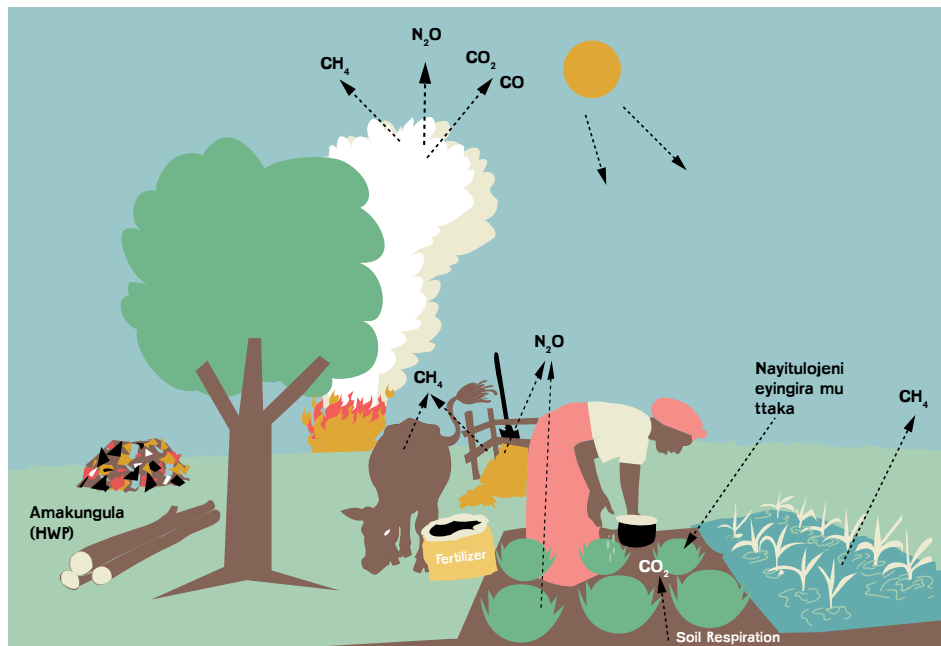
## 1.5 Emikka egibuguumiriza ensi giva wa?

Emikka gino giva mu ntabagana y'ebikolo eby'obutonde ebiri ku nsi ne mu bicolwa byaffe abantu. Ensibuko y'emikka gino eragiddwa mu bufunze mu kufaananyi ekiddirira wano wansi katono. Naddala, ebitundu 68 ku buli kikumi (68%) eky'emikka gino giva mu kukozeza (okuchoomera) amafuta g'emmotoka n'ag'amakolero wamu n'amanda agasimibwa mu njazi (coal).



Ensibuko y'emikka egibuguumiriza ensi

Ekifaananyi kino wansi kiraga emikka egibuguumiriza ensi egiva mu byetukola mu bulimi wamu n'egyo egiggibwa mu bbanga nga gimiribwa ebirime oba entabagana y'ebikolo by'obutonde mu bbaga ne mu ttaka bwe tukozesa obulimi obutuufu.



Emikka egibuguumiriza ensi egiva mu bulimi n'egyo obulimi gye buggya mu bbanga ly'ensi. (Kyakubibwa Elijah Njenga)

## 1.6 Enneetegekera n'enkendeenza y'enkyuukakyuuka mu mbeera y'obudde

Abalimi mu nsi yonna bamaze emyaaka nga balwaanyisa oblulabe obulimi n'obulunzi bwe bukolera ensi, naddala enkyuukakyuuka z'embeera y'ensi. Mu kuluubirira okweetegekera n'okukendeenza enkyuukakyuuka zino n'olw'okwekakasa nti emmere elimwa emala era n'embeera z'abantu (*livelihoods*) zongera okuba obulungi, abalimi n'abalunzi bafubye nnyo okugonjoola ennima n'ennunda yabwe nga bakozesa kyetwaayise SALM. (Laba essomo eryokubiri).

Bino  
birowoozeeko

### OKWEETEGEKERA N'OKUKUKENDEENZA ENKYUUKAAYUUKA Z'OBUDDE

**Zino z'engeri ebbiri ez'okukwaatamu enkyuukakyuuka zino.**

**Okweetegeka n'okukyuusa enkola:** Kino kitegeeza nti enkyuukakyuuka zino bwezijja, tukola kyetusobola okukendeenza obulemu bwezireeta mu ntabagana y'abantu, mu butonde bw'ensi ne mu by'enfuna. **Okukendeenza enkyuukakyuuka zennyini:** Kino kitegeeza nti abantu bafaabiina okukendeenza abikolwa byaabwe ebyongera mu bbanga ly'ensi emikka egibuguumiriza ensi.

Obukodyo abalimi abaabulijjo (*smallholders*) bwe bayinza okukozesa enkyuukakyuuka zino bwezijja za murundi mwenda (9 *categories*). (Laba essomo ery'ookubiri). Obukodyo buno tujja kubuttottola okusingawo okuva kussomo ery'okusatu okutuuka ku ly'ekkumi n'elimu (Essomo 3 – 11).



Obukodyo bw'okweetegekera n'okukukendeenza enkyuukaayyuka z'obudde (Kyaakubibwa Elijah Njenga).

## AKAGEZO AKAMPIMPI

1. Mukubaganye ebirowooza ku ebyo byemulaba mu kifananyi kino. Singa bino bibadde byoolo bibiri, kiriwa kyewandyagadde okubeeramu?
2. Wandika:
  - a. Ebiziibu ebireeteddwa enkyuukakyuuka mu mbeera z'obudde mu byaalo bino ebibiri.
  - b. Ebyo abalimi byebayinza okukola okweetegekera enkyuukakyuuka zino n'okukyuusa enkola zaabwe.
3. Olowooza nkyuukakyuuka ki ezibadde mu mbeera y'ensi wakat w'emyaaka 10 ne 30 egiyise? (Okueza nga ebyeeya okweyongera, amataba, entonnya y'enkuba okutabuka? Buzibu ki kino bwekireetede abalimi mu byaalo ebyo?
4. Bilolwa byo ki ebiyinza okuleeta enkyuukakyuuka mu mbeera z'obudde?
5. Kuba obufaananyi bubiri okulaga kalendalio y'obulii mu kitundu kyo ey'emyaaka etaano emabega n'eyo eya leero.
6. Njaawolo ki z'olabye mu kitundu kyo mu kweetegeka, okukyuusa enkola n'okukukendeeza enkyuukaayuuka z'obudde bw'ensi? Mu bukodyo obwo, buliwa bw'olowooza nti bwebusinga okukukwaatako butereevu mu kweetegeka, okukyuusa enkola n'okukukendeeza enkyuukaayuuka z'obudde bw'ensi?
7. Olinawo entegeka yonna okweetegeka, okukyuusa enkola n'okukukendeeza enkyuukaayuuka z'obudde bw'ensi? Oba ozirina, zeezirira? Oba nedda, lwaki tozirina?

## 2. Endabirira y'ettaka ewagira obulimi bw'obuwangaazi (*Sustainable Agriculture Land Management*), oba SALM

### Ennyanjula

Oluvannyuma lw'okuyita mu ssomo lino oja kuba nga weeyongedde okutegeera endabirira y'ettaka ewagira obulimi bw'obuwangaazi (*Sustainable Agriculture Land Management*), gyetwaayise "SALM", oja kusobola okunokolayo obukodyo n'enkola za SALM eziwerako n'okunyonnyola obukulu bwaabyo. Era oja kusobola okuttottola entabagana eriwo wakati w'enkyuukakyuuka mu mbeera z'obudde n'enkola ya SALM.

### Essomo lino lijja kwetaaga essaawa 1

#### 2.1 Kiki kyetuyita "Enkola ya SALM"?

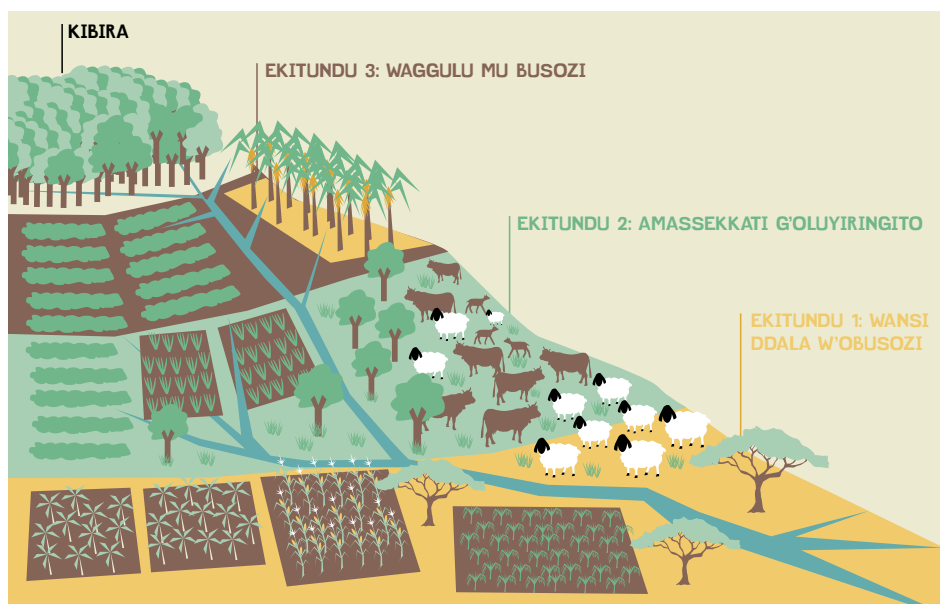
Kyetuyita (SALM) bwe bukodyo n'obulombolombo abalimi bwebayinza okukozesa okweetegekerako enkyuukakyuuka z'embeera z'obudde nga bakukyuusa enkola zaabwe okusobola okuddaabulula amangu obutonde bw'ensi mu bitundu by'eggwanga ebirimi.

*Enkola ya SALM eyinza okugabanyizibwamu ebitundu mwenda (9) ebiri mu lukalala luno wansi:*

1. Enkozesa ennungi ey'ebiriisa n'ebigimusa by'ebirime.
2. Okukozesa obulungi ettaka n'amazzi.
3. Ennima ey'omuganyulo mu by'enfuna.
4. Okumba emiti n'obwegendereza mu nnimiro.
5. Enkabala entuufu, ennima ennungi n'enkozesa ya kasasiro ava mu birime.
6. Okuddaabulula ebitundu ebyoonooneddwa obulimi n'obulunzi obukyaamu.
7. Okugatta obulimi n'obulunzi mu bweegendereza.
8. Okukozesa obyuuma ebikola amasannyalaze nga tebireeta mikka egibuguumiriza ensi, wamu n'okukozesa mu bweegendereza enku, amanda, n'ebirara ebikwaata omuliro.
9. Okumalawo mu bweegendereza ebiwuka ebireeta endwadde mu bantu ne mu bisolo by'aabalunzi.

#### AKAGEZO AKAMPIMPI

1. Mu kifaanayi kino wansi londamu ekitu essambayo mw'eri.
2. Kuba ekifaananyi ku lupapula nga kiraga ebiri mu ssamba eyo.



Engeri obulimi gyebukwaataganamu n'ebitundu by'eby'obutonde bw'ensi eby'obusozi nga kano

|                         | EKITUNDU 3:<br>WAGGULU MU<br>BUSOZI                                                                                                                                                                                                                                               | EKITUNDU 2:<br>AMASSEKKATI<br>G'OLUYIRINGITO                                                                                                                                                                                                                                                                                        | EKITUNDU 3:<br>WANSI DDALA<br>W'OBUSOZI                                                                                                              |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Obulimi</b>          | Mmwaanyi, bitooke, ebisolo.                                                                                                                                                                                                                                                       | Ebisolo, ebirime by'emmere, emmwaanyi.                                                                                                                                                                                                                                                                                              | Okugeza, kasooli, bijanaalo, "lablab", muwogo, okulunda endiga.                                                                                      |
| <b>Embeera y'obudde</b> | Obuwanvu waggulu gyebukoma, n'obunnyogove gyebukoma.                                                                                                                                                                                                                              | Mu massekkati, wannyogovu, wannyuukirivu.                                                                                                                                                                                                                                                                                           | Bitudu bya wansi ( <i>low altitude</i> ), wakalu nnyo.                                                                                               |
| <b>Enkuba mu mwaaka</b> | 1200 - 2000 mm                                                                                                                                                                                                                                                                    | 800 - 1600 mm                                                                                                                                                                                                                                                                                                                       | 500 - 850 mm                                                                                                                                         |
| <b>Obuwanvu waggulu</b> | 1200 - 2000 m                                                                                                                                                                                                                                                                     | 800 - 1200 m                                                                                                                                                                                                                                                                                                                        | 700 - 800 m                                                                                                                                          |
| <b>Ettaka</b>           | Ettaka erinnyuukirivu, liva mu vvu eriva mu nsi munda ( <i>volcanic</i> ), enjazi za kintabuli mu ttaka wansi.                                                                                                                                                                    | Ettaka elimyufu eliraga nti waliwo ayoni, ettaka nga lyakabumbabumba, ettaka elyakitaka ngaliri ku njaziyazi.                                                                                                                                                                                                                       | Ttaka lya kikuusi, Ttaka lya kikuusi eliva mu vvu eriva mu nsi munda ( <i>volcanic</i> ).                                                            |
| <b>SALM</b>             | <ul style="list-style-type: none"> <li>Okukuuma n'okutaasa ettaka n'amazzi.</li> <li>Obulimi obugatte n'eby'ebibira (<i>agroforestry</i>).</li> <li>Engoba y'ebiwuka by'endwadde z'ebisolo n'ebirime.</li> <li>Endabirira n'enkozesa y'ebirisa by'ebirime n'ebigimusa.</li> </ul> | <ul style="list-style-type: none"> <li>Ettaka n'amazzi okulabirwa obulungi (obubalaza bw'amadaala, okusimba omuddo ebirime ebigatte).</li> <li>Okulabirira ebirisa byomu ttaka.</li> <li>Emiti n'ebirime ebigatte. Obulunzi obulungi.</li> <li>Okuziyiza ebiwuka eby'akabenje.</li> <li>Okukabala n'okukozesa ebisasiro.</li> </ul> | <ul style="list-style-type: none"> <li>Obulunzi obutabaganye.</li> <li>Emiti n'ebirime ebigatte.</li> <li>Okuziyiza ebiwuka eby'akabenje.</li> </ul> |

## 2.2 Obukulu n'emigaso gy'enkola ya 'SALM'?

Obukodyo bw'enkola ya SALM bulina emiganyulo nga gino:

- Okukakasa nti amakungula geeyongera obungi.
- Okukuuma obugimu by'ettaka, okukuuma ebibira n'ebibangirizi by'omuddo n'amalundiro, okwo nga kw'otadde waggulu mu busozisozi, ku buserengeto, ku miseetwe, mu ntobazi ne mu nyanja.
- Okukuuma ebibira eby'obutonde n'ebyo ebisobola okuvaamu eby'amaguzi n'emiganyulo emirala.
- Obutalagajjalira nsibuko z'emigga mu nsozi n'ensulo ddaamu z'amasannyalaze zireme kuggwaamu mazzi era tube n'amazzi agatumala naddala mu bitundu egenderera okukuuma obutonde bw'ensi.
- Okukakasa nti amazzi agali mu ttaka ne mu njazi gasobola okumala obulungi obweetaavu bw'abantu n'emirimu gyaabwe.
- Enkola ya SALM esobola okuddaabalula ettaka eriserebye olw'enkozesa ey'ekiragajjavu.

## 2.3 Obukodyo bw'enkola ya 'SALM'

| OKUKOLA N'OKUKOZESA EBIRIISA N'EBIGIMUSA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ESSOMO 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Okubikka ettaka lileme kukala mangu.</li> <li>• Okukozesa kasasiro ava mu bulimi n'obulunzi okukola n'okukozesa ebigimusa.</li> <li>• Okulima ebirime ebyongera naitrogen mu ttaka (<i>nitrogen fixers</i>) nga ebijanjaalo ne soya.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>• Okukozesa obusa bw'ebisolo n'ebinyonyi ebiri ku ssamba.</li> <li>• Okukozesa n'obwegendereza ebigimusa ebigule mu kakolero (<i>chemical fertilizers</i>).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| OKUKUUMA N'OKUKOZESA OBULUNGI ETTAKA N'AMAZZI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ESSOMO 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>• Okutema obubalaza bw'amadaala g'obukiika (<i>terracing</i>) ku buserengeto buseetezwe.</li> <li>• Okuzimba ebigulumu ebya kontuwa (<i>contour bunding, semi-circular bunds</i>), ku buserengeto bikugire mukoka.</li> <li>• Okuzimba obubalaza obugazi n'emikutu mu bukiika.</li> <li>• Okusima obunnya obw'amabuto (<i>semi-circular</i>).</li> <li>• Ebugulumu by'ebisasiro eb'obukiika bw'oluyiringito.</li> <li>• Okusima ebinnya ebiziba emukutu egivesa mukoka aleme kukulukutira bbanga ggwanvu n'okukyuusa amakubo g'amazzi (<i>diversion ditches and cut-off drains</i>).</li> <li>• Ebinnya omulegama mukoka.</li> <li>• Okusima ebinnya omusimbibwa ebirime.</li> <li>• Emikutu emiwanvu okudda wansi nga gya bukiika.</li> <li>• Ebigulumu ebisibe obukiika (<i>tied ridges</i>).</li> </ul> | <ul style="list-style-type: none"> <li>• Okusimba omuddo mu bukiika bw'obuserengeto</li> <li>• Okufukiirira ennimiro (<i>irrigation</i>).</li> <li>• Okulembeka amazzi g'enkuba mu bisasi.</li> <li>• Okukozesa agayinja okuzimba ebigulumu mu bukiika.</li> <li>• Okusimaasima ettaka eriseetedde ekisusse (<i>irregular surfaces</i>).</li> <li>• Ttanka z'amazzi.</li> <li>• Amatogero amanene.</li> <li>• Ebirembeka n'okuwamba amazzi eby'enjawulo, nga seffuliya ennene (<i>pans</i>).</li> <li>• Ebidiba.</li> <li>• Ddaamu.</li> <li>• Enzizi ne nnayikondo.</li> <li>• Obuyonjo n'okukuuma amateeka g'eby'obulamu mu bitundu ebitwetoolodde.</li> <li>• Okukozesa nate n'obwegendereza amazzi getufumbisizza.</li> </ul> |
| OBULIMI OBWA BUZINEESI – OBUVAAMU ENSIMBI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ESSOMO 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>• Enkyuusakyuusa mu birime ebirimwa mu butundu bw'ennimiro emu (<i>crop rotation</i>).</li> <li>• Okugatta ebirime bibiri oba bisatu eby'enjawulo mu nnimiro emu.</li> <li>• Okukozesa ebitundu by'ebirime ebivunze nga ebigimusa.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• Okulima obukiika bw'oluyiringito lw'akasozi.</li> <li>• Okuyuusa buli mwaaka (oba buli lw'osiga) ebirime ebisigwa mu nnimiro emu.</li> <li>• Okusiga ensigo ezilongooseddhamu abakugu (<i>improved crop varieties</i>).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| OKUGATTA EBIBIRA N'OBULIMI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ESSOMO 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>• Okusimba emiti n'obwegendereza mu nnimiro.</li> <li>• Okusimba emiti n'obwegendereza mu malundiro.</li> <li>• Okusimba emiti n'obwegendereza wamu n'ebirime mu malundiro.</li> <li>• Okukozesa emiti okulunda ebiwuka eby'omugaso nga enjuki oba obusiring'anyi obukola obuuzi (<i>silkworm</i>).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>• Okusimba emiti n'obwegendereza okwetoolola ebidiba n'entobazi omuli ebyennyanja.</li> <li>• Okusimba obubira obutono ku ssamba.</li> <li>• Okusimba emiti nga ensalo z'ennimiro ku ssamba.</li> <li>• Okusaasaanya emiti n'obwegenderesa gyetokebe n'ebirime ku ssamba.</li> <li>• Okusimba emiti gy'ebibala.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                 |

**OKUKABALA N'OBWEGENDEREZA N'OKUKOZESA OBULUNGI  
EBISASIRO EBIVA MU NNIMIRO NE MU DDUNDIRO**

**ESSOMO 7**

- Okwewala okukabala ennimiro.
- Okukendeeza ennyo okukabala ennimiro.
- Osima ebinnya ebiwanvuko omusimbibwa ebirime.
- Okutemaatema ebisasiro bye'birime n'okubimansa mu nnimiro nga ogenda okukabala.
- Okusongola obuti n'okubukozesa okufumita obunnya mu ttaka okusigamu ensigo nga tokabadde.
- Okukabala obukiika bw'akaserengeto n'okukabala obufu bwokka wetusiga ensigo (mu kifo kyobukabala ennimiro yonna).
- Okukozesa akakumbi akasikibwa ekisolo okusima \*obukutu obwa 5 - 10 cm okudda wansi obwokusigamu ensigo awatali kukabala nnimiro yonna.
- Okuzimba ebigulumu eby'obukiika bw'akaserengeto nga bigulumye 10 - 15 cm, ku ntikko zaabyo n'osimako obukutu obwa 2.5 - 5 cm okudda wansi obw'okusigamu ensigo.
- Okukozesa ebisasiro n'obwegendereza.

**OKUZZAAWO N'OKUDDAABULULA ETTAKA**

**ESSOMO 8**

- Okuwummuza ettaka lisobole okweddaabulula lyokka.
- Okukola ebyo ebiyamba ettaka okuddamu obugimu n'okweddaabulula.
- Okusimba ebirime n'emiti awamu mu bitundu.
- by'ettaka erikooye (liweddemu obugimu).
- Okuziyiza empiira n'okukozesa omuliro n'obwegendereza mu bulimi n'obulinzi.
- Okusimba emiti n'ebirime mu ngeri ey'amagezi ku masamba n'amalundiro.

**OKULUNDA OKUGATTIDWAMU MU BWEENGENDEREZA OBULIMI  
OKULUDA EBIWUKA (NJUKI) OBA OKUSIMA EBIDIBA BY'EBYENNYANJA**

**ESSOMO 9**

- Okuliisa ebisolo abulungi n'okubiwa amazzi.
- Okulabirira obulungi ebiraalo n'ebizimbe ebirala omukuumirwa ebisolo.
- Enkwaata entuufu n'enkozesa y'ebisasiro
- eby'essamba n'eddundiro.
- Okuziyiza ebiwuka ebireeta endwadde.
- Okuzaalisa ebisolo eby'omutindo ogwawaggulu (*improved breeding*).

**OKUYIYA ENGERI Z'EBYENFUMBISA EBY'OBUWANGAAZI  
MU BUTONDE BW'ENSI, AMASANNYALAZE N'OKUKOZESA  
OBULUNGI ENKU NAMANDA**

**ESSOMO 10**

- Okukozesa nga enku ebisasiro ebiva mu ssamba ne mu malundiro.
- Byogaasi ava mu bintu ebivunda (*biogas*).
- Okukozesa ebisasiro ebiva mu ssamba n'amalundiro mu ngeri endala ez'enjawulo ku faamu.
- Okufumbira ku ssigiri ezikekkereza enku n'amanda.
- Okwookya amanda nga tetutema kumalawo bibira n'emiti awalala.

**OKUZIYIZA EBIWUKA EBIRYA EBIRIME N'OKULEETA ENDWADDE**

**ESSOMO 11**

- Okukozesa ebiramu ebirala ebirya oba okutta ebiwuka bino.
- Okulima ebirime ebitalumbibwa mangu biwuka.
- Obukodyo obw'enjawulo mu kulima n'obulunzi (okufuuyira, ebigimusa, okusalira ebirime).
- Okutega n'okutta ebiwuka eby'akabenje.
- Okufuuyira eddagala.
- Obukodyo obw'ekinnansi.
- Okubaga entegeka ez'enkalakkalira ezikendeeza n'okumalawo ebiwuka eby'akabenje.

**Kino kikulu:** Kikyaamu nnyo okulowooza nti obukodyo bw'enkola sa SALM bwonna bwa muganyulo buli wantu wonna era tusaana okuzeekenneenya tulondemu ezo zokka ezituukana n'obutonde bw'ebitundu byetulimu.

**AKAGEZO AKAMPIMPI**

1. Weekenenneenye maapu (*map*) y'essamba gyewakubye waggulu, naddala ebitundu ebyaawukana mu butonde bwaabyo n'enkozesa yaabyo mu bulimi n'obulunzi (*Agro-ecological zones*).
  - a. Faamu eri mu bitundu ki? Kuba ensalo z'ebitundu nga osinziira ku mbeera y'obudde bwabyo (*climatic zones*), owandiike obukodyo bwa SALM obukozesebwa mu buli kitundu. Kozesa enkalala ezo waggulu ezifunza ebiri mu masomo agajja mu maaso mu kitabo kino.
  - b. Essambayo erina bizibu ki (mukoka okukulukusa ettaka – “*erosion*”)? Oba olina obukodyo obumalawo ebizibu bino, tegeeza banno.
2. Nkyuukakyuuka ki z'oleese ku ssamba okwekakasa nti amakungula geeyongera?

### 3. Endabirira n'enkozesa y'ebiriisa by'ebirime n'ebigimusa

#### Ennyajula

Ekigendererwa ky'essomo lino kwe kulaga omusomi ebimu ku biriisa n'ebigimusa ebisinga okumanyibwa, okunnyonyola obukulu n'omugaso gwaabyo era n'okukuyamba okuvumbula amakubo g'oyinza okuyitamu okwongerera n'okukuuma ebiriisa by'ettaka lisobole okukuwa amakungula agasingawo naddala ag'emmere. Tujja kukubaganya ebirowoozo ku nkozesa y'ebigimusa ebiva mu birime byennyini.

#### Essomo lino lijja kwetaaga essaawa 4

#### 3.1 Ebiriisa by'ebirime kye kiki?

Ebiriisa by'ettaka bikulu nnyo mu nkula y'ebirime n'okukungula okwamagoba. Awatali biriisa bino ebimera biyinza okukalaasira nebisereba mu nkula yaabyo nebiremwa okumulisa n'okubala ebibala; ebimu bifa nebikala.

*Ebimu ku biriisa by'ettaka:*

- |                     |                         |
|---------------------|-------------------------|
| ■ Potasiyumu (K)    | ■ Kasiyumu (Ca)         |
| ■ Magineziyumu (Mg) | ■ Salufa (S)            |
| ■ Nayitulojeni (N)  | ■ Ayironi/Ekyuuuma (Fe) |
| ■ Fosiforaasi (P)   | ■ Zinki (Zn)            |
| ■ Kaaboni (C)       |                         |

#### AKAGEZO AKAMPIMPI

1. Wandiiika olukalala lw'enkyuukakyuuka ezitali za bulijjo (*abnormal*) ttaano zewaalabye mu birime by'essamba yo.
2. Oyinza okujjukira ddi oba lwaaki ebirime mu ssamba yo byaalaga ekula etali ya bulijjo?

#### 3.2 Endabirira y'ebiriisa by'ebirime kye kiki?

Ettaka liba ggimu bwe libaamu ebiriisa ebimala ate nga bitabuddwa nga buli kiriisa eky'enjawulo kiri mu bungi obutuufu. Okulabirira ebiriisa byomuttaka kitegeeza okubiikuma nga bimala oba okwongerera ku bugimu bw'ettaka. Kino kutuukirizibwa nga tukozesa ebiriisa ebyo ebiri mu ttaka era n'okwongeramu ebirala naddala ebyo ebiva mu nnimiro zennyini ne mu malundiro. Omugaso gw'ebiriisa by'ettaka kwe kwongerera obungi bw'amakungula n'okuyamba ettaka okweddaabulula.

**Bwetukozesa ebigimusa n'obulagajjavu oba okubiyitiriza, twoonoona ettaka nga tulifuula ery'olunnya ate nelitandika okuvaamu emikka egibuguumiriza embeera y'ensi.**

Ebiriisa ebyomuttaka byongerera kinene ku: Bugimu bw'ettaka, Enkula y'ettaka, Obungi bw'amakungula, Enkyuukayuuka mu mbeera y'obudde, Okweetegekera enkyuukakayuuka ezo n'okukyuusa mu nkola nga zizze, Okuyamba obutonde bw'ensi okweddaabulula, Okukendeeza emikka egibuguimiriza ensi. Engeri emu ku ezo ez'okulabirira ebiriisa mu ttaka kwe kukozesa ebigimusa.

Eby'okulabirako by'enkwaata ennungi y'ebiriisa byomuttaka: Okukozesa obusa bw'ebisolo ne kalimbwe w'ebinyonyi, okukozesa ebigimusa ebigule n'ebikoleddwa ku ssamba kwennyini naddala kompositi.

### 3.2.1 Okukozesa obusa bw'ebisolo

Obusa buva mu bisolo bingi ku ssamba era buyinza n'okufunika oba okugulwa okuva ku balunzi abalala oba mu butale. Obusa bukozesebwa ku ebirime bingi nga ebigimusa eby'obutonde.

#### EBIGIMUSA EBY'ENJAWULO EBIVA MU BISOLO EBIRINDE:

1. Kalimbwe w'enkoko n'ebinyonyi ebirala.
2. Obusa bw'ente.
3. Obusa bw'emblaasi.
4. Obusa bwe'mbuzi.
5. Mu nsi ezimu bakizesa bbi n'omusulo gw'abantu nga ebigimusa.

*Ebyokukola:*

- Oyinza okutabula ebigimusa ebiva mu bisolo n'ebigimusa eby'engeri endala eziwerako. Ekyo kivaamu ebigimusa ebisingako obulungi.
- Yanika ebigimusa by'obusa n'ebiva mu nnimiro oluvannyuma obitabike mu ttaka mw'ogenda okkusiga. Ebigimusa ebibisi biyinza okwookya ebirime n'okubyoonoona ate nga ekyo ssi kirungi mu bulimi.

*Okussa mu nkola:*

- **Buli Muti:** Yiwa ebigaali (*wheel barrows*) bibiri eby'ebigimusa ku buli muti mu nkulungo eri mita (*metre*) emu okuva ku muti okugwetoolola. Bw'eba endokwa (*seedling*), ebigimusa biyiwe nga obyetoolooza emirandira.
- **Ku birime:** Saasaanya ttani 2 (*tonnes*) ez'ebigimusa mu buli yiika (*acre*) y'ennimiro.

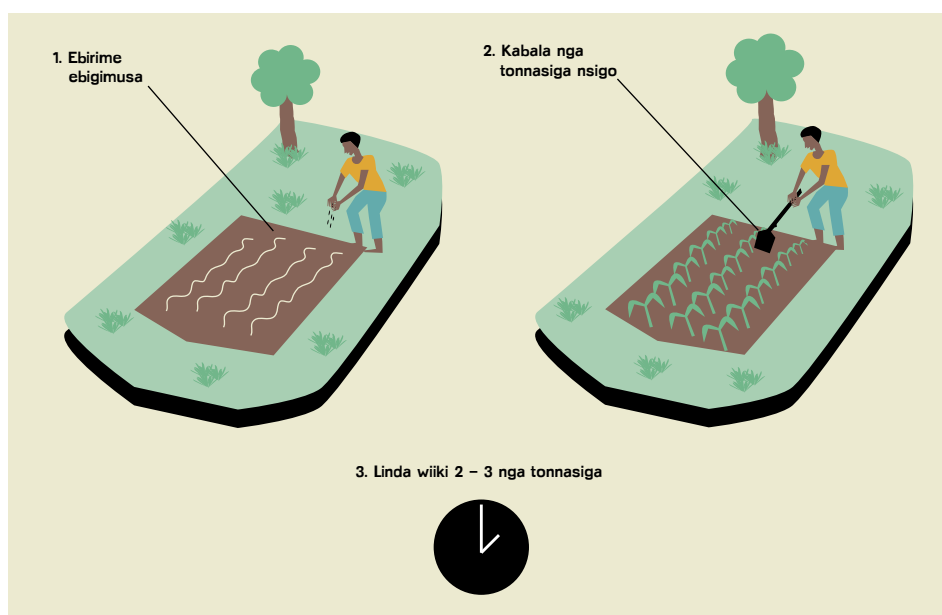
*Obulungi bw'ebigimusa eby'enjawulo tebwenkanankana olw'ensonga zino byetuyize:*

- Ebisolo eby'enjawulo mwe biva.
- Obungi bw'ebisolo ebyo.
- Engeri ebiraalo n'ennyumba z'ebisolo ebirala gye bizimbiddwamu.
- Endiisa y'ebisolo ebyo (*diet*).

- Engeri obigimusa ebyo gye bikunng'aanyizibwa.
- Entabula y'ebigimusa ebiva mu busa ne mu bimera.
- Entereka ekuuma ebigimusa bireme kuggwaamu kiriisa olw'okukala oba amazzi olibyoozaamu ekiriisa.

### 3.2.2 Onkozesa y'ebigimusa ebiramu (*green manure*)

Mu “bigimusa ebiramu” tutegeeza okusimba ebimera (okugeza ebirime ebizaamu, laaba obuwayiro 3.2.3) ebiyamba ebyongera ku bugimu bw'ettaka n'okukuuma ettaka. Ebimera ebyo bitera okubuubuuka mu nkula yaabyo naye tebirekebwa kumulisa oba okutuuka amakungula. Emirandira gyaabyo emiwanvu okutuuka wansi ddala mu ttaka ginyuunyuntayo ebiriisa ne gibireeta mu ttaka eriri waggulu ebibala by'emirandira emimpi we gibituukira. Ebimu ku bimera bino bijja nitrogen mu bbanga nebmuyingiza mu ttaka nga ekigimusa ekikulo ddala. Ate mu kubikka ettaka, ebimera ebyo biziya omuddo okumera mu birime ate birwanyisa endwadde z'ebirime. Ebimu ku birime bino birimu obuwuka obutono ennyo nnyini (*microbes*) obw'omugaso ku ttaka n'ebirime ebirala. Ebimera ebikozesebwa nga ebigimusa ebiramu biyinda okusaayibwa nebiyozesebwa okukola ebigimusa ebivunzevunzeemu (*compost*). Mu ngeri yonna ebigimusa ebiramu gye bikolebwa, byongera nnyo ku ttaka lya waggulu ddala (*humus or organic matter*).



Okusimba ebigimusa ebiramu (*green manure*)

### 3.2.3 Ebirime ebizzaamu (*cover crops*)

Ebirime ebizzaamu olumu biyitibwa ebiyingiza nayitulojeni mu ttaka. Ebimu ku birime bino biba bya nva, nga ebijanjaalo ne soya naye ebirala byaawuka ku nva zino. Kyokka byonna bifaananako ebigimusa ebiramu mumiganyulo gyabyo mu bulimi; bisobola okunuuna nitrogen mu bbanga nebmuyingiza mu ttaka neryeyongera obugimu n'obutakaddiwa. Ebirime bino (nga mukuna) bisigibwa mu kasooli akuzekuzeemu ate bisobola n'okugoba egimu ku

middo mu nnimiro. Ebirime ebizibizi bisaana okukabalwa oba okusaayibwa nga bimulisa birame ate kunyuunyunta biriisa byebitatde mu ttaka.

**Kino kikulu:** Kyeetaagesa ebimera ebizzaamu okusigibwa nga byakamulisa bireme kunyuunyunta biriisa ebimera ebirala bye byetaaga.



#### EBY'OKULABIRAKO BY'EBIRIME EBIZZAAMU (COVER CROPS):

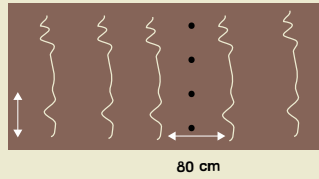
- |                                 |                                          |
|---------------------------------|------------------------------------------|
| • <b>Essenke</b>                | • <b>Lumonde omuganda (Sweet potato)</b> |
| • <b>Bijanjaalo</b>             | • <b>Veechi (Vetch)</b>                  |
| • <b>Obusujju (Butternut)</b>   | • <b>Lusaani (Lucern)</b>                |
| • <b>Empindi (Cowpeas)</b>      | • <b>Lupiini (Lupin)</b>                 |
| • <b>Desimodiyuumu</b>          | • <b>Mukuna (Mucuna)</b>                 |
| • <b>Laabulaabu</b>             | • <b>Ebinyeebwa (Peanuts)</b>            |
| • <b>Lentili</b>                | • <b>Kawo (Peas)</b>                     |
| • <b>Soya (Soybean)</b>         | • <b>Ensujju (Pumpkin)</b>               |
| • <b>Sikwooshi</b>              | • <b>Empinnamuti (Pigeon peas)</b>       |
| • <b>Kuloova (Sweet clover)</b> |                                          |

*Ennima ya mukuna mu nnimiro ya kasooli*

1. Siga kasooli mu nnyiriri ezaawuliddwa ebigillumu bya 80 cm obugazi ate nga ebikolo bya kasooli byaawuddwa 40 cm mu nnyiriri zennyini. Oyinza okukozesa emiguwa okukakasa ebipimo bino.
2. Siga ensibo bbiri mu buli kannya.
3. Koola kasooli nga tonnasiga mukuna (oyinza ilukozesa obukodyo obw'okweewala okukabala ettaka, nga obwo obuli mu ssomo ery'ebiwuka).
4. Siga mukuna nga kasooli akuzeemu okumala ennaku nga 60 nga ali kumpi okukungula n'okuliibwa.
5. Buli hekiteya (*hectare*) emu yeetanga 60 kg ez'ensigo za mukuna.
6. Siga ensigo bbiribbiri eza mukuna ku kigulumu ekyawudde ennyiriri za kasooli nga obunnya bweyawudde 40 cm.
7. Mukuna ajja kugenda mu maaso okukula nga kasooli akunguddwa okutuuseza ddala mu kiseera k'enkuba ekiddirira.
8. Leka mukuna avunde akole ebigimusa.
9. Ennimiro bw'etaba na muddo mungi oyinza okusiga kasooli obutereevu mu mukuna avunze ate nga tokabadde.

Ettaka bwe liba nga ssiggimu kimala ate nga lilimu omuddo, siga mukuna buli mwaaka okumala emyaaka esatu. Obugimu bwebudda, siga mukuna buli myaaka ebiri.

1. Siga kasooli mu nnyiriri; 80 cm wakati waazo, 40 cm wakati w'ensigo. Pimisa n'enkokondo ne'miguwa.



2. Siga ensigo bbiri buli kinnya.



3. Koola kasooli omulundi gumi nga tonnasiga mucuna. Oyinza okubikka omu ddo gufe.



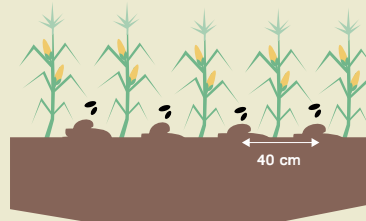
4. Siga macuna nga kasooli wa nnaku nga 60 (atuuse okunoga).



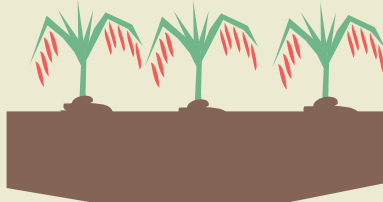
5. Kozesa 60 kg eza mucuna buli hactare.



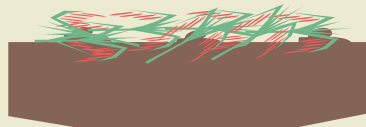
6. Suula ensigo 2 eza mucuna buli kagulumu wakati wa kasooli nga zaawuddwa 40 cm.



7. Mucuna ajja kugenda mu maaso okukula kasooli nga amaze okunogebwa okutuusa ku kiseera ky'enkuba ekiddirira.



8. Leka mucuna mu musiri na ebisubi ebibikka avundiremu.



9. Okusinziira ku mddo ogumeze mu musiri, abalimi abamu basiga kasooli butereevu mu macuna avunzevunze nga tebakabadde.



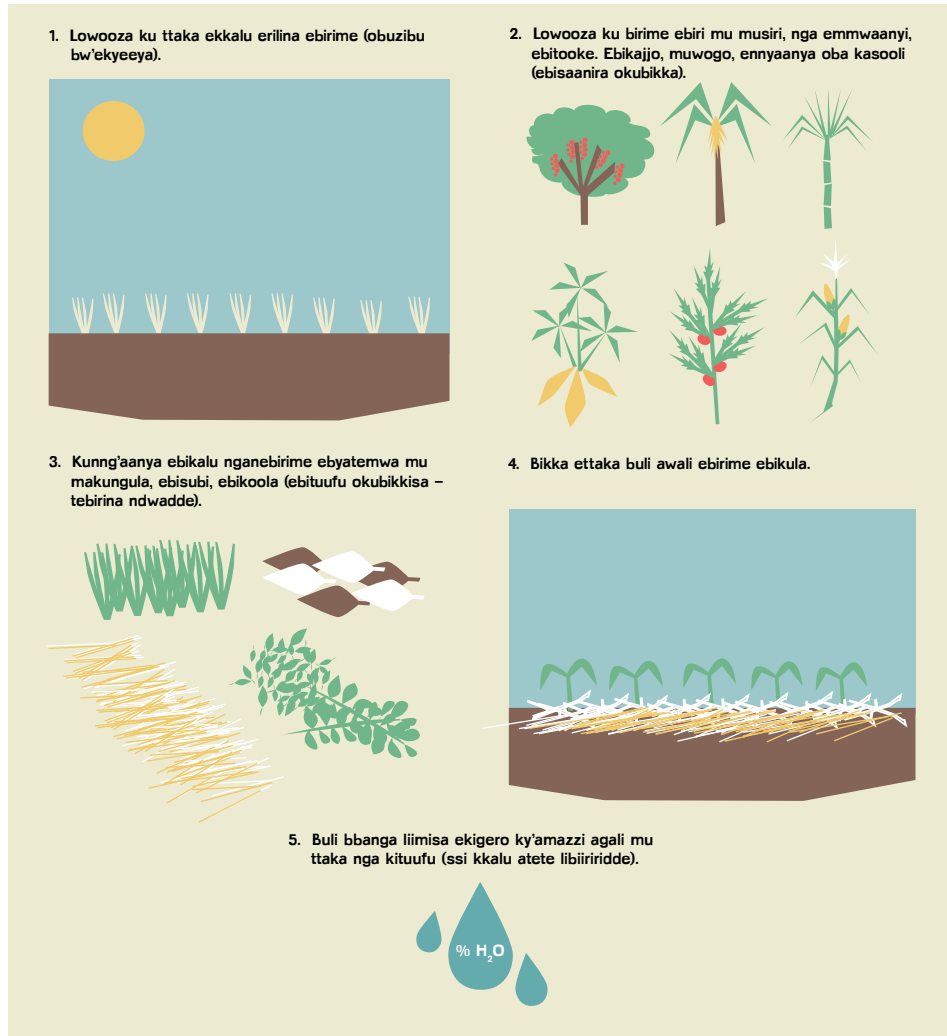
Ennima ya mukuna (*mucuna*)

Oyinza okulaba n'okuyiga enkozesa ya mucuna okuddaabulula ettaka mu video eri ku muko gwa Intaneti (*Internet*):

<http://www.accessagriculture.org/node/513/en>

### 3.2.4 Okubikka emisiri (*mulching*)

Ekigendererwa mu kubikka emisiri kwe kukuuma ettaka obutakaddiwa, okukendeeza mukoka, okukuuma ettaka obutakala, ettaka obutafuumuka na mpewo, okuziyiza omuddo, okukuuma embeera (*structure*) y'ettaka n'okukakasa nti ettaka teribuguumirira oba okunnyogoga ekiyitiridde.



Embikka y'ettaka (*mulching*)

### 3.2.5 Ebigimusa ebitobaatobanye – eby'oluzzizzi (*liquid manure*)

Ebigimusa ebitobaatobanye oba eby'oluzzizzi biva mu birime, naddala ebyenya enya (*legumes*), evvu n'obusa, nga byonsatule bitabuddwa oluvannyuma lw'okuvundavundamu nebituuka ku mutendera ogw'okukulukuta empolampola. Ebigimusa bino oyinza okubitabula obutereevu mu ttaka oba ku birime byennyini. Ebirime ebituufu okukozesa ebigimusa ebitobaatobanye ye "*Mexican Sunflower*" (*Tithonia diversifolia*) ne *Sesbania Sesban*.

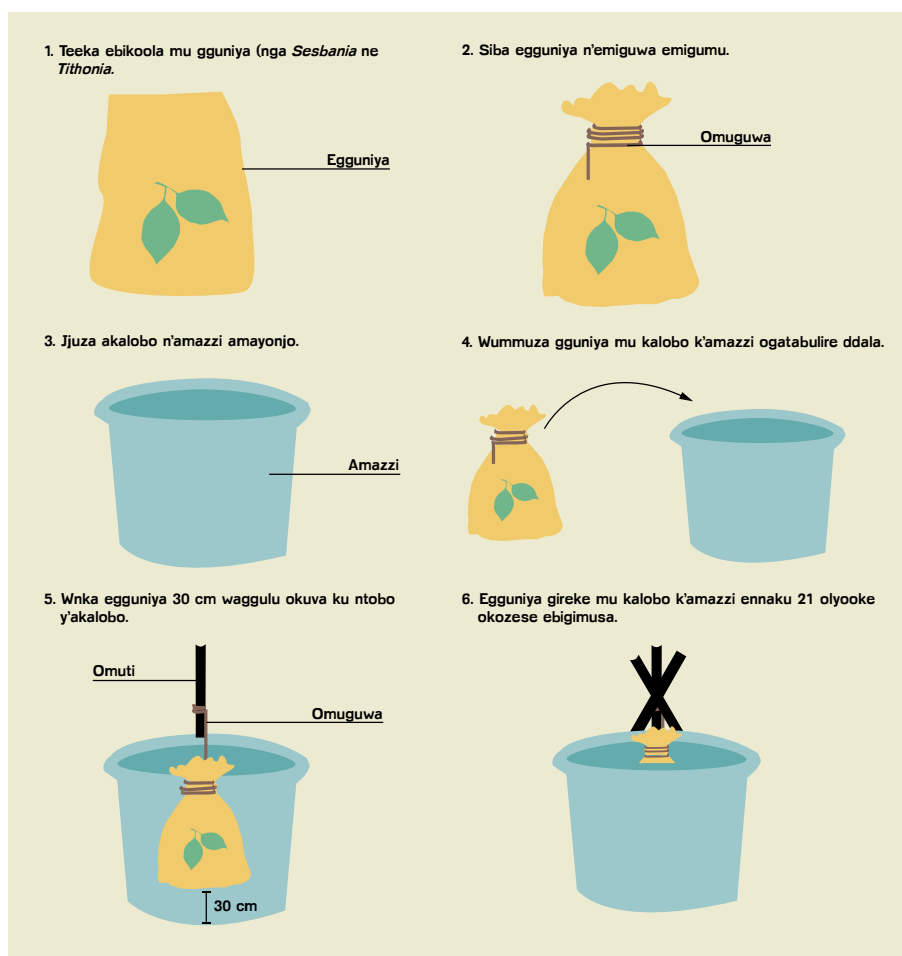
Ebigimusa bino bikuuma ebirime, bigoba ebiwuka n'endwadde z'ebirime, byongerera ebiriisa (Nayitulojeni, Fosiforaasi ne Potasiyumu) mu ttaka era bigimusa n'okufukirira ebirime.

*Okukozesa ebigimusa eby'oluzzizzi obutaweera kuganyula kuti obulimi:*

- Kulongoosa n'okugimusa ettaka.
- Kukendeeza ensaasaanya y'ensimbi mu bulimi.
- Kyongerera abalimi okweemalirira mu byeetaago byabwe.
- Kukozesa ebyo ebiri ku ssamba n'obukugu bw'abalimi bennnyini.
- Kikuuma ebiwuka eby'omugaso.
- Kikuuma obutonde bw'ensi.
- Kikendeeza okukozesa eddagala ery'obutwa era nekiyamba embeera y'obulamu bw'abalimi.

*Engeri ebigimusa eby'oluzzizzi gyebikolwaamu:*

1. Temaatema obutundu bw'ebikoola ebirie by'enva, nga *Sesbania* ne *Tithonia*, ebiwotose.
2. Obutundu buno bupakire mu gguniya.
3. Egguniya gibbike mu pipa y'amazzi amayonjo nga bw'otabulira ddala.
4. Saanikira pipa eyo okumala ennaku 21.
5. Saabulula ekimmemmette kino n'amazzi nga buli liita yaakyo ogitabuza liita bbiri ez'amazzi.
6. Tabula ekigimusa kino mu ttaka elyetooolode buli kikolo ky'ekirime. Bw'oyiira ebirime obutereevu ebirime bisiriira.



Engeri ebigimusa eby'oluzzizzi gyebikolwaamu

### 3.2.6 Ebigimusa ebikolere mu binnya (composting)

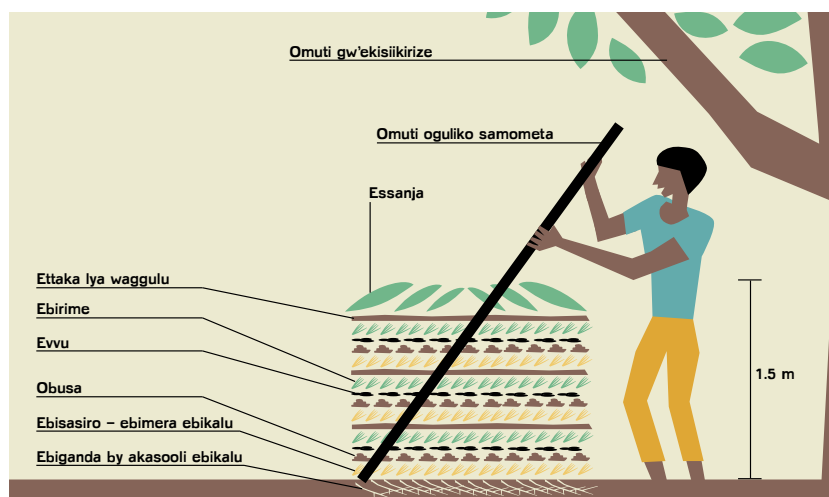
Ebigimusa ebikolerwa mu binnya nga tukozesa ebimera n'ebisasiro eby'enjawulo tubiyita "compost". Wano katubiyite kompositi. Kompositi akolebwa mu ngeri ya butonde ddala kubanga ava mu bikuta, bisusunku n'ebirara byetussula nga tukozesezza ebirime eby'enjawulo, ebyo byonna nga bigattiddwaako obusa n'ebirara ebivunda nebifuuka ekutundu ky'ettaka ekiyitibwa hyumaasi (*humus*). Okukola kompositi kyabbeeyi ntono ddala ate nga ekigimusa ekivaamu kirimu ebiriisa bingi eby'ebirime. Kompositi mulungi nnyo okukozesa okugimusa ettaka mu kifo ky'ebigimusa ebigule. Hyumaasi kye kitundu ky'ettaka lya waggulu ddala era mu nsi yonna ly'erisinga okutwaalibwa mukoka.

*Engeri entuufu kompositi gy'akolebwaamu mu kinnya:*

1. Sima ekinnya mu kisiikirize oba mu kidaala.
2. Ekinnya kibe kya mita 1.5 mu bugazi ne 0.5 – 1 m okukka wansi.
3. Kabalakabala ettaka ly'omwaaliro gw'ekinnya kino 30 cm okukka wansi. Ettaka lino lifukirire amazzi.
4. Suula ebisasiro mu kinnya ekyo nga obisengeka mu masa.
  - **Essa erisooka wansi:** Teekamu ebisasiro ebigulumidde 30 cm naddala ebisusunku obutitiriri bw'ebimera nga kasooli, omuwemba oba obulo.
  - **Essa eryokubiri:** Teekamu ebisubi ebikalu bigulumire 15 cm.
  - **Essa eryokusatu:** Teekamu obugulumivu bwa 15 cm obw'ebikoola ebibisi, okugeza nga eky'ebijanjaalo oba eby'emit.
  - **Essa eryokuna:** Yiwamu obusa ne kalimbwe nga bya bugulumive bwa 10 cm.
  - **Essa eryokutaano:** Mansamansiraki ettaka eyawaggulu; oba kisoboka, mansaako evvuly'emit.
5. Fukirira amasa gano oluvannyuma ddamu emirundi esatu emitendera gye gimu egy'amasa nga bwetulaze.
6. Fumita obuti obukunaamiridde 450 mu kompositi obukozese okukutegeeza nga kompositi atandise okukala oba okubibirira ekiyitiridde.
7. Oluvannyuma, yiwa ettaka n'ebisubi ku kompositi bimubikke aleme kukala.
8. Leka kompositi mu kinnya okumala ennaku 21 olwo omusime omukozese nga ebigimusa.

### 3.2.7 Okukozesa ebigimusa ebigule (ebitava mu bintu biramu)

Ebikolo by'ebigimusa ebitali bya butonde ye Fosiforaasi ne Nayitulojeni. Emu bukodyo bw'okuddaabiriza ettaka oba okugimusa kwe kulyongeramu Fosiforaasi ne Nayitulojeni nga biri mu bigimusa ebigule (ebiva mu makolero). Ebigimusa ebitava mu bintu biramu biva mu ttaka eriva mu birombe. Ebiriisa ebibirimu mummuka mangu mu mazzi ebirime nebisobola okubinuuna mu ttaka. Wabula, kikulu nnyo okumanya n'kujjukira nti ebigimusa bino kubwaabyo byokka tebimala kugimusa ttaka kimala n'okulikuuma nga ggimu.



Kompositi engeri gy'akolebwaamu

*Obuzibu obuli mu kuzozesa ebigimusa ebigule mu maduuka:*

- Okulozesa ebigimusa ebyo obutaweera kuleeta ebizibu nga bino:
  - ebigimusa ebiva mu bisasiro okuvunda bikendeera nnyo mu ttaka (ofiirwa 65% oluvannyuma lw'emyaaka nga 8 nga okozesa ebigimusa ebyo),
  - ettaka lifuuka lya lunnyu,
  - ebigimusa ebyo byongera emikka egibuguumiriza ensi (okugeza nga nayitulose okisayidi – “nitrous oxide”, ne kaaboni dayokisayidi).
- Bya beeyi ya waggulu.
- Bivaamu emikka egibuguumiriza ensi (okugeza, nayitulojeni okesayidi, ate byetaagisa amafuta g'emmotoka okubijja mu makolero n'amaduuka okubituusa ku ssamba.

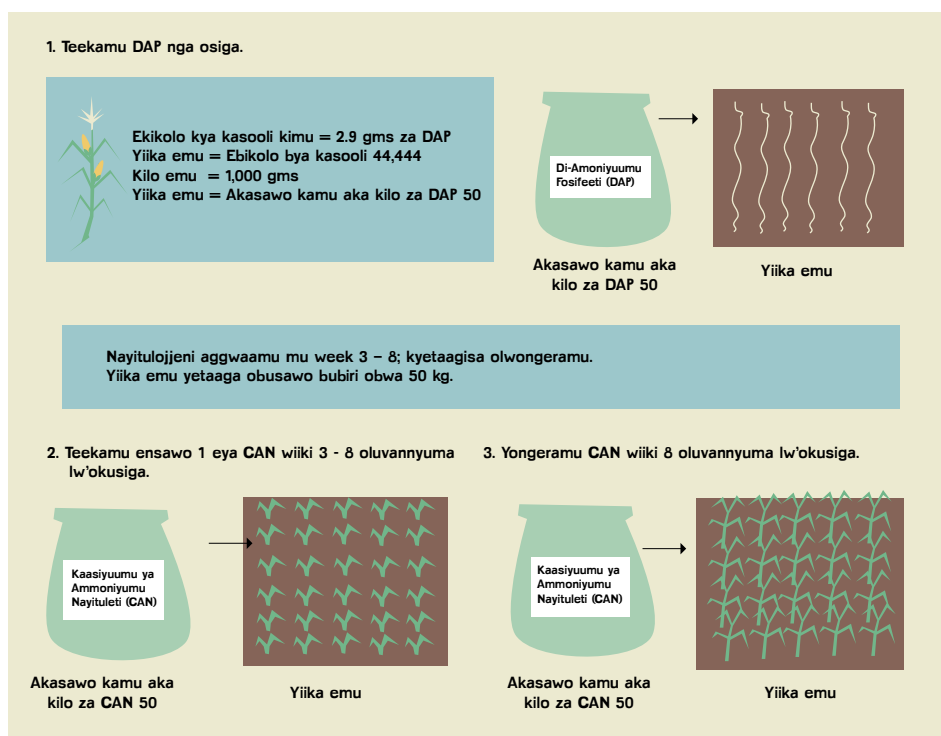
Bino  
birowoozeeko

**Okukozesa ebigimusa ebitali bya butonde ekiyitiridde kyongera kunkyuukakyuuka mu mbeera z'obudde era kuyinza okuba eky'akabenje ku ttaka.**

*Eby'okulabirako by'ebigimusa ebitali bya butonde:*

| EKIGIMUSA                                                                                            | EBIKOLO                                                                                                 | ENKUZESA YAAKYO                         |
|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Di-Amoniyumu<br>Fosifeeti (DAP)                                                                      | 18% Naitrojeni ( $\text{NH}_4$ - naitreti)<br>46% Fosiforaasi ( $\text{P}_2\text{O}_5$ )                | Nga osiga                               |
| Nayitulojeni<br>Fosiforaasi,<br>Potasiyumu (NPK)                                                     | Ebitundu 21 ebya Naitulojeni<br>Ebitundu 21 ebya Fosiforaasi<br>Ebitundu 17 ebya Potasiyumu             | Nga osiga; okumansa owetooloola ebirime |
| Kaasiyumu ya<br>Nayituleeti wa<br>Amoniya (CAN)                                                      | 26% Nayitulojeni ( $\text{NH}_4 + \text{NO}_3$ )<br>Yureya (45 – 46% Nayitulojeni<br>( $\text{NH}_4$ )) | Okumansa owetooloola ebirime            |
| Ebigimusa bino bimmuka mangu mu mazzi era bwe bitabulwa mu ttaka erinnyuukirivu lwe bisinga okugasa. |                                                                                                         |                                         |

Eigimusa bino bimmuka mangu mu mazzi bikoze mu ttaka erinnyuukiridde.



Enkozesha y'ebigimusa ebitali bya butonde

**Kino Kikulu:** Ebigimusa ebitali bya butonde bisinga kukozezebwa mu ttaka eririna ebiriisa eby'obutonde oba kaaboni (*carbon*).

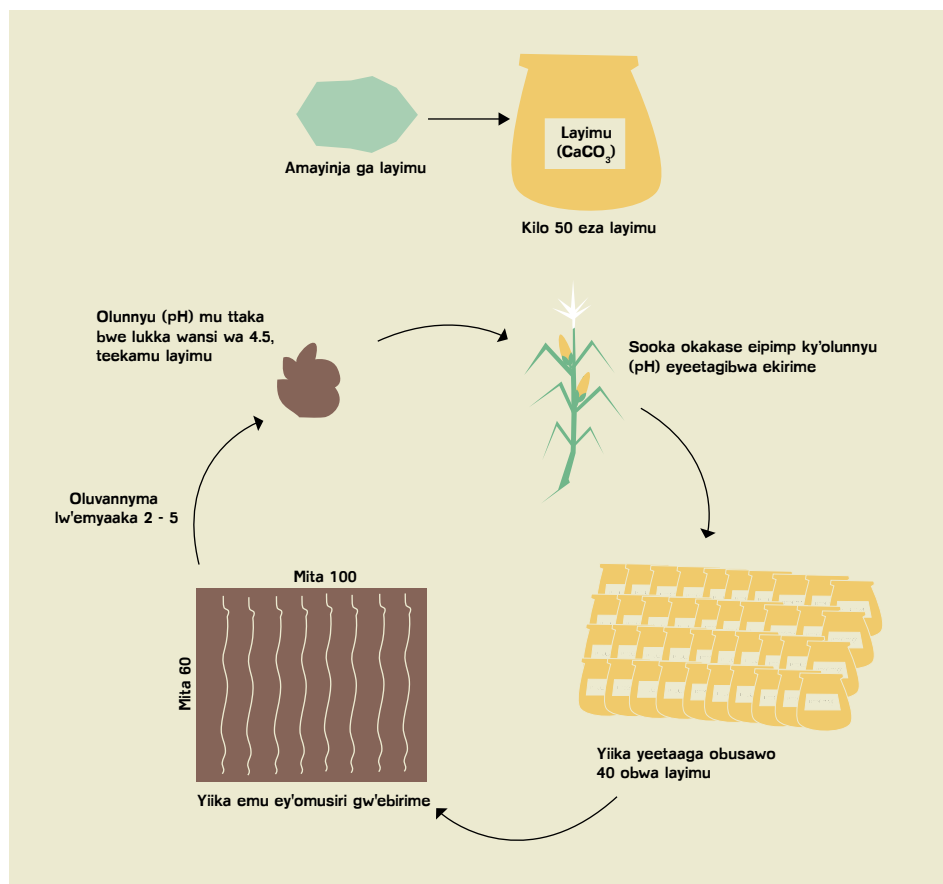
### 3.2.8 Olukozesa ekigimusa kya layimu (*lime*)

Oluusi ettaka lufuuka lya lunnyu olw'okukozesa ebigimusa ebigule ekiyitiridde, okulima ekirime ekimu obutaweera, n'okukendeera kw'ebiriisa eby'obutonde mu ttaka. Engeri emu ku ezo ezinga okukozesebwa okulwaanisa olunnyu lwe kwongera layimu mu ttaka amakungula gasobole okweyongera. Kyokka buli kirime kirina ekipimo ky'omunnyu gw'ettaka kyaawufu kye kyetaaga.

*Enkozesha ya layimu entuufu*

1. Ekipimo ky'omunnyu mu ttaka ekitweetaagisa okukozesa layimu kiri 4.5 pH n'okukka wansi.
2. Layimu ossibwa mu ttaka oluvannyuma lw'okukabala oba okulima obulungi.
3. Teeka layimu mu ttaka wiiki emu nga tonnasiga oba nga osiga.
4. Kozesa tani (*tonnes*) 2 oba 3 eza layimu mu yiika emu oba bbiri.
5. Teeka layimu mu ttaka buli myaaka egiva ku ebiri okutuuka ku etaano nga osinziira kubungi bw'omunnyu mu ttaka.

Bw'okozesa layimu kirungi okusiga kasooli, oba omucheere, oba omuwemba, obulo, enng'aano.



Enkozesha ya layimu (Lime)

Layimu tasangika mangu mu maduuka. Olina okumilagiriza mu bitongole by'eby'obulimi buli lw'metaaga.

**Kino kikulu:** Layimu agula buwanana; abalimi ba bulujje tebasobola bbeeyi ye. Layimu alina okukozesebwa eteeka kuba mutono ddala.

### AKAGEZO AKAMPIMPI

1. Kiriisa ki ky'olaba nga kibula mu ssamba yo? (Ekibuuzo kirondoola ebyokuntandikwa y'essomo lino).
2. Jjaye maapu gyewakubye emabegako. Kwaata ki zewandisiimye mu kukuuma obulingi ebiiriisa mu ttaka ku ssamba yo? (Laba obukodyo bwe twayogeddeko waggulu).

## 4. Okukuuma n'okutaasa ettaka n'amazzi

### Ennyanjula

Okukuuma n'okutaasa amazzi obulungi kidaabulula ettaka era nekyongera amakungula mu ngeri empangaazi. Ekigendererwa ky'essomo lino lwe kussa essira ku bukodyo bw'okukuuma n'okutaasa ettaka n'amazzi, okukakasa nti ettaka lilina amazzi agamale ebbanga lyonna era n'okuziyiza mukoka okutwaala ettaka oba ettaka lyennini obutagonnomoka, n'ebiriisa obutaggwa mu ttaka

### Essomo lino lyetaagisa essawa 8

Obukodyo bwa SALM obw'okukuuma n'okutaasa ettaka n'amazzi buli mu matuluba amagazi ana. Obumu ku bukodyo buno buttotoledwa mu ssomo lino.

|                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>OBUKODYO<br/>BW'OKUKUUMA<br/>N'OKUTAASA<br/>AMAZZI<br/>G'OMUTTAKA</b>         | <ul style="list-style-type: none"><li>• Amadaala g'obukiika bw'obuserengeto.</li><li>• Ebigulumu ebyetoolodde obusozi.</li><li>• Bupuloti n'obukutu.</li><li>• Ebigulumu ebiringa ebitundu by'enkukungo nga bikwaataganye.</li><li>• Ennyirir z'ebisasiro.</li><li>• Emikutu egikyaanya amazzi okuva ku myaala n'ebinnya ebiregamamu amazzi gano.</li><li>• Ebinnya ebineneko ebitega amazzi.</li><li>• Okusima ebinnya ebizaziko era nga biwanvuko ebisimbibwaamu ebirime.</li><li>• Ebinnya eby'obukiika.</li><li>• Ebigulumu eby'obukiika ebyawudda obuwonko obulimu obwaala omukulukutira amazzi obisimba bw'akaserengeto.</li><li>• Ennyiriri z'omuddo ez'obukiika.</li><li>• Okufukirira ebirime (<i>Irrigation</i>).</li></ul> |
| <b>ENNEMBEKA Y'AMAZZI<br/>G'ENKUBA</b>                                           | <ul style="list-style-type: none"><li>• Okulembeka mu kisasi.</li><li>• Okutega amazzi ku ttaka ne ku njazi.</li><li>• Ettaka (<i>ground</i>) eritaseetedde.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>ENTEREKA Y'AMAZZI<br/>AWATATIIRIIKA<br/>(<i>impermeable<br/>surfaces</i>)</b> | <ul style="list-style-type: none"><li>• Ttanka.</li><li>• Ttanka za sseminti mu ttaka wansi nga za enjuuyi ssatu (<i>triangular</i>).</li><li>• Ebitaba.</li><li>• Ebidiba.</li><li>• Daamu.</li><li>• Enzizi ne nnayikondo .</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>OBUYONJO<br/>N'EBY'OBULAMU<br/>EBY'EMITINDO<br/>GY'OBUWANGAAZI</b>            | <ul style="list-style-type: none"><li>• Obuyonjo bw'ebitundu by'obutonde bw'ensi (<i>Ecological sanitation</i>).</li><li>• Amazzi mu mafumbiro.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

### 4.1 Obukodyo bw'okukuuma n'okutaasa amazzi g'omuttaka

#### 4.1.1 Obubalaza

Okutema obubalaza obusengekeddwa ng'amadaala kukendeeza oluyinringito lw'obuserengeto mu nnimiro. Buli kabalaza kaba ka bukiika bw'akasozi era kakugirwa n'ettaka. Okukendeeza oluyinringito kikendeeza emisinde gya

mukoka – naddala mu nsozi – ekyo nekikendeeza ettaka olutokomoka ne mukoka. Ate, n'amazzi gayingira mango mu ttaka nelinnyikira n'ebimera nebiganyulwa mu nkula yaabyo.

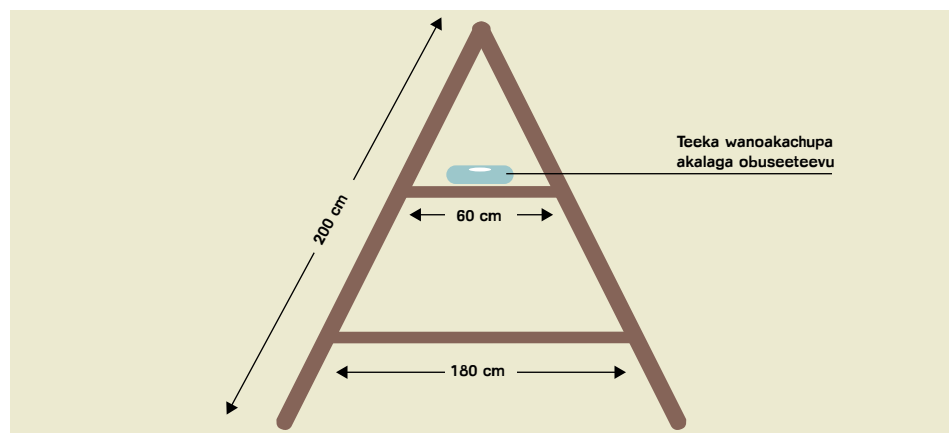
## AKAGEZO AKAMPIMPI

**Engeri ki z'oyinza okukendeezaamu embiro za mukoka mu nnimiro eziri ku buserengeto?**

### *Ffulemu ya A*

Obubalaza bukolebwa ku buserengeto nga okozesa obubaawo oba obutayimbwa obugattiddwa awamu okufaanaa ennukua 'A'. Obubaawo obwo okubukola weetaaga:

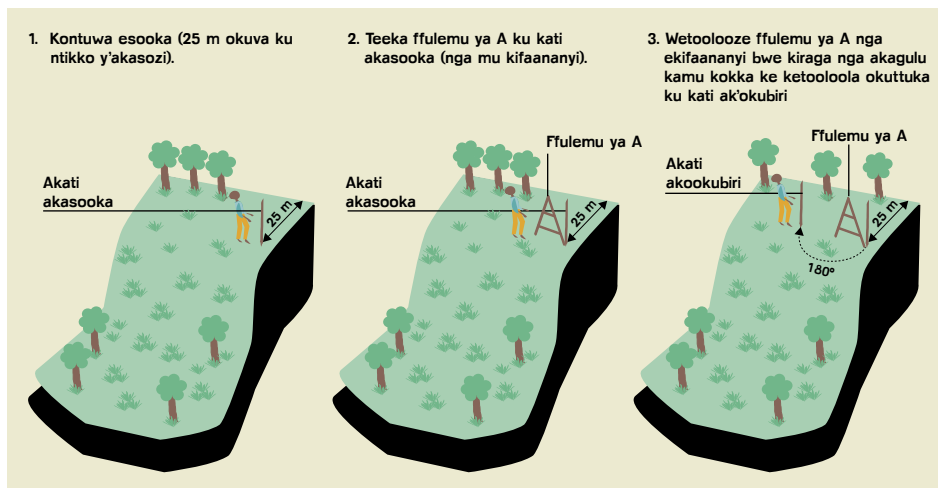
- Obubaawo oba obutayimbwa bubiri obobutereevu nga bwa 200 cm obuwanvu.
- Akabaawo aka 180 cm.
- Akabaawo aka 60 cm.
- Akabaawo k'ababazimbi akalimu ettonde ly'amazzi, oba ettonde. ly'amazzi mu luseke lwa pulasitiiki, okukulaga nti obubaawo buteredde nga museetwe (*level*).
- Obusumaali okukwaataganya obubaawo.



Ffulemu ya 'A'

*Okulagirira: Obubalaza n'ebigulumu mu bukiikabw'obuserengeto bikolebwa buti ne ffulemu ya 'A':*

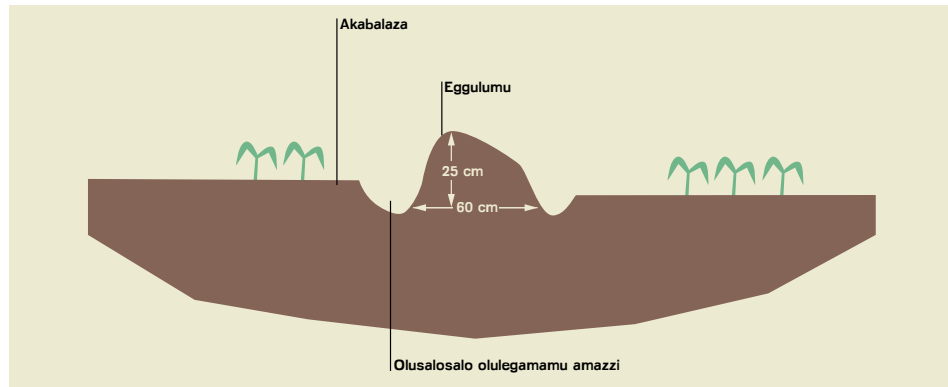
1. Weetaaga obuganda bw'obuti bw'onakozesa okulamba ennyiri ebigulumu byezinaagoberera
2. Lambula essambayo ngabw'lamba ebitundu eby'oluyiringito olwesulise ennyo. Akabalaza akasooka kakole waggulu ddala w'akaserengeto.
3. Kuba olunyiriri ku ttaka nga lulamba ebitundu ebiri waggulu ekyenkanyi (*same altitude*) oba metre 25 okuva ku ntikko y'akasozi. Teeka akati akasooka mu kifo ekisooka ku ntandikwa y'essamba yo. Teeka ffulemu ya A awo wennyini. Kyuusa ffulemu ya A ngaekifananyi ekyo wansi bwekiraga.



Enkozesha ya ffulemu ya A okuzimba obubalaza ku kaserengeto

4. Teeka akagulu ka ffulemu ya A mu kifo kimu okakwaatirewo tekavaawo. Kati wetoolooze akagulu akalala okutuuka ku kati akaddirira ku diguli 180 (180°) nga bw'okakasa nti akabaawo akaliko akaseke katereeredde ddala (*level*).
5. Kino kiddemu nga bw'yongera okusimba obuti mu ngeri y'emu okutuuka ku nkomerero y'essamba.
6. Olunyiriri lw'okubye nga okozesa ffulemu ya A lulamba ebitindu ebiri ku buwanvu obumu waggulu lwetuyita kontuwa (*contour*). Seeteza obutundu bwa kontuwa zonna. Ekyo kijja lwanguya okukukabala ng'okozesa enkubi esikibwa ekisolo (*ploughing*).
7. Kabaza enkumbi eyo nga ogoberera kontuwa zewakubye. Ettaka bweriba ery'ulubumba, kabala emirundi ebiri ku buli ludda lwa kontuwa. Mu ttaka ery'olusenye kabala emirundi esatu n'okusingawo. (Osobola n'okusima ekinnya ekitega amazzi).
8. Ettaka ery'ebali wa kontuwa lisene oliyiwe ku kontuwa yennyini.
9. Kontuwa zirina okubeera 60 cm mubugazi, ne 25 cm mubuwanvu bw'ekinnya.
10. Ettaka bwe liba ery'ulubumba, teweetaaga kukomerera ttaka lyekwaate. Ery'olusenye lyo lilina okukomererwa lyekwaate bulingi.
11. Ku buserengeto obwoluyiringito oluyitiridde, obubalazabulina okubeera okumu (obufunda). Ku buserengeto obutakutamyee nnyo, obubalaza bulina okwawulwa 15 m.
12. Siga ebirime ku bubalaza obugendana (*parallel*) n'ensalo za kontuwa. Oyinza n'kusimba eisubi oba emitu ku bigulumu bya kontuwa.
13. Kusinziira ku mbeera y'ebitundu ("*agro-ecological zones*" mu ssomo 2) by'essamba, oyinza okuziba e mikutu gya kontuwa amazzi galegame n'ettaka linnyikire, oba obutaziba amazzi gakulukute gakendeere mu ssamba.

Ebigulumu bya kontuwa kyetaagisa okubirabirira n'okubiddaabiriza okumala emyaaka ebiri egisooka. Kya bwegendereza nnyo era kirungi okwongera ebigulumu bino okubugumya nga biteekebwaako amayinja ku busolya bwaabyo.



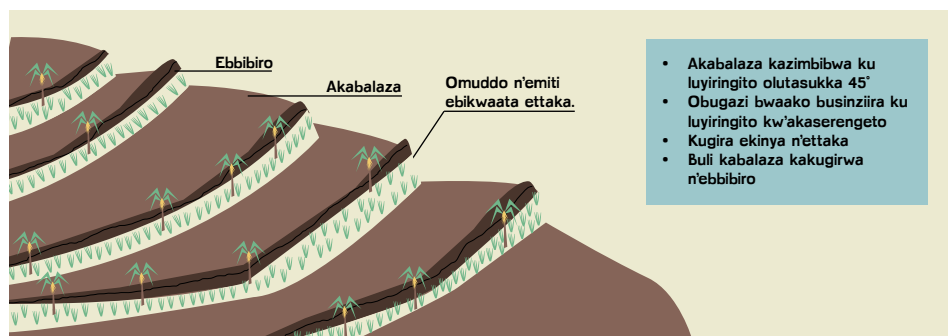
Enzimba y'ebigulumu bya kontuwa (*contour bunds*)

Laba video eraga ebikwaata ku bigulumu bya kontuwa ku muko gwa Intaneti (*Internet*) guno: <http://www.accessagriculture.org/node/511/en>

#### 4.1.1.1 Ebika by'obubalazaobutaasa ettaka ku buserengeto (*terraces*)

##### a. Obubalaza obw'amadaala (*bench terraces*)

Obubalaza buno buba bwa museetwe omutereevu oba buyinza okwewunzikako akatono (Bulabika nga amadaala mu nnyumba). Ebitundu byaabwo eby'omuseetwe mwe mulimibwa ebimera ebikuuma n'okutaasa ettaka; oky'okulabirako, emiddo egy'enjawulo oba ebijanjaalo. Ebimera bino biwamba mangu amazzi agakulukuta n'ebiriisa byegatwaala. Omuddo guliibwa ebisolo by'omulunzi. Kiyamba nnyo okulima omuddo n'ebisagazi ku ddaala ly'obubalaza erisembayo wansi.



Enzimba y'obubalaza obw'amadaala ku kasozi (*bench terraces*)

##### b. Obubalaza bu “*Fanya juu*”

“*Fanya juu*” (*Swahili*), mu njogera y'obulimi, kitegeeza kuyiwa ttaka mu mambuka. Okukola obubalaza buno, sima ekinnya nga bw'oyiwa ettaka ku luuyi olwawaggulu likole ekigulumu eky'obukiika. Ekinnya kitega amazzi nekigasobozesa okukka mu ttaka empolampola. Ekugulumu ky'bukiika kiziyiza ettaka okukulugguka. “*Fanya juu*” zitera okukozesebwa mu bitundu eby'ensozi “*terraces*”. Kya bwegendereza nnyo era kirungi okwongera ebigulumu bino okubugumya nga bitekebwaako amayinja ku busolya bwaabyo.

1. Sima omukutu mu bukiika bw'akaserengeto, nga bw'oyiwa ettaka waggulu waako likole ebbibiro lya sentimita 40 okutuuka ku 50 mu bugulumivu.
2. Emikutu gino giyinzira okuwaawulwa mita 10 okutuuka ku 20, okusinziira ku luyiringito lw'akaserengeto.
3. Ebisubi oba oba obuti bitera okusimbibwa ku bigulumu bino okubinyweeza, okugeza nga ebisagaze (mu bitundu by'enkuba ennyingi). Mu mukutu muyinza okusimbibwamu ebitooke.

The diagram illustrates a traditional Zulu beehive structure, which is a large, dark brown, rounded mound. The structure is composed of several parts, each labeled with Zulu and English text:

- Ebbibiro**: The top of the structure, which is the entrance to the hive.
- Kugira n'ebbibiro**: The area immediately below the entrance.
- Olunnya (mpangi)**: The main body of the structure.
- Akabalaza**: The base of the structure.

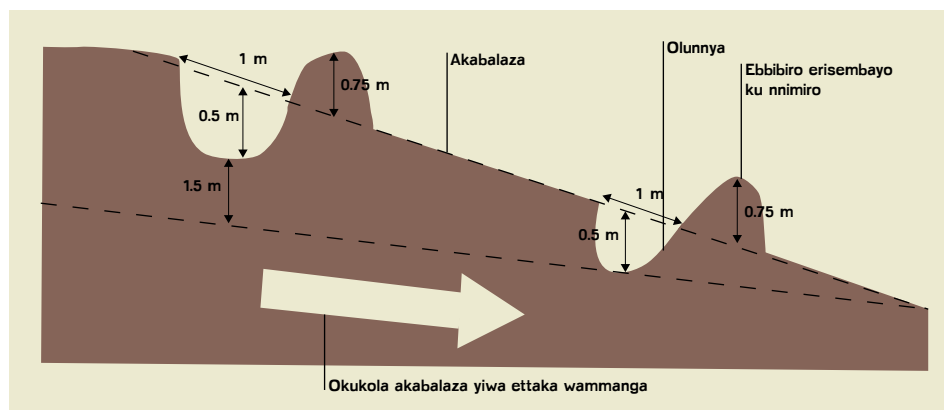
Dimensions and measurements are indicated by arrows:

- The height of the top section is **40 - 50 cm**.
- The height of the main body is **40 - 50 cm**.
- The width of the base is **10 - 20 m**.

A large white arrow points from the base towards the entrance, labeled **Okukola akabalaza, yiwa ettaka waggulu**, which translates to "To go to the base, go to the top of the hill".

Laba video eraga ebikwaata ku fanya juu ku muko gwa Intaneti (*Internet*)  
guno: **<http://www.accessagriculture.org/node/511/en>**

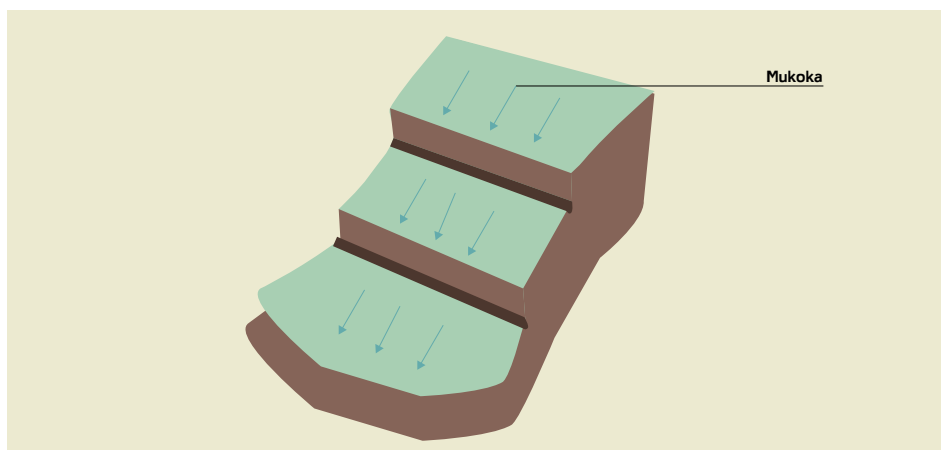
*“Fanya chini” (Swahili)*, mu njogera y’obulimi, kitegeeza kuyiwa ttaka mu maserengeta. Okukola obubalaza buno, sima ekinnya nga bw’oyiwa ettaka ku luuyi olwawansi likole ekigulumu eky’obukiika. Simba emiti oba emmere y’ebisolo ku busolya bw’ebugulumu ebyo. Bulu kabalaza ka *“fanya chini”* kakugire n’ekigulumu mu maserengeta gaako. Obubalaza bu *“fanya chini”* butera okukozesebwa mu bitundu ebya wansi ebirina oluyiringito olusaamusaamu.



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#### d. Obubalaza omulegamye amazzi (*water terraces*)

Obubalaza buno buzimbibwa mu bitundu ebitera okulumbibwa amataba. Buyamba abalimi okukugira amazzi agawagudde mu bungi nga bukendeeza emisinde gyaago, ssinnakinddi n'okukyuusa gyegalaga. Obubalaza obulegamamu amazzi bufaanana n'obw'amadaala (*bench terraces*), naye buli tebulina bugulumu bya bukiika kuziyiza mazzi. Mu kufo ky'ebugulumu obukutu busimibwa wansi (*under*) w'akabalaza okuwamba amazzi agakulukuta.



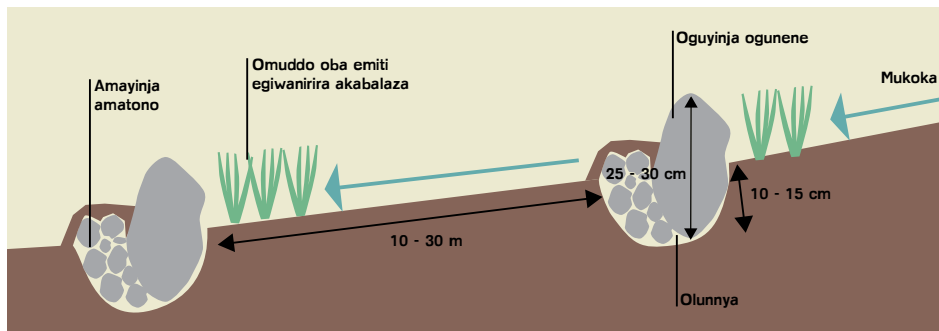
*Engeri gyotemamu ensalosalo ez'amazzi*

#### e. Obubalaza bwamayinja (*stone terrace*)

Ku bubalaza buno amayinja gakozezebwa okuzimba ebikugiro ebinyweevu ku buserengeto obw'oluyiringito oluyitiridde. Obubalaza obw'amayinja busobola okukendeeza embiro z'amazzi, okwongera ebipimo by'amazzi agayigira mu ttaka, kino nekiyamba obulimi n'kwongera makungula mu bitundu ebikalu ne mu malungu. Okukozesa obubalaza buno ku buserengeto obw'oluyiringito olusaamusaamu kiyaamba nnyo mu ntega y'amazzi n'okulima ebirime ebiwerako mu myaaka gy'enkuba ey'ekkekwa

*Okulagirira: Enzimba y'obubalaza obw'amayinja*

1. Ojja kweetaaga amayinja amanene n'amatono (obugulumivu 25 cm – 30 cm), okusinziira ku bugazi bw'ettaka lya n'obunene bw'akabalaza.
2. Sima emikutu, 10 – 15 cm mu buwanvu wansi (*depth*). Emikutu gyesuule 15 – 30 m.
3. Yiwa amayinja amanene mu mikutu.
4. Kuludda olutaakugire mazzi yiwayo amayinja amatono gawanirire amanene.
5. Waggulu ne mu massekati g'amayinja amatono yiwamu enfuufu oba ettaka eryawaggulu erisobola okusaasaanyizibwa amazzi g'enkuba.
6. Simba emiti oba ebisubi ku mbalama za buli kabalazai bikawagire.



Enzimba y'obubalaza obw'amayinja

Laba video y'obubalaza buno ku muko gwa Intaneti:

<http://www.accessagriculture.org/node/891/en>.

#### 4.1.2 Ebigulumu/bikugiro by'obukiika oba okulima obukiika (*contour bunds/contour farming*)

Mu nnima eno, omulimi akabala, n'asiga era n'akoola nga adda mu bukiika bw'akaserengeto, mu kifo ky'okulima nga akkirira. Ennyiriri za kontuwa (*contour*) zirambulukuka mu bukiika nga buli lumu lugatta ebifo ebiri ku bugulumugu/obuwanvu obwenkanankana (*same altitude*), mukifo ky'okukkirira oba okwambuka. Kontuwa nga bweyerambulula mu bukiika bw'akaserengeto, oja kulaba nti zeefutise nnyo mu bitundu eby'oluyiringito oluyitiridde ate nga zeesambyemu bitundu eby'olusaamusaamu. Ennima eno

**Okunoonyereza kwa bakakensa (*experiments*) mu nnimiro n'amasamba kwalizuula nga ennima y'obukiika ekendeeza mukoka okutwaala ettaka ekitundu kimu kyakubiri (50%). Wabula, ku buserengeto obwusukka diguli 50 (50°), okulima obukiika kulina okukozesebwa wamu n'obukodyo obulala obutaasa ettaka okusobola okuganyula obulimi.**

Wali okimanyi?

Ebikugiro by'ettaka byomunnima y'obukiika bigulumu bya lubeerera ebizimbibwa nga tuyiikuula ettaka okutondawo emikutu gy'obukiika nga gigoberera kontuwa ku buserengeto. Mu ndabika, ennima eno efaananako ne "*fanya chini*" (laba ekitundu 4.1.1.1, c wagguluko). Ennima eno ey'ebikugiro bya kontuwa esinga kuganzibwa mu bitundu by'ensozi n'ebikalu era esinga kukozebwa kulegama mazzi, kwongera ku mazzi agawambibwa okuva mu mukoka, kuziyiza ettaka okutwaalibwa mukoka n'okukendeeza amataba. Ebikugiro bya kontuwa bizimbibwa nga tukozesa ffulemu ya A (laa ekitundu 4.1.1 wagguluko).

**Kino kikulu:** Ebifunvu bya kontuwa bwebizimbibwa obubi mu ngeri etali ntufu biyinda okwogera ettaka okukulugguka ennyo ne mukoka.

## AKAGEZO AKAMPIMPI

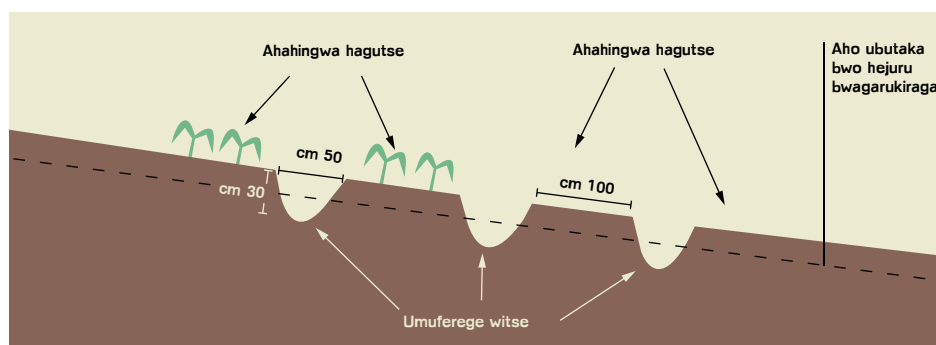
Weekenneenyo essamba oteebereze kontuwa wezinaayita.

Kinokyanguko bwemuba ababiri nga omu ayambaga omulala atambula okudda kuluuyi olulala olw'ennimiro egenda okukolebwaamu kontuwa.

Oyo atambula alina okugoba omusittale ogugatta ebifo by'obuwanvu (*altitude*) obumu n'ekifo omulala w'ayimiridde.

### 4.1.3 obubalaza obugazi n'obukutu obutono (*broad beds and furrows*)

Obukutu bwoogerwaako wano busimibwa wakati w'ennyiriri z'ebirime nga bufunda ate nga buzibikiddwa kunjuuyi zombi. Obukutu buno buwamba mukoka. Akamu bwekajjula amazzi nga gabundukira mukaddirira wansi. Wakatu w'obukutu wabaawo ebibangirizi eby'obukiika okuli ebirime. Obukutu bunobukola mu ngeri y'emu na buli obunnyikiza amazzi mu ttaka (*infiltration ditches*).



Enzimba y'obubalaza obugazi n'obukutu obutono (*broad beds and furrows*)

### 4.1.4 Ebikugiro by'ebitundu by'enkulungo (*semi-circular bunds*)

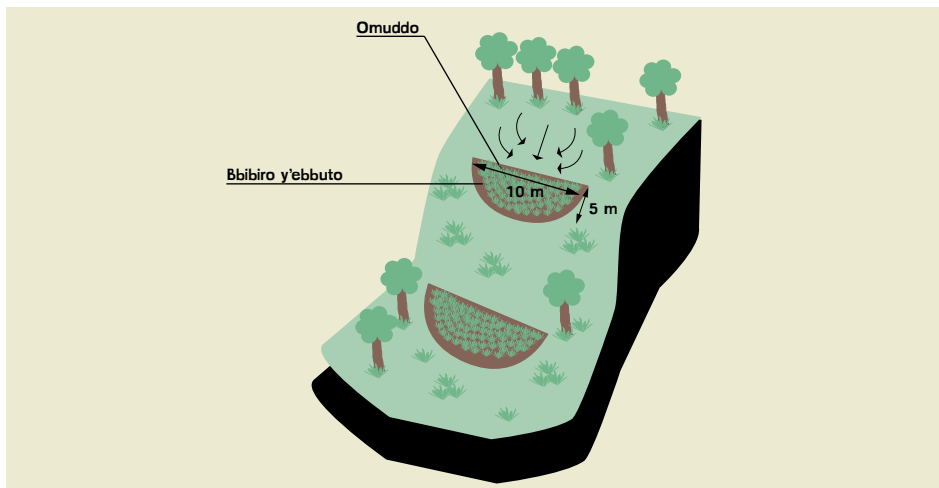
Okuzimba ebikugiro by'ebitundu by'enkulungo bino osima obunnya ku nkomerero ya kontuwa nga nabwo bwa bitundu bya nkulungo buli kami. Ebikugiro bino biyamba okutega n'okulegama amazzi n'okwngera ku bugimu bw'ettaka naddala bwetwongeramu ebigimusa.

Obunene bw'obuya n'enkuma oba ensaasaanya ya kontuwa bisinziira ku birime oba ennima ekozesebwa. Ebikugiro bizimbwa nga byesambye ku binnaabyo amazzi agabunduka okuva waggulu w'akasozi gasobole okulegama wansi w'akaserengeto. Ebinnya ebisimiddwa okusimbamu ebirime bijjuzibwamu ebigimusa ebitabuliddwaamu ettaka lya waggulu (*top soil*) okugimusa n'okuyamba ettaka okusigala nga linnyikidde okumala ekiseera.

Okulagirira: Ezimba y' ebikugiro bi nnabbuto (*by'ebitundu by'enkulungo*)

1. Ebikugiro bino bizimbiibwa ku buserengeto obw'luyiringito olusaamusaamu ddala (1 – 2%) mu bitundu by'enkuba eya wakati wa 500 mm ne 700 mm.

2. Lamba ebifo nga ogoberera kontuwa mu misittale egitalina busongovu (*smooth curved*) na gyawukanye 8 m – 50 m, ng'otandikira mu mambuka n'okuksinzira ku kipimo ky'oluyiringito.
3. Lamba ku nnyiriri ebitundu amazzi wegakwaataga (*affect*) n'ennimiro. Binoby'ebitundu ebikugiro mwebinaazimbwa.
4. Okuzimba ekikugiro, lamba obugazi (*radius*) okuva ku 6 m okutuuka 20 olyooke okole ekikugiro wansi w'omusittale ogwo nga kya kitundu kya nkulungo. Okuva ku kikugiro ekimu okutuuka ku kirala lekawo 3 m – 30 m.
5. Munda y'enkulungo ez'ekitundu ky'nkulungo z'olambye simamu ebinnya nga ettaka bw'oliyiwa emaserengeta, likole ekikugiro ekiri nga ebbuto.
6. Ebinnya ebyo bbijjuzeemu oluyinja ate osimbe emiti oba obusaka kumikugiro gyaabyo ate munda mu kinnya ky'oziise osimbemu emmere y'ebisolo n'obuti okukuuma obugimu bw'ettaka nga ebizibizi mu bire by'enkuba ennyingi ennyo.
7. Munda mu binnya oyinza okusima emikutu egya 1.5 m obugazi n'obusimba bwa 0.5 m okubittululamu amazzi agayiritidde enkuba bw'etonnye ennyingi.

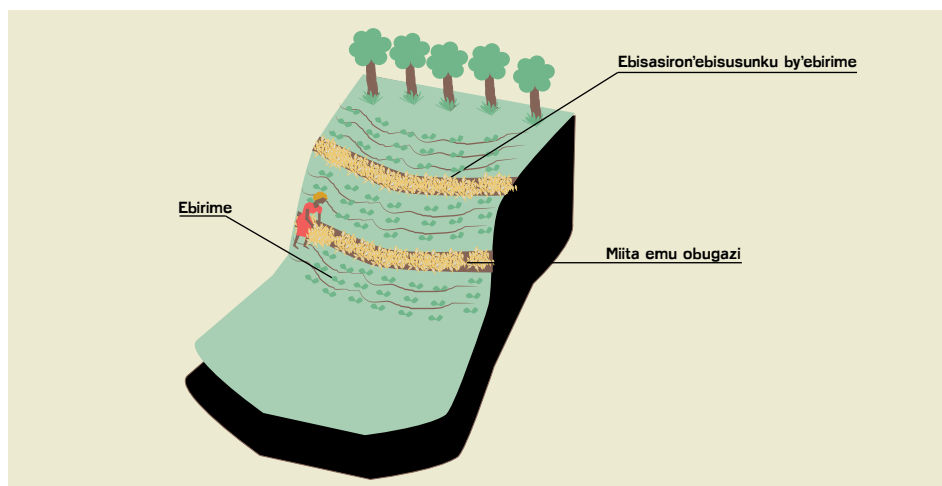


Ezimba y' ebikugiro by'ebitundu by'enkulungo (bi nnabbuto)

Laba video ku: <http://www.accessagriculture.org/node/903/en>

#### 4.1.5 Ennyiriri z'ebisasiro (*trash lines*)

Ennyiriri zino zizimbibwa bukiika bw'obuserengeto nga okozesa obutabi/ obutitiriri n'ebisusunku by'ebirime (naddala ebya kasooli, obulo, omuwemba) ebyakungulwa omwaaka oguyise, ebisubi, ebisasiro by'awaka, n'ebirala. Ennyiriri ezo ziziyiza mukoka okutwaala ettaka era zongera amazzi okunnyikira mu ttaka. Zizimbibwa nga za metre nga emu obugazi.

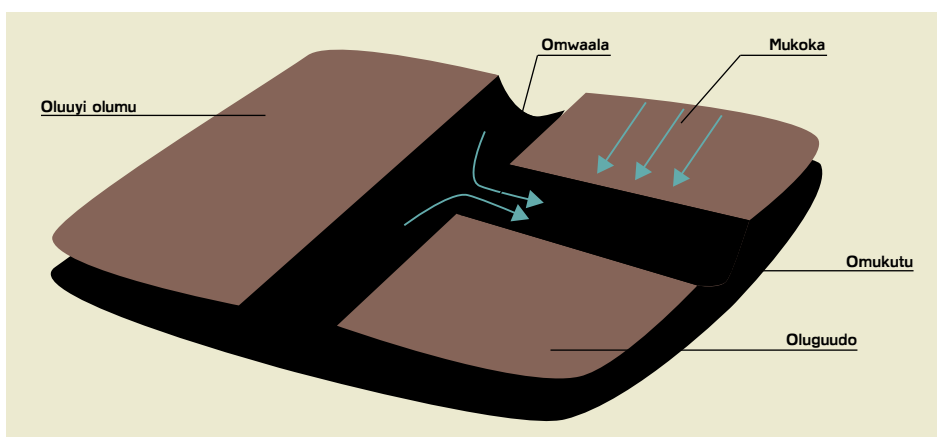


Enzimba y'ennyirir z'ebisasiro (*trash lines*)

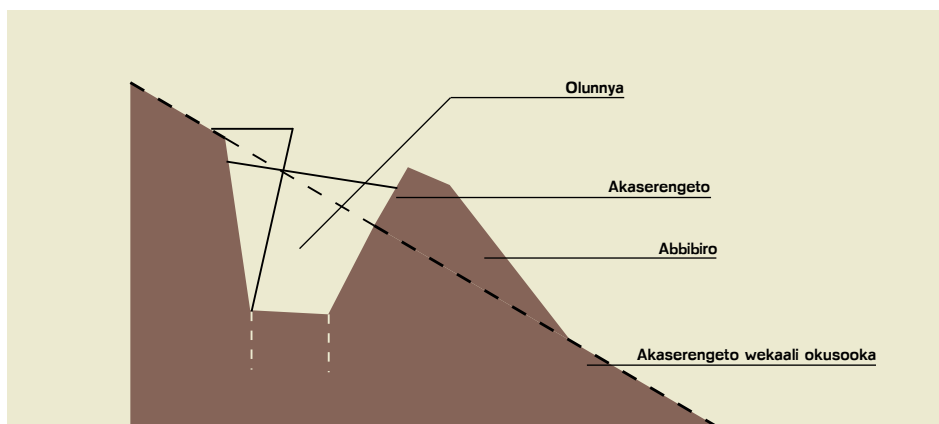
#### 4.1.6 Emikutu egikyaamyamazzi okuva ku myaala n'ebinnya ebibundula amazzi (*diversion ditches and cut-off drains*)

Omukutu ogw'ekika kino (*diversion ditch*) gwewunzika okuva ku mwaala oba ekinnya kya mukoka (*gully*) negwolekera ekifo ekituufu okulegamyamu amazzi oba negutwaala agamu ku mazzi mu misiri okufukirira ebirime. Enkula y'emikutu gino ya bika ebiwerako.

Ebinnya ebibundula amazzi (*and cut-off drains*) byo biwamba amazzi gonna agajjira mu mikutu gyetwoogeddeko wano. Oluvannyuma, amazzi ago gasaasaanyizibwa obukutu obutono obugatwaala ku myaala gy'emigga oba awalala, olwo ebitundu eby'amaserengeta ne bizibirwa ettaka lyaabyo nebitatwaalibwa mukoka. Ebinnya ebyo biyinza okuzimbibwa mu ttaka, amayinja oba ebintu ebirala okusinziira ku bosobozi n'obweetavu bw'omulimi.



Enzimba y'emikutu egikyaamyamazzi okuva ku myaala (*diversion ditches*)



Ebinnya ebibundula amazzi (cut-off drains)

#### 4.1.7 Ebinnya ebiregamwaamu amazzi (*Retention ditches*)

##### a. Ebinnya ebya kontuwa ebikulukusa amazzi (*Contour drainage ditches*)

Ebinnya bino bizimbibwa bukiika bwa buserengeto ngabulondoola kontuwa. Biyamba amazzi agayitiridde mu nnimiro. Bwebiba nga bizibikiddwa ku nkomerero zaabyo zombi biregamya amazzi negakozesebwa oluvannyuma mu bitundu by'ennimiro eby'emaserengeta g'obusozi. Bikomya amazzi okukulukuta obutereevu mu busimba bw'obuserengeto. Kano kekamu ku bukodyo obusinga okukozesebwa abalimi ababulijjo ab'ennimiro entonotono (*small-holders*) mu bitundu by'ensozi kubanga okuzimba lwa layisi okusinga okw'obubalaza obw'amadaala ate bwangu okuzimba. Era bukendeeza mukoka. Bikiyamba amazzi agaba gayitiridde mu nnimiro ne mu myaala. Buziyiza n'ebiriisa mu ttaka okukka wansi ennyo mu ttaka emirandira gyegitatuuka. Ekinnya ekisooka waggulu ku kasozi (*storm water drain*) kya mugaso nnyo amazzi agava mu misiri egiri waggulu bwegaba amangi ekiyitiridde.

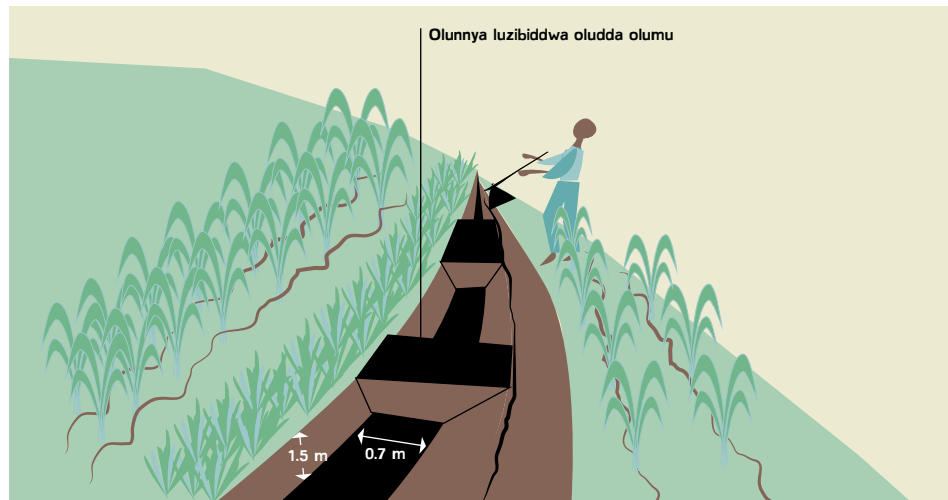


Enzimba y'ebinnya bya kontuwa ebikulukusa amazzi (*Contour drainage ditches*)

##### b. Ebinnya bya kontuwa ebiyingiza amazzi mu ttaka (*Contour infiltration ditches*)

Ebinnya bino mikutu emimpi oba obunnya obusimiddwa mu lukala olugoberera kontuwa ne waggulu ku busozi okuva ku misiri gy'ebirime.

Amazzi gakyamisibwa okuva mu myaala egiri mu mabbali g'enguudo negatwaalibwa mu binnya bino ebizibikiddwa ku nkomerero yaabyo. Amazzi agaligama mu binnya ebyo gayingira mpolampila mu ttaka.



Enzimba y'ebinnya bya kontuwa ebiyingiza amazzi mu ttaka

#### 4.1.8 Ebinnya omusimbibwa ebirime (*Pitting*)

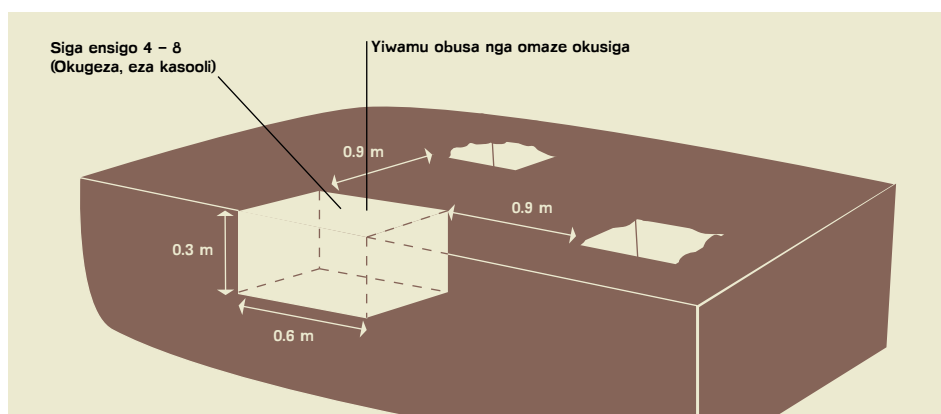
Pittingi y'enkola y'okusima ebinnya nebisimbibwaamu ebirima ebitali bimu; okugeza nga ebitooke, emmwaanyi, chai, ebimera by'empeke kasooli, obulo n'ebijanjaalo. Ekinnya nga ekyo kikola nga omulembeko n'eterekerero ly'amazzi n'ebiriisa by'ebirime mu ttaka. Ebigimusa eby'enjawulo bitabulwa mu ttaka ly'ebinnya bino obugimu bwaabyo buwangaale. Osobola n'okusiga ebirime eby'enjawulo mu binnya ebyo buli mwaaka. Ennimitiro emu etera okusimibwaamu ebinnya bino nga bingi, nga olusuku oba essamba y'emmwanyi.

##### a. Ebinnya bya “Zai” (*Zai pits*)

Byetuyita ebinnya bya “Zai” biba bimpi wansi naye nga bigazi; bisimbibwaamu birime by'empeke nga kasooli. Byiibwaamu ettaka lya waggulu (*topsoil*) erisimiddwa awalala nga litabuliddwa n'ebigimusa, naddala kompositi, oba obusa. Oluvannyima lw'entabula eno omulimi asimba ebirime mu binnya bino. Ebinnya bya “zai” bya mugaso nnyo mu bitundu eby'ettaka ly'olusenyu ne mu bitundu abikalu. Mu bitundu ebimu, ensima y'ebinnya bino elongoosebwaamu okusenziira ku mbeera eriyo. Ekyookulabirako, e Katumani mu Machakos (Kenya) ebinnya bino bimpiko era bifunda. E Njombe, mu Tanzania, ewali enkuba eya 1,000 mm ebinnya bino byongerwaako obunene n'obuwanvu wansi (cm 60 n'okusingawo). Mu buli kimu ku binnya ebinene musigibwaamu ensigo nga 15 – 20 nga bitabiddwaamu ebigimusa. Amagoba g'okukuluusana kuno ge makungula okweyongerera emurundi ebiri okugeraageranya n'ennima eyabulijjo.

Laba ensima y'ebinnya bya “Zai” ku:

<http://www.accessagriculture.org/node/901/en>

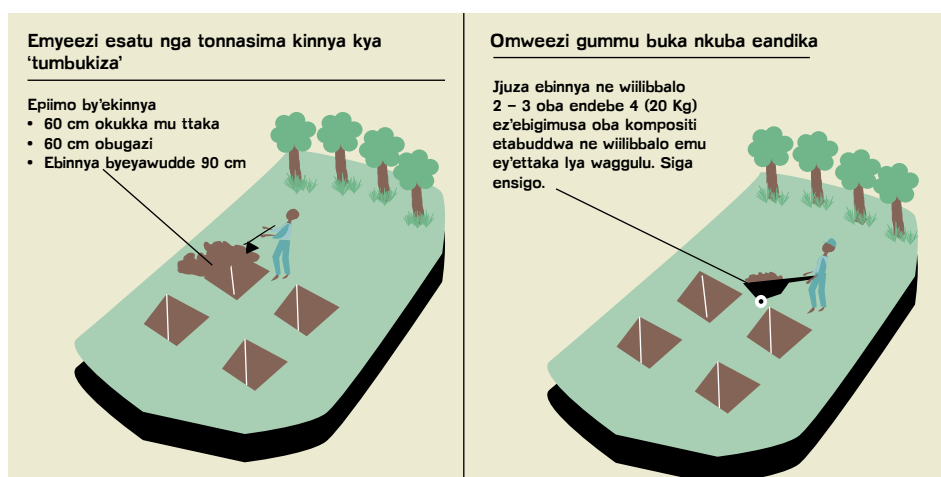


Ensima y' ebinnya bya "Zai" (Zai pits)

## b. Ebinnya bi "Tumbukiza" (Tumbukiza pits)

"Tumbukiza" binnya binene nnyo nga bujjuziddwaamu ebisasiro n'ebintu ebivunzevunze, nga obusa obutabiliddwaamu ettaka lya waggulu.

"Tumbukiza" (Swahili) kitegeeza kuyiwamu byonna. Ebinnya bino biyinja okusimibwa mu ngeri ez'enjawulo birimibweemu omuddo ogw'okuliisa ebisolo naddala ebisagazi, n'okugimusa ettaka. Ebisagazi bino bitwaala ennaku nga 30 okutuuka okusaayibwa n'ebirala nebittuka. Okuwuukuula ebinnya binokweetagisa abakozi abawerako.



Ensima y' ebinnya bi "Tumbukiza" (Tumbukiza pits)

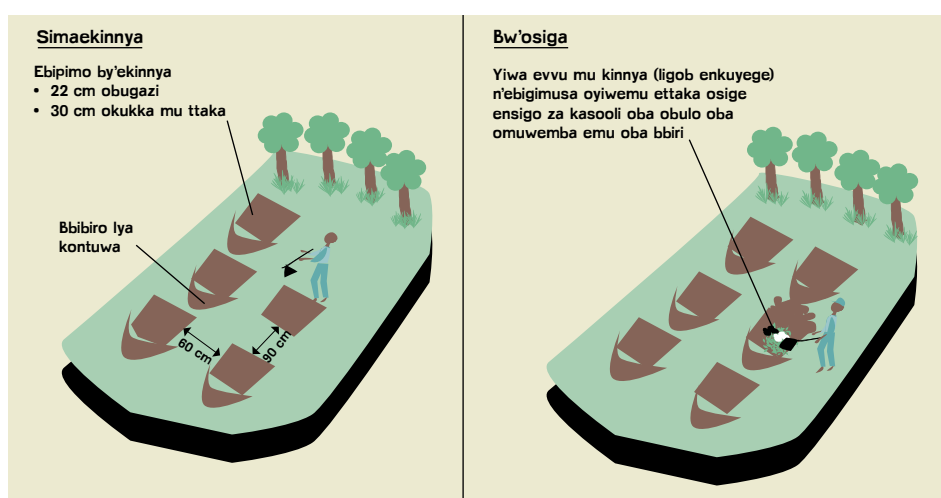
## c. Ebinnya bi "Chololo" (Chololo pits)

Ebinnya bi "Chololo" bisimibwa, nebisigwaamu ebirime nga biyiiriddwaamu evvu, obusa, ebigimusa eby'enjawulo n'ebisusunku by'ebirime. Entabula eno eyamba ettaka okukuuma amazzi n'kuligimusa. Ebirime ebisimbiddwa mu binnya bino bisobola okugumira ebiseera by'ekuba ey'omuswaaba ate amakungula negeebazaamu emirundi esatu miramba. Ebinnya bi "chololo" byangu nnyo okusima n'okulabirira ate tebyeetaagisa bakozi bangi.

## d. Ebinnya bi "Ngolo" (Ngolo pits)

Ebinnya bi "ngolo" bigatta akakodyo ka SALM ak'okusima ebinnya n'ak'okuzimba ebikugiro ku kaserengeto aka 35% – 60% mu busulifu. Ebinnya bisaasaanyizibwa ku kaserengeto konna nebiba nga ebituli

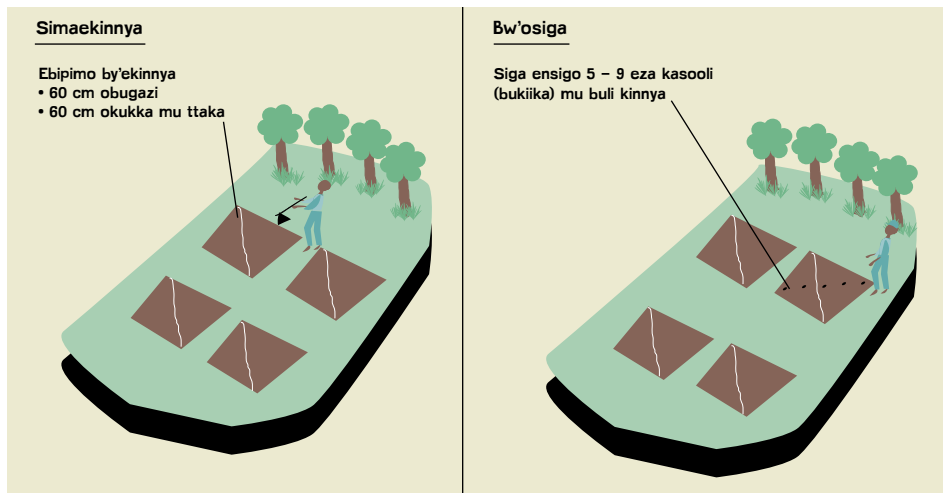
by'ekitimba gaggadde ku taaka. Ebinnya bino lubeerera biba bingi ku ssamba. Ettaka eriyiikuddwa mu binnya likozesebwa okuzimba ebikugiro okusimbibwa ebirime n'okusuulibwaako omuddo ogukooledwa mu musiri wamu n'ebisusunku by'ebirime. Ebinnya bye bimu bilegamy n'okukuuma amazzi. Ebirime ebligimwa mu binnya ebyo biba bibiri ebiwaanyisiganya buli myaaka ebiri. Amkungula mu musiri ogulimu ebinnya bi "ngolo" bwe gakendeera, gulekebwa ettaka neliwummula okumala emyaaka egiwerako, okutuusa lwelimeramu obusaka n'ebisubi ebiwanvu, byonna nebikula, olwo nno okulima ebirime nekuddamu. Ebinnya bino bijjululwa, kwe kugamba nti ebipya bisimbibwa mu bifo ebisusunku n'ebisasiro webyetuumye okumala emyaaka. Kyokka, amakungula g'emisiri egikozesa akakodyo kano gasangiddwa nti mangi okusinga ag'emisiri egiri ku bubalaza bw'amadaala. Ebinnya bi ngolo brina amannya amalala abiri, ingolu ne binnya bya "matengo".



Ensima y' Ebinnya bi "Ngolo" (Ngolo pits)

#### e. Ebinnya bya Ttaano ku Mwenda (Five by nine pits)

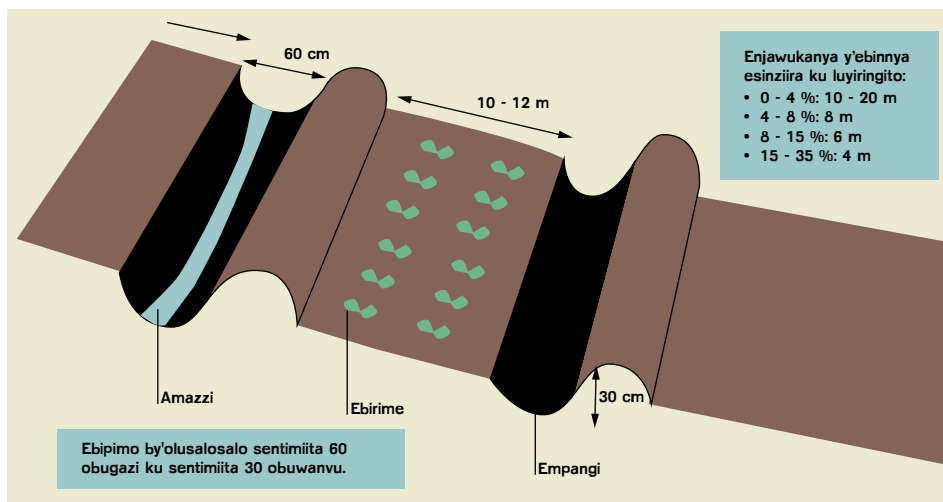
Ttaano ku mwenda biba binnya binene okusinga bi "Zai" nga obugazi n'obuwanvu bwenkanankana 60 cm ku 60 cm ne 60 cm okukka wansi; birimibwaamu kasooli. Erinnya 'ttaano ku mwenda' liva ku nsigo ezisigibwaamu: ttaano mu bitundu ehby'enkuba entono ne mwenda mu by'enkuba ennyingiko. Ebinnya eyo biyiikikamu ebi ebigimusa bingi okusinga bi "Zai". N'olw'ekyo, bisobolera ddala okuleeta amakungula amangi ag'ebbanga. Buli kinnya kikozebwa okumala emyaaka egitasukka ebiri.



Ensima'y' ebinyya bya ttaano ku mwenda (Five by nine pits)

#### 4.1.9 Empangi (Trenches)

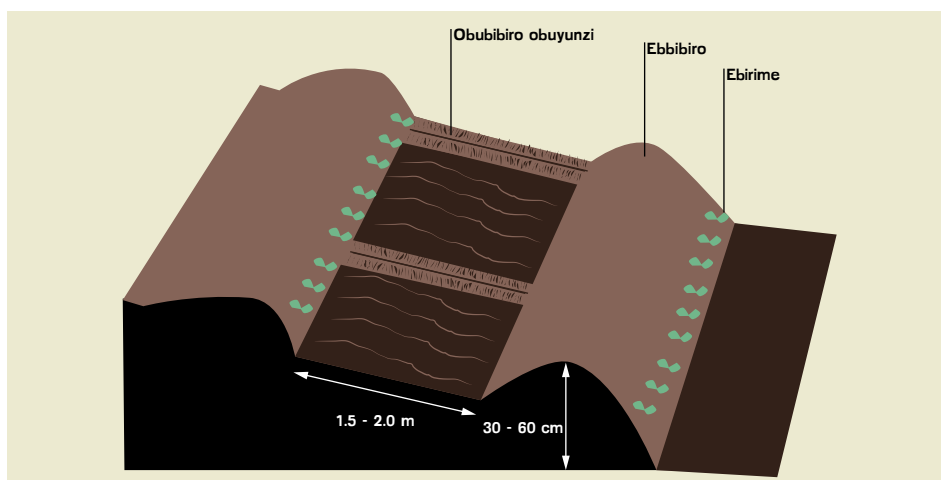
Empangi sizimibwa bukiika bw'akaserengeto nga nnyimpi okukka wansi zilegamemu amazzi. Ziyamba okuzza mu ttaka omudding'anwa, nekiyamba ensulo n'enzizi, okukuuma ettaka ly'emasirengeta nga teritwaalibwa mukoka, era ziyamba emiti okukula amangu mu bitundi ebikalu. Ku bikugiro by'empangi kusimbibwaako obisubi, ebirime nga ebijanjaalo, n'emit. Kino kinyweeza ettaka n'okuwagira enkula y'ebimera eby'enjawulo ebyongera ebirimusa ne kaaboni (carbon) mu ttaka.



Ensima y' empangi (Trenches)

#### 4.1.10 Ebikugiro ebiyunge (Tied ridges)

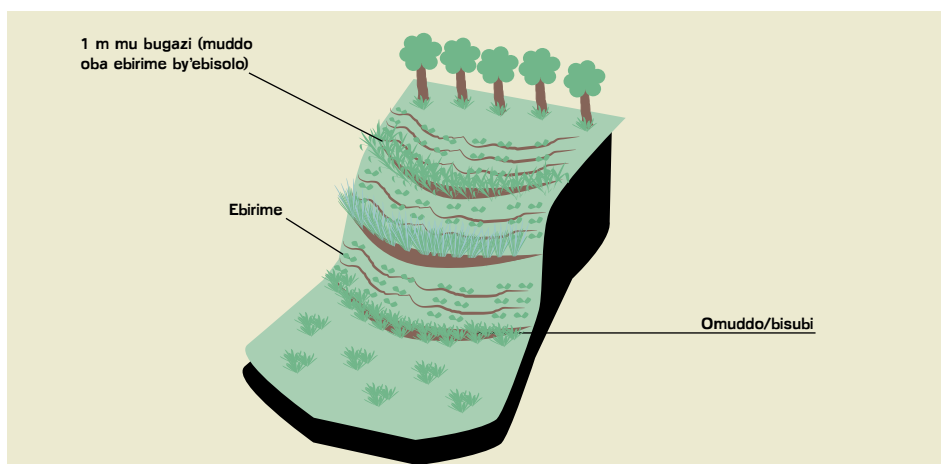
Ebikugiro ebiyunge bizimbibwa bukiika bw'obuserengeto mu bitundu ebikalu nga biddir'ganye mu maserengeta. Biziba amakubo (obukutu) amazzi mwegakulukutira nga gatwaala n'ettaka. Buli bikugiro ebibiri bigattibwa ebigulumi ebikkirira mu busimba bw'akaserengeto wakati waabyo newalabika nga ebidiba ebiddir'ganye. Kino kiyamba okulegamyama amazzi n'okugayingiza mu ttaka. Mu ngeri eno bikuuma ettaka nga linnyikivu mu biseera by'ekyeeya, amakungula negeeyongera n'ettaka neritatwaalibwa mukoka. Akakodyo kano kanguyira nnyo abalimi okussa mu nkola.



Enzimba y'ebikugiro ebiyunge (*Tied ridges*)

#### 4.1.11 Ennyirir z'ebisubi (*Grass strips*)

Ennyiriri z'ebisubi ez'obukiika ziba nfunda (1 m); zisimbibwa ku nsalo z'obubalaza obw'amadaala okugoberera kontuwa nebukendeeza amazzi okukulukuta nga gava mu kadaala akamu okuyiika mu kaddirira olwo ne zikuuka ettaka obutatwaalibwa mukoka. Akaodyo kano kayinza okukozesebwa mu bitundu eby'ekuba ennyingi. Ennyiriri z'ebisubi zisimbibwaako omuddo oguliisa ebisolo, okugeza ebisagazi oba ziyinza okulekebwa ebisubi ebitali bisimbe eby'ensiko nebimerako nabyo nebiriibwa abisolo ku ddundiro.



Ensimba y'ennyirir z'ebisubi (*Grass strips*)

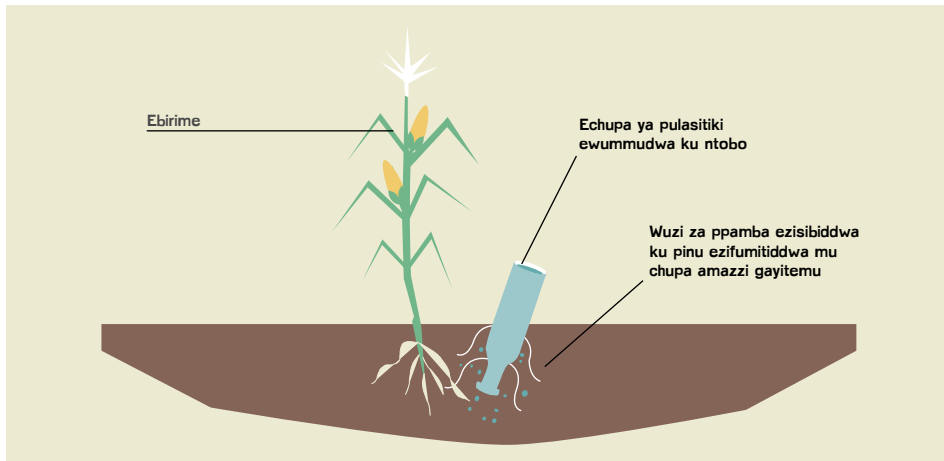
#### 4.1.12 Okufukirira emisiri (*Irrigation*)

Mu lulimi lw'ebby'obulimi 'okufukirira' kitegeeza kukozeza mazzi agakung'aanyiziddwa oba agalembekeddwa okuvubiriza ettaka okuli ebirime. Enkola eno eyongera amazzi mu ttaka n'ezibira n'okutaasa ebirime mu biseera eby'ekyeeya nga ebirime ebifunyezza amazzi mu ngeri entegeke obulungi

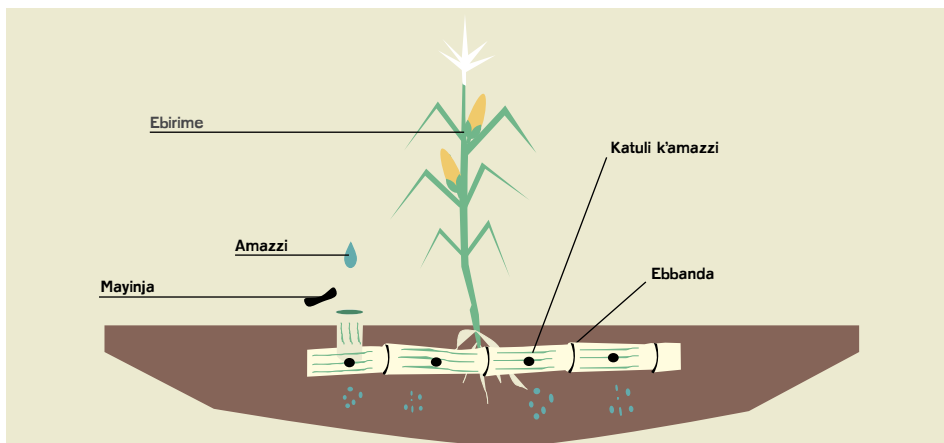
##### *Enfukirira ey'amatono (Drip or trickle irrigation)*

Mu nfukirira y'ebirime ey'amatondo, amazzi gatwaalibwa emufulejje egibunyisiddwa amasamba. Obufulejje obw'emipiira oba pulastiki nga gifumitiddwaamu ebituli wbyaawuddwa amasa giyungibwa ku mifulejje

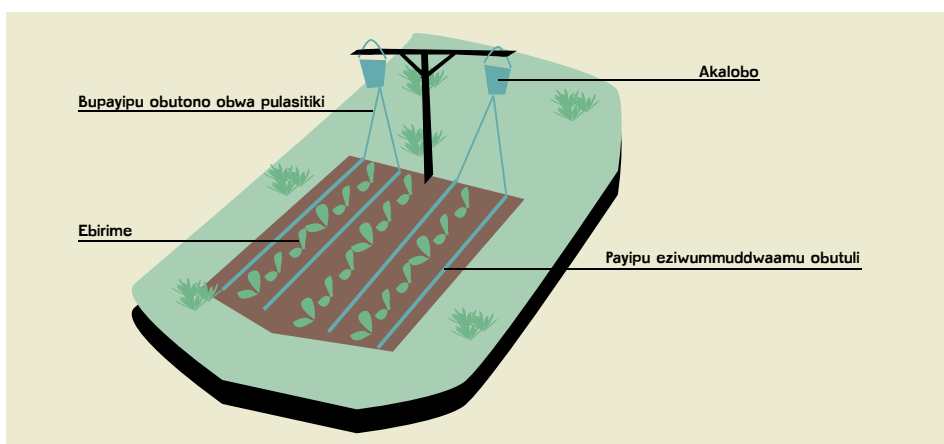
neggyoolekezwa mu nmiro. Akuuka akalala kasibwa ku bufulejje buno nekasobozesa amazzi okutonnya ku birme empolampola mu matondo. Enfukirira eno ntuufu nnyo ku nmiro entono. Wliwo ebika ebiwerako eby'okufukirira ebirime mu ngeri eno nga bisinziira ku busobozi bwa buli mulimi ne'bikola by'alina. Eky'kulabirako kwe kukozeza echupa z'amazzi oba amabanda n'endobo okutwaala amazzi obutereevu ku birime.



Okufukirira abirime n'echupa z'amazzi



Enkozeza y'amabanda okufukirira ebirime



Okufukirira abirime n'obulobo

## AKAGEZO AKAMPIMPI

1. Jjaye ekifaananyi ky'essamba yo kye wakubye. Bukodyo bwa SALM buliwa bw'okozesa ku ssamba eyo?
2. Wandika olukalala lw'ensonga 5 lwaki olowooza nti obukodyo obwo bwa mugaso gy'oli?

Bino  
birowoozeeko

**Okukuuma n'okutaasa embalama z'emigga:** Ekitundu ekikwaataganye n'omwaala gw'omugga lwe lubalama lwaagwo. Kumbalama z'emigga kubeerako ebimera eby'obutonde (*natural vegetation*) ebiteekwa okukuumibwa. Olumu, mu btamany, abalimi basaanyawo ebimera bino nga babitema alime ebirime. N'ekirala, enkuba eyitiridde ereeta amataba ku mbalama zino n'ettaka okugonnooka okuva ku busozi (*landslides*) n'ettaka okutwaalibwa amazzi. Embalama bwezisaanyizibwaawo, emigga giwagula negibutikira ebitundu ebigiriraanye, ettaka n'ebirime ebiririko nebizaama. Amazzi gano ate gayiwa oluyinja n'omusenyi ogutagasa nnyo birime oba ebisolo. Ambalama zino zikuumibwa n'okutaasibwa wbe tuzimba ebikugiro ebisimbiddwaako ebimera era n'okuzimba bu daamu obutono obwa waya (*gabions*). N'olw'ekyo tulina okukuuma embalama zino nga tetuzirimaako na bulagajjavu ettaka n'ebimera bireme kuzaama. Abalimi bayinza okuddaabulula embalama zino ngabakomya okuzirimako, ebimera biddemu okututula, n'okusimba omuddo, emiti, ebikajjo oba ebitooke.

## 4.2 Engeri z'okulembeka amazzi g'enkuba

Okulembeka amazzi olina okukendeeza embiro zaago n'okugakung'aanya awamu ogakozese kufukirira ebimera, ebirime, emiti, omuddo gw'ebisolo n'okugakozesa awaka, naddala mu bitundu ebikalu ne mu malungu. Ekigendererwa kwe kukeendeeza obuzibu obuva mu bbula ly'enkuba. Ekimu ku bireeta ebbula lino y'enkyuukakyuuka y'embeera y'obudde.

*Engeri essatu ezisinga okukozesebwa n'okulegaya n'okulembeka amazzi:*

1. Okulembeka amazzi g'ebisasi by'amayumba (*Roof catchment*).
2. Okulegama amazzi ku ttaka ne ku njazi. (*Ground surfaces and rocks*).
3. Ebitundu ebyesimyesimye, nga enguudo, leerwe obukubo n'ebisinde by'ensolo n'ebiwonvu.

### 4.2.1 Okulembeka amazzi g'ebisasi by'amayumba (*Roof catchment*)

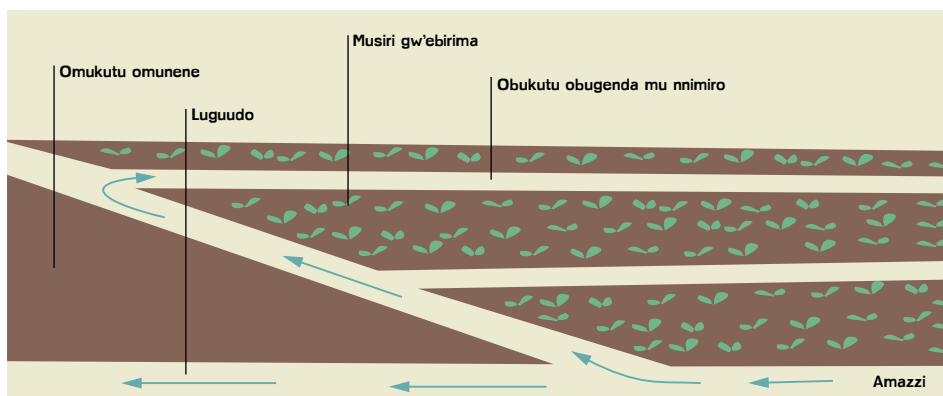
Okulembeka amazze g'ekisasi lweetaagisa engogo ezikwaata amazzi nezigatwaala mu ttanka, mapipa, n'ebirala mwetutereka amazzi, oba mu budiba. Okulembeka kusinga kukozebwa ku bizimbe ebiserekeddwa amabaati oba amategulawadde n'ennyumba z'essubi zirembekebwaako.

#### 4.2.2 Okulegamyama amazzi ku ttaka ne ku njazi (Ground surfaces and rocks)

Amazzi agakulukuta ku ttaka (mu mikutu oba emyaa,) gategebwa negoolekezwa mu misiri oba gterekebwa mu bidiba, ttanka ne ddaamu negakozesebwa oluvannyuma.

#### 4.2.3 Ebitundu ebyesimyesimye, nga enguudo, leerwe obukubo n'ebisinde by'ensolo n'ebiwonvu

Mukoka ava ku nguudo, ku njazi, awaka, oba ku reerwe gakung'aanyizibwa negoolekezwa mu misiri oba gterekebwa mu bidiba, ttanka ne ddaamu negakozesebwa oluvannyuma. Emikutu nagyo gisobola okukozesebwa okutwaala amazzi ago gyegeetagibwa.



Okutega amazzi ku nguudo

#### AKAGEZO AKAMPIMPI

1. Jjaye ekifaananyi ky'essamba yo kye wakubye. Kakodyo ki k'okozesa okukufuna amazzi ku ssamba eyo?
2. Wandika olukalala lw'ensonga 5 lwaki olowooza nti akakodyo ako ka mugaso gy'oli?

### 4.3 Entereka y'amazzi

Obukodyo bw'okutereka amazzi kola za bulijjo ate nga za mugasonnyo, naddala mu biseera eby'ekyeeya. Amazzi gano gasinga kukozesebwa mu maka g'abantu, naye gasobola okukozesebwa mu bulimi, okugeza, ttanka z'amazzi amalembake ziyinza okuyamba munfukirira y'ebirime ey'ekika ky'amatonde. Waliwo enterekannyingi, nga ttanka, ebidiba, ne ddamu.

#### 4.3.1 Ttanka

Ttanka ziyinza okukteekebwa waggulu, ku ttaka, ne wansi mu ttaka neziyamba okulembeka amazzi g'enkuba n'okugatereka amazzi. Zisobola n'okukozesebwa okutereka amazzi agajjiddwa mu myaala oba ku njazi. Amazzi gano gasobola okukozesebwa mu maka g'abantu, mu masomero ne mu malwaaliro. Okujjako nga akaserengeto kayambye amazzi okukulukuta

negagenda mu ttanka, kyeetagisa ebyuuma ebigapika okugenda mu ttanka oba kugajjamu gatwaalibwe waggulu wa ttanka.

#### **4.3.2 Baakaazi (*Birkas*)**

Baakaazi zizimbiwa mu nkokoto oba obutegula obw'ebbumba obwookeddwa buleme amazzi okubuyitamu. Baakaazi ziba za njuuyi ssatu (*rectangular*).

#### **4.3.3 Ebitaba n'ebidiba (*Excavated pans and ponds*)**

Ekidiba lye tterekero ly'amazzi essime mu ttaka nga litereka amazzi agatasukka 5,000 m. Ebitaba bbyo bisimibwa nga bimpi mukukka wansi (miita 1 okutuuka ku miita 3) bisimibwa okulegamamu amazzi agakulukutira ku njazi, okuwamba mukoka, agavamu mikutu egiva ku nguudo, oba amazzi agava mu nsozi ne mu bisenyi. Bwe bisimibwa obulungi nga ettosi lisobola okuteeka wansi waabyo, amazzi g'ebitaba gayinza okunyweebwa ebisolo oba okufukirira ebirime.

#### **4.3.4 Daamu (Amabibiro) z'amazzi**

##### **a. Ddaamu zi Chaako (*Charco dams*)**

Ddaamu zino okuzikola, basima ebinnya ebitono oba ebidiba ebya 3 m okukka wansi. Zizimbibwa ku museetwe mu bifo ebirondeddwa n'obwegendereza. Zisinga kuyamba mu kutereka mazzi ga bisolo kunywa. Okwongerera omuganyulo gwa ddaamu zino, zizimbibwa mu bitundu eby'ebiwonkowonko amazzi mwegalegama enkuba nga etonnye. Ekifo ekituufu oku zizimbamu kirondebwa nga tukozesa maapu za kontuwa oba nga twekenneenya amazzi gyegalegama ku bwaago.

##### **b. Bu ddaamu bw'ettaka (*Small earthen dams*)**

Amazzi ageetagibwa bwegaba nga mangi, bu ddaamu obukugiddwa ettaka obutaka bwe businga. Bzimbibwa ku migga oba okumpi ennyo mu mabbali g'emigga amazzi wegabundukira amangi. Ebbibiro lya ddaamu nga eno ligulumira 2 – 5 m. Wakatu w'ebbibiro munda ekomererwaayo ebbumba. Ebeeweera nga mayinja ate nelitemwaako obukutu obukulukusa amazzi bwe gayitirira mu ddaamu, ereme kwaabika. Obungi bw'amazzi ddaamu zino zegatereka gava ku bikumi bya kyubiki (*cubic*) metre negatuuka ne mu nkumi. Olw'ensimbi ennyingi ezeetaagibwa okuzimba ddaamu zino, zitera kuzimbibwa bibiina ebegassi oba eby'abalimi. Ddaamu z'ettaka zitereka amazzi mangi agamala obulingi okufukirira ebirime n'ebisolo okunywa. Okusima obunnya obukwaata ettosi erigalimu n'okusima enzizi zisaasaanye amazzi kyongerera ku bulungi bwaago naye tegasaana kunyweebwa bantu nga tegasengejjeddwa n'okuchamusibwa.

##### **c. Daamu z'omusenyu n'ezoomu ttaka wansi (*Sand and subsurface dams*)**

Amazzi g'emigga mingi agyomu bitundu ebikalu gakukulukuta okumala emyeeze mibale bubazi buli mwaaka; mu myeezi egisinga emirala emyaala giba mikalu. Kino kye kivaakoemigga egyo okugiyita egy'musenyu (*sand rivers*). Naye mu myeezi egy'enkuba, emigga gino giba gya mataba.

Ddaamu ey'omusenyu ezimbibwa mu bukiika bw'omugga okukendeeza embiro z'amazzi mu biseera ebyo. Obugulumivu bwa ddaamu nga eyo bweyongerako nga kimu kya kusatu kya metre oluvannyuma lw'amataba okuzongerako omusenyu ku ntikko zaazo. Ddaamu z'omusenyu, wadde amazzi gaazo gali mu ttaka munda, zifaananako n'ezabulijjo, wabula, entikko yaazo egulumira waggulu okusinga amazzi wegakoma mu mwaala. Ddaamu eya bulijjo lye bbibiro olumu erizimbwa mu bbumba erikomereddwa okwekwaata, nga omusingi gwaayo gukka wansi w'omwaaliro gw'omwaala. Olumu, ebbibiro ligayizibwa neliba ekubo ly'abantu okukutula omugga; kino kikendeeza ku kusaasaanya ensimbi kuby'enyamula. Omusenyu oguli wansi w'omugga mu ttaka gusaana okuyibwamu mpolampola mu mitendera ate nga tegugulumidde kiusse waggulu, kubanga kino omusenyu n'ettaka ebireetebwa amazzi biyinda okuyitirira. Ddaamu y'omusenyu etera okuwangaala kubanga amazzi gaayo tegakalira mangu. Engeri ennyangu ey'okulegama amazzi mu migga gy'omusenyu kwe kuzimba ddaamu zino oba ezabulijjo. Ebikola kuddaamu zino biba kumpi n'omugga; ebyongera ku ssente ezeetaagiza ye sseminti n'abakozi. Ddaamu z'omusenyu abantu b'ebutundu byaazo bazikkiriza era bazaagala kubanga amazzi gaazo gali mu musenyu munda wansi; n'lw'ekyo tegakalira mangu era tegayingiramu bintu bijama ebireeta endwadde.

#### 4.3.5 Enzizi ne nnayikondo

Mu bitundu by'ebbula ly'amazzi kyeetaagisa okusika amazzi okuva wansi mu ttaka. Nnayikondo gwe mukutu ogusimwa okukka wansi mu ttaka okutuuka ku njazi ezinnyikidde amazzi neziba nga ttanka mu ttaka. Kikulu nnyo buli ayagala okusima nayikondo okweetegeka n'okumanya engeri ky'eyinda okutuusa ku butonde bw'ensi (*Environmental Impact Assessment*) n'oku buuliriza buli mwaaka ekibutuuseeko olwa nayikondo. Kyeetagisa n'okufuna laisinsi n'okuteeseganya n'abantu. Ebintu nga ddaamu ne nayikondo biyinda okukosa obutonde bw'ensi mu bitundu mwebiri, ettaka n'ebirikolerwaako, ssinnakindi nebireeta n'obukuubagano mu bantu.

### 4.4 Obuyonjo n'eby'obulamu eby'emitindo gy'obuwangaazi (*Sustainable sanitation systems*)

#### 4.4.1 Obuyonjo bw'ebitundu by'obutonde bw'ensi (*Ecological sanitation*)

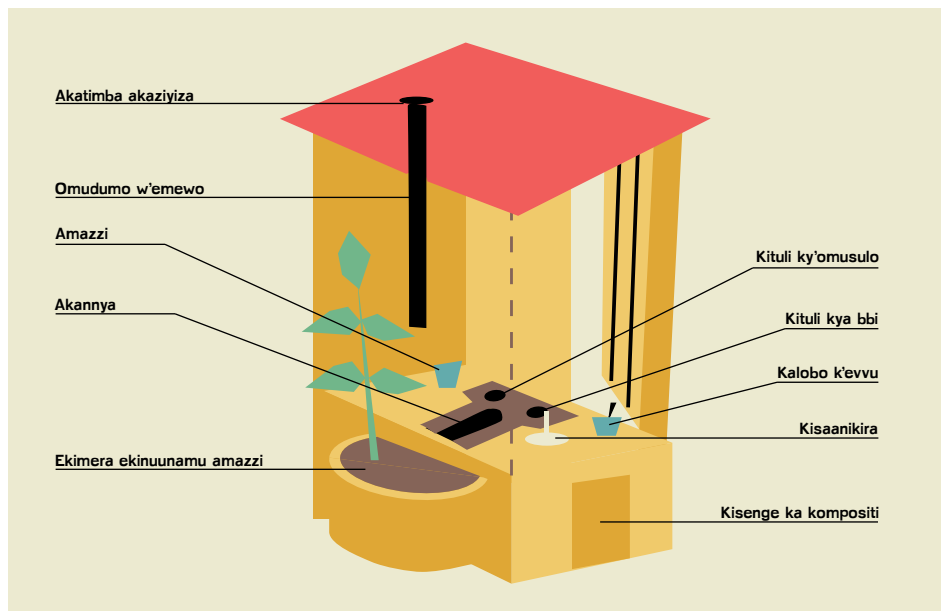
Abalimi bsobola okukozesa buyonjo ezizimbiddwa ku mutindo gw'obuyonjo bw'ebitundu by'obutonde bw'ensi (*EcoSan toilet*) mwebayinda okukkung'aanyiza omusulo gw'abantu n'obubi (bbi – “*faeces*”) mu ngeri entuufu mu by'obulamu nebabikozesa ng'ebigimusa okwongera amakungula. Buyonjo zino mpangaazi era azirina teyeetagisa kusima byoolooni.

Mu buyonjo ezo obubi tebeegatta mu musulo. Omusulo gukunng'aanyizibwa (negusaabululwa n'amazzi) gukozesebwe nga ekigimusa mu kulima enva endiirwa, ebirime ebirala n'emit. (Emikebe gy'amazzi esatu gitabula gumu ogw'omusulo). Bbi alekebwa n'avunda oluvannyuma n'atabulwaamu evvu n'ettaka eddungi erya waggulu okukola

ebigimusa. Evvu liyamba bbi okuvunda mu ngeri entuufu mu by'obulamu n'okumujjamu ekivundu.

*Enkozesa y'obusa okugimusa:*

1. Zimba era okozese “eco-toilet”.
2. Yiwa olubatu lw'evvu mu kituli kyaayo buli lunaku lukendeeza olusu olubi n'okutta obuwuka obuleeta endwadde (*germs*).
3. Kunng'aanya omusulo ogweetaagisa ogusaabulule n'amazzi ogukozese nga ekigimusa.
4. Mu bwegendareza, jjamu bbi omutabulemu ettaka (omukebe gwa bbi gutabulwa omukebe gumu ogw'ettaka) lifune bakitiriya ezivunza n'okukola ebigimusa.
5. Ebitabule biteeke awantu okumala wiiki ssatu mu kisiikirize.
6. Bitabulire ddala naye na bwegendereza bifuuke ebigimusa obiteeke mu nnimiro.



Buyonjo ezimbiddwa ku mutindo gw'obuyonjo (*Eco-San Toilet*)

**Kino Kikulu:** Ebigimusa ebivudde mu “EcoSan toilet” tobiyiwa butereevu ku birime. Bitabule mu ttaka. Kino kiziyiza buwuka bw'endwadde okubirumba.

#### 4.4.2 Amazzi agava mu ffumbiro

Amazzi agakozeseddwa mu ffumbiro oba mu kinaabiro gayinza okulongoosebwa negakozesebwa okufukirira ebirime. Okugalongoosa, galeke mu musana kutte obuwuka. Galeke gawole nga tonnagakozesakufukirira birime galeme kubyookya.

## 5. Obulimi bw'eby'enfuna (agronomic) n'obukodyo bwaabwo

### Ennyanjula

W'onaamalira essomo lino ojja kuba oyize okulonda ebirime ebituufu okulima mu ssamba yo, ennima entuufu eya buli kirime oyongere amakungula n'okukendeeza akabenje k'okutabula obutonde bw'ensi n'okuleeta enkyuukakyyuka mu mbeera z'obudde.

### Essomo lijja kwetaaga essaawa 4

#### 5.1 Obulimi bw'eby'enfuna (agronomic) n'obukodyo bwaabwo

Enkola y'obulimi eno egenderera ku labirira n'okuddaabulula ettaka ttaka lizaale amakungula agasingawo n'enfuna y'omulimi, okulyuusa enkola okygendana n'enkyuukakyyuka y'embeera y'obudde. Obumu ku bukodyo bw'ennima eno buttottoddwa wano wansi.

| ENKOLA/<br>OBUKODYO                                  | EBY'OKULABIRAKO                                                                                                                         | EMIGANYULO                                                                                                                                                                            |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ensigo n'ebirime ebirongoosed-dwaamu abakugu         | Kasooli w'ebikolo ebitabule, emiyembe emizungu, enga endiirwa ez'ekinnansi, muwogo agumira endwadde, ebinyeebwa, ebitooke eby'enjawulo. | Ebirime bikula mangu era bitera okugumira endwadde n'ebiwuka.                                                                                                                         |
| Okugobereraganya y'ebirime mu musiri mu mpalo        | Kasooli agobereddwa ebinyeebwa, n'oluvannyuma lumonde.                                                                                  | Ebiwuka ebirumba ekirime ekimu tebiyitirira, omuddo n'endwadde bikendeera, emirandira teginyuunyunta kitundu kimu mu ttaka kukimalamu biriisa, ebiriisa byomuttaka bitabulwa bulungi. |
| Okugatta ebirime mu musiri                           | Siga kasooli n'ebijanjaalo; kasooli n'ebinyeebwa; kasooli n'obummonde.                                                                  | Naitulojeni ( <i>nitrogen</i> ) okuyingizibwa mu ttaka, amakungula okweyongera olw'kuokulima ebirime ebibiri omulundi ogumu.                                                          |
| Okusiga wakati w'ennyiriri ( <i>Alley cropping</i> ) | Kasooli asimiddwa wakati w'emiti n'obusaka bw'obukomera bw'emisiri.                                                                     | Okukwaata n'okugumya ettaka.                                                                                                                                                          |
| Okugobereraganya ebirime mu misiri gy'essamba        | Wiiki ntono nga kasooli anaatera okutuuka okukungula, siga ekirime ekirala, nga ebijanjaalo oba ddengu okusikira kasooli.               | Okukakasa nti ettaka likozesebwa omwaaka gonna n'okuwa ettaka n'ebirime ebirimusa eby'obutonde.                                                                                       |

Obulimi bw'eby'enfuna (agronomic) n'obukodyo bwaabwo - 1

| ENKOLA/<br>OBUKODYO                                                                                                                                                                                                                                               | EBY'OOKULABIRAKO                                                                      | EMIGANYULO                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Ennima ya kontuwa                                                                                                                                                                                                                                                 | Ennyiriri z'omuddo.                                                                   | Okukendeeza mukoka okutwaala ettaka.                                                            |
| Ebirime ebigimusa ettaka byennyini                                                                                                                                                                                                                                | Bijanjaalo, soya, b'ebirala.                                                          | Okukuuma ettaka nga ggimu, okwongeramu nayitulojeni.                                            |
| Amabibiro agasimbiddwaako omuddo gw'ebisolo                                                                                                                                                                                                                       | Ebisagazi eby'enjawulo, emiti nga kaliyandula oba sesibaniya, okuva emmere y'ebisolo. | Ebigimusa bifunika mangu (ebimera byennyini, n'obusa bw'ebisolo); ebisolo okuliisibwa obulungi. |
| Ennwaanyisa y'ebiwuka entabaganye obulungi n'obulimi                                                                                                                                                                                                              | Okulozesa eddagala, emitego n'obukodyo bw'obutonde okutta ebiwuka.                    | Kikendeeza obungi bw'eddagala eggule erikozesebwa mu nnimiro.                                   |
| Ebirime ebigimusa ettaka byennyini (Laba essomo nnamba 3)<br>Emiddo egiriisa ebisolo (Laba essomo nnamba 6)<br>Amabibiro agasimbiddwaako omuddo gw'ebisolo (Laba essomo nnamba 6)<br>Ennwaanyisa y'ebiwuka entabaganye obulungi n'obulimi (Laba essomo nnamba 11) |                                                                                       |                                                                                                 |

Obulimi bw'eb'enfuna (*agronomic*) n'obukodyo bwaabwo - 2

## 5.2 Ensigo n'ebirime ebirongooseddwamu abakugu

Okutonda ensigo n'ebirime bino, abakugu bazinoonyerezamu, nebazigezesa nga banoonya okuzissaamu ebisaanyizo nga okukula amangu, okugumira ekyeeya, okuzaala amakungula amangi, n'okugumira endwadde ezireetebwa ebiwuka. Ebimu ku birime ebyo bigumira enkyuukakyuuka z'embeera y'obudde n'okongera obugimu mu ttaka neliwangaala.

Bino  
birowoozeeko

**Eby'okulabirako by'ensigo n'ebirime abakugu byebalongoosezzaamu: Kasooli wa maleeto n'agumira ekyeeya, ebijanjaalo eby'enjawulo, enva endiirwa, muwogo agumira endwadde ya mozeyiki (*mosaic*), ebinyeebwa n'ebitooke eby'engeri y'emu**

Ebirime ebireeta amakungula amangi byongera nnyo ku biriisa mu ttaka naddala ebisusunku byaabyo nga bizziddwa mu misiri. Wabula ebimu ki byo birina okulimwa n'obwegendereza. Byonna tebisaanira mbeera zonna oba ettake ly'ebika byonna.

**Kino Kikulu:** Kimanyi nti olini okweebuuza ku mukugu w'eb'okulima oba omuwi w'amagezi ali mu kitundu kyo nga tonnagula nsigo zino.

*Ezimu ku ngeri z'okukyuusa enkola osige ensigo z'ebirime ebyo ziizino:*

- Okusiga mu budde obutuufu
- Okukyuusa ebirime buli lusiga
- Okusiga wakati w'ennyiriri (*Alley cropping*)
- Okweetoolooza y'ebirime mu musiri
- Okugatta ebirime mu musiri
- Okugobereraganya

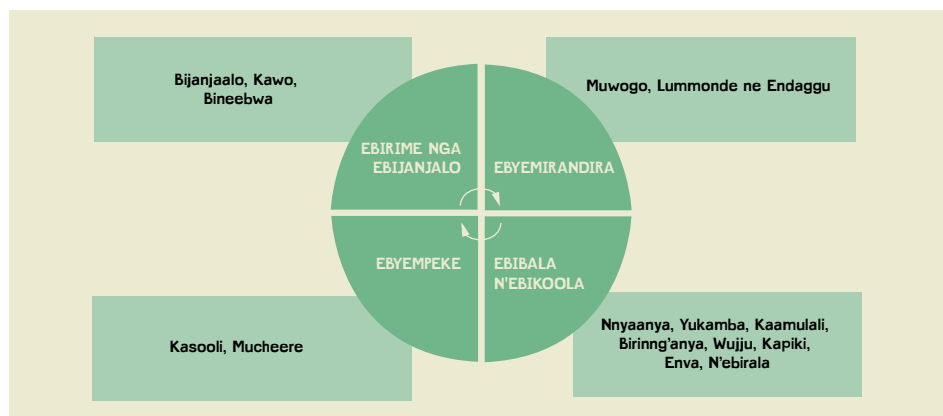
### 5.3 Okukyuusa ebirime buli lusiga oluddako

Mu nkola eno, ebirime nga bisatu oba bina bisimbibwa mu mpalo omulimi z'asazeewo nga bigobereragana buli lusimba oluddako. Ennima eno yeetagisa okwewala ebiwuka n'endwadde ezirumba ebirime ekimu okusajjala mu musiri ogumu. Ekeendeeza omuddo, ebiwuka ebirumba ekirime ekimu, okukozesa ebigimusa ebigule, endwadde ate n'ezibira ettaka obutakaddiwa mangu. Eyamba emirandira negitakaddiya kitundu kimu munda mu ttaka wansi.

Bino  
birowoozeeko

**Ebirime ebituufu okusimba mu nkola y'okukyuusa ebirime buli lusiga oluddako: Kasooli agobereddwa ebinyeebwa, n'oluvannyuma lumonde, ebirime ebyongera nayitulojeni mu ttaka, ebirime ebivaamu obuwunga (cereals), eby'emirandira n'omuddo oguliisa ebisolo.**

Okusingira ddala, mu nkola y'obulimi eno abalimi basiga ebirime ebivaamu emmere y'obuwunga, nga kasooli, obulo, omuwemba n'omucheere ogutali gwa mu ntobazi (*high feeders*), nebazzaako ebirime ebireeta nayiturogeni (*nitrogen fixing*), nga ebijanjaalo ne soya (*intercrops*), nebasembyaayo eburime by'emirandira, nga lumonde omuzungu, lumonde omuganda ne muwogo (*cover crops*).



Ekukyuusa y'ebirime buli lusiga oluddako (*crop rotation*)

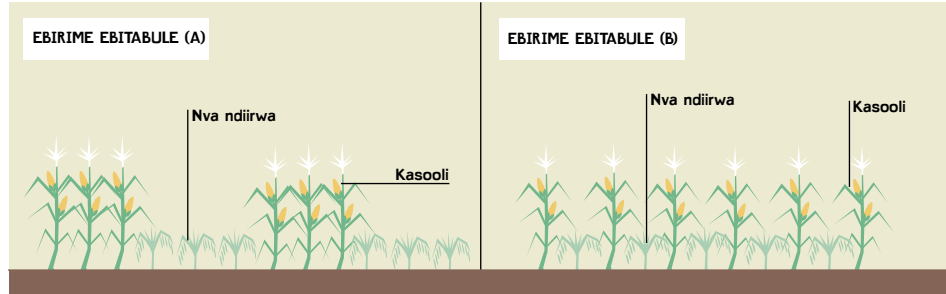
### 5.4 Okugatta ebirime mu lusiga olumu (*Intercropping*)

Mu nnima eno, buli lusiga omulimi asiga ebirime bibiri n'okusingawo mu nnyiriri zomunnimiro y'emu, okugeza nga kasooli n'ebijanjaalo, kasooli n'ebinyeebwa oba kasooli ne lumonde. Engatta eyo eyongera ku nfuna y'omulimi, ereeta ebisiikirize, eyingiza nayitulojeni mu ttaka, era ekeedeeza omuddo ne mukoka. Ennima y'emu eteeka ebikoola mu ttaka nebigimusa ettaka. Ebisusunku ebiva mu mirime nga kasooli bisobola okukozesebwa okubikka ettaka (*mulching*) n'kukola kompositi.

Bino  
birowoozeeko

**Mu birime ebisinga okukozesebwa mu kutabika ebisige mu misiri mwemuli bino: Ebijanjaalo, soya, kawo, empindi, obutungulu, n'enva endala.**

Mu nnima y'okugatta ebirime mu lusiga olumu, omulimi alina okwegendereza ennyo ebirime ebisiiga ebirara endwadde. Eky'okulabirako, endaggu, ensujju, wujju (*watermelon*) ne kyukamba (*cucumber*) tebyandigattiddwa na bitooke, kubanga byaalula obuwuka obuwuka obubusiigibwa ebitooke amangu (*infectious chlorosis virus*).



Engatta y'ebirime mu lusiga olumu (*Intercropping*)

### 5.5 Okuddirinng'anya ebirime (*Relay cropping*)

Mu nnima eno, wiiki ntono nga ekirime ekikulu (*main crop*), nga kasooli, nga kinaatera okutuuka okukungula, omulimi asiga ekirime ekirala, nga ebijanjaalo oba ddengu okusikira kasooli. Ennima eno ekukakasa nti ettaka likozesebwa omwaaka gwonna. Ekendeeza ensimi ezisaasaanyizibwa mu kulima, ewa ettaka n'ebirime ebigimusa eby'obutonde, ekendeeza omuddo. Ereete nayitulojri mu ttaka n'ekendeeza endwadde.



Okuddirinng'anya ebirime (*Relay Cropping*)

### 5.6 Ensiga ya kontuwa

Ekitegeezebwa mu nnima ya kontuwa kwokusiga ebirime mu nnyiriri engazi (15 – 45 m) nga biwaanyisiganya n'emiddo gy'ebisolo oba ebirime by'empeke (nga kasooli), nga ennyiriri ezo zigoba kontuwa z'akasozi, ziryooke ziziyize mukoka okutwaala ettaka.

#### AKAGEZO AKAMPIMPI

1. Ddamu wekenneenye akifananyi ky'essambayo:
  - a. Ku nnima zetwoogeddeko mu ssomo lino, ziriwa z'okozesa ku ssambayo? Mu ezo z'otakozesa, mulimu ezimu z'osaanira okukozesa? Birime ki by'oddirinng'anya buli lusiga oluddirira?
  - b. Waensonga ttaano lwaaki oddirinng'anya buli lusiga oluddirira?
  - c. Ku ssamba yo olinako emiti oba ebirime by'okuliisa ebisolo. Oba tekuli, lwaaki tebiriiko?

## 6. Obulimi obugatte n'ebiyebibira (Agroforestry)

### Ennyanjula

Essomo lino lituwa amagezi g'okusimba emiti mu nnimiro oba mu malundiro mu bugenderevu. W'onaamalira essomo ojja kuba oyize emiganyulo egiri mu kusimba emiti mu ngeri eyo, nga mwemuli okuziyiza enkyuukakyyuka mu mbeera z'obudde, n'obukodyo obukozesebwa mu nnima eno.

### Essomo lijja kwetaaga essaawa 8

#### 6.1 Obulimi obugatte n'ebiyebibira (agroforestry) kye kiki?

Ennima eno y'okusimba mu bugenderevu emiti mu nnimiro z'ebirime oba mu malundiro eyongera nnyo amakungula ate n'eziyiza enkyuukakyyuka mu mbeera z'obudde. Emiti gyomunnimiro gi kaasangwaawo giyinza okutalizibwa negirabirirwa eran'emirala negisimbwa mmu nnimiro y'emu.

Emiganyulo egiri mu nkola eno ntoko. Emiti giyamba negirongoosa omukka gwa kaaboni dayokisaidi (*carbon dioxide*), ogumu ku gibuguumiriza ensi, negigwaawulayawula mu bikolo byaagwo nga gyeekolera emmere yaagyo mu bikoola ebya kiragala, oba negigukuumira mu bikoola ebyo, mu nduli, ne mu mirandira. Mu kukola emmereyaagyo, emiti gita omukka okisijeni (*oxygen*) gwetusika nga tussa. Emiti gikula mangu mu bitundu by'ensi ebiriraanye ikweeta (*equator*) okusinga mu biri ewala nayo. Bwetusanyaawo ebibira, emiti gyetutemye gita kaaboni dayokisaidi n'agenda mu bbanga ebbugumu neryeyongera. N'olw'ekyo, kikulu nnyo okusimba emiti n'okukuumira ebibira okwewala akabi kano.

Okusimba mu bugenderevu emiti mu nnimiro z'ebirime oba mu malundiro kulina emiganyulo mingi egikyaatagana na bino: amakungula amangi, obulimi obuwangaazi, egikwatagana y'obulimi n'obutonde bw'ensi (*adaptability*). N'olweekyo, wadde okusimba emiti mu nnimiro kwongera ku makungula, kumatiza ebyeetaago byaffe nga tebigootanya mmatiza y'ebyeetaago by'abaana n'abazzukulu baffe ate nga ku kkiriziganya mu ngeri nnyigi n'ebiyobuwangwa bwaffe n'okukuumira obutonde bw'ensi (*ukabilianaji*).

*Emiganyulo gy'obulimi obutabaganye n'ebibira:*

| GYETUGANYULIRWA        | EMIGANYULO                                                                                                                                              |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mu ntabagana y'abantu  | Emmere, endiisa ennungi, okuzimba, eddagala, obuwangwa, okusanyusa amaaso.                                                                              |
| Mu by'enfuna           | Obusuubuzi bw'embaawo, ebibala, empagi, eddagala.                                                                                                       |
| Mu by'obutonde bw'ensi | Obugimu bw'ettaka, ennima n'ennunda eganyula, embeera y'obudde entuufu, okukugira n'okuziyiza kibuyaga, obulingi bw'endabika y'ensi obusanyusa abalabi. |



## 6.2 Emiti emituufu okutobeka n'ebirime

| EMIGANYULO                              | EBIKABY'EMITI                 | EMIGANYULO EMIRALA                                       |
|-----------------------------------------|-------------------------------|----------------------------------------------------------|
| <b>Enku</b>                             | <i>Calliandra calothyrsus</i> |                                                          |
|                                         | <i>Sesbania sesban</i>        |                                                          |
|                                         | <i>Cordia africana</i>        | Gigumira enkuyege                                        |
|                                         | <i>Gliricidia sepium</i>      | Gigumira enkuyege n'ebyeeya                              |
| <b>Kuziyiza mukoka okutwaala ettaka</b> | <i>Calliandra calothyrsus</i> |                                                          |
|                                         | <i>Gliricidia sepium</i>      | Gigumira enkuyege n'ebyeeya                              |
|                                         | <i>Sesbania sesban</i>        |                                                          |
|                                         | <i>Morus alba</i>             |                                                          |
|                                         | <i>Tephrosia vogelli</i>      |                                                          |
| <b>Okwongera obugimu bw'ettaka</b>      | <i>Sesbania sesban</i>        |                                                          |
|                                         | <i>Calliandra calothyrsus</i> |                                                          |
|                                         | <i>Cajanus cajan</i>          |                                                          |
|                                         | <i>Gliricidia sepium</i>      | Gigumira enkuyege n'ebyeeya                              |
|                                         | <i>Tephrosia vogelli</i>      |                                                          |
|                                         | <i>Albizia chinensis</i>      | Gigumira enkuyege                                        |
|                                         | <i>Trema orientalis</i>       |                                                          |
| <b>Okusiikiriza ebirime ebirala</b>     | <i>Ficus natalensis</i>       | Gigumira enkuyege                                        |
|                                         | <i>Albizia chinnensis</i>     | Gigumira enkuyege                                        |
|                                         | <i>Polyscias fulva</i>        |                                                          |
|                                         | <i>Cordia africana</i>        | Gigumira enkuyege                                        |
|                                         | <i>Maesopsis eminii</i>       | Gigumira enkuyege                                        |
|                                         | <i>Trema orientalis</i>       |                                                          |
|                                         | <i>Croton macrostachyus</i>   |                                                          |
| <b>Emmere y'ebisolo</b>                 | <i>Calliandra calothyrsus</i> |                                                          |
|                                         | <i>Albizia chinnensis</i>     |                                                          |
|                                         | <i>Morus alba</i>             |                                                          |
|                                         | <i>Sesbania sesban</i>        |                                                          |
|                                         | <i>Gliricidia sepium</i>      | Gigumira enkuyege n'ebyeeya                              |
|                                         | <i>Moringa oleifera</i>       | Gigumira ebyeeya                                         |
| <b>Embaawo</b>                          | <i>Khaya anthotheca</i>       | Gigumira enkuyege, gigumira ebimera ebirumbi (parasites) |
|                                         | <i>Milicia excelsa</i>        |                                                          |
|                                         | <i>Podocarpus falcatus</i>    | Gigumira enkuyege, gigumira ebimera ebirumbi (parasites) |
|                                         | <i>Maesopsis eminii</i>       | Gigumira enkuyege                                        |
|                                         | <i>Grevillea Robusta</i>      |                                                          |

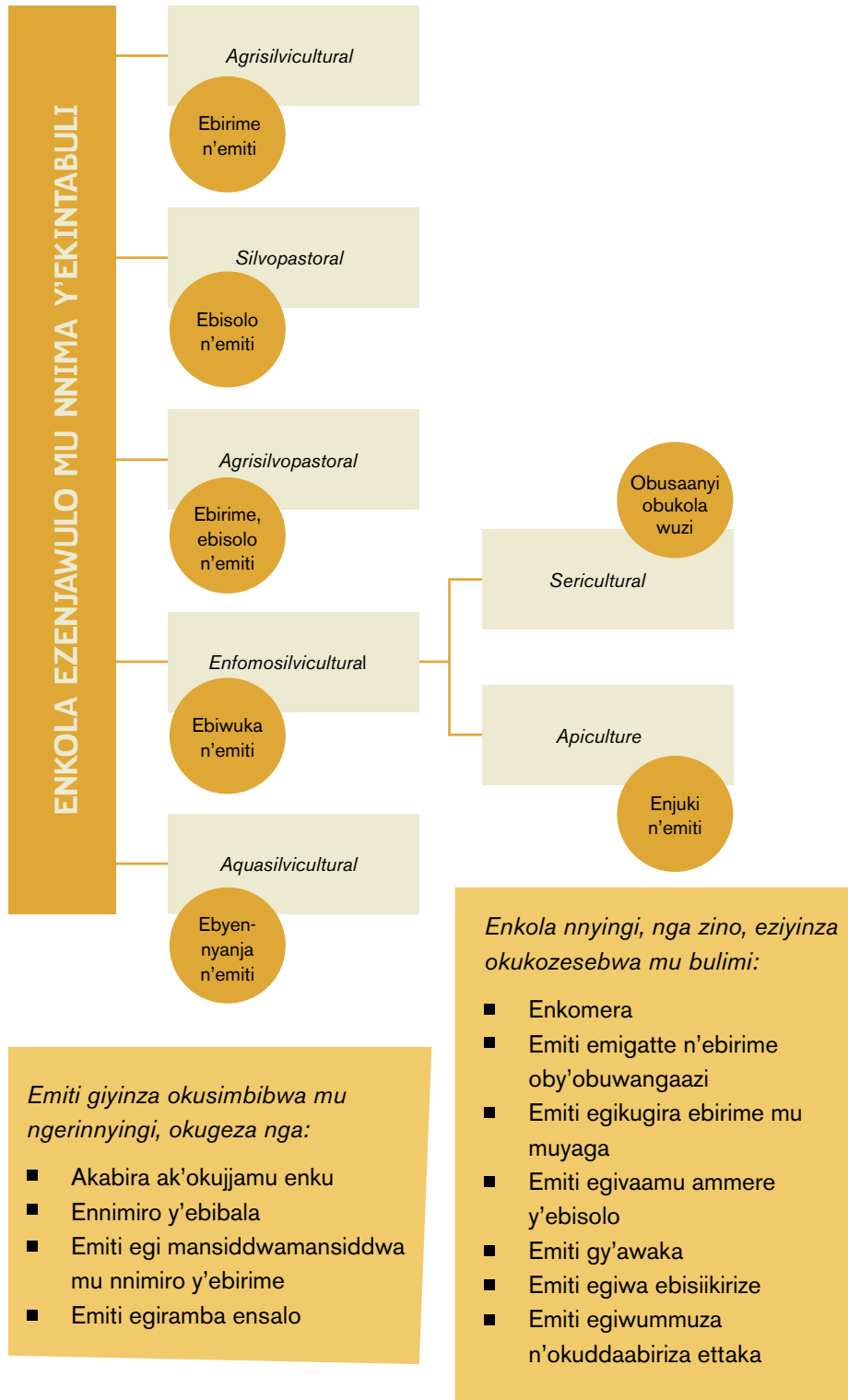
Emiti gy'entabaganya z'obulimi obugatte n'ebibira - 1

| EMIGANYULO               | EBIKABY'EMITI                  | EMIGANYULO EMIRALA          |
|--------------------------|--------------------------------|-----------------------------|
| Embaawo                  | <i>Albizia lebeck</i>          | Gigumira enkuyege n'ebyeeya |
|                          | <i>Markhamia lutea</i>         | Gigumira enkuyege           |
|                          | <i>Cederella odorata</i>       | Gigumira ebyeeya            |
| Okuddaabalula Ettaka     | <i>Acacia mearnsii</i>         | Gigumira enkuyege n'ebyeeya |
|                          | <i>Terminalia brownii</i>      | Gigumira enkuyege n'ebyeeya |
|                          | <i>Terminalia superba</i>      | Gigumira enkuyege n'ebyeeya |
| Empagi                   | <i>Markhamia lutea</i>         | Gigumira enkuyege           |
|                          | <i>Acacia mearnsii</i>         | Gigumira enkuyege n'ebyeeya |
|                          | <i>Grevillea Robusta</i>       |                             |
| Eddagala                 | <i>Azadirachta indica</i>      | Gigumira enkuyege n'ebyeeya |
|                          | <i>Melia azedarach</i>         | Gigumira enkuyege           |
|                          | <i>Callistemon citrinus</i>    |                             |
|                          | <i>Spathodea nilotica</i>      |                             |
|                          | <i>Combretum molle</i>         | Gigumira enkuyege n'ebyeeya |
|                          | <i>Terminalia brownii</i>      | Gigumira enkuyege n'ebyeeya |
|                          | <i>Moringa oleifera</i>        | Gigumira ebyeeya            |
| Oby'obulungi (ornaments) | <i>Markhamia lutea</i>         | Gigumira enkuyege           |
|                          | <i>Grevillea Robusta</i>       |                             |
|                          | <i>Casuarina equisetifolia</i> | Yenye ushindani             |
| Oby'obulungi (ornaments) | <i>Terminalia brownii</i>      | Gigumira enkuyege n'ebyeeya |
|                          | <i>Callistemon citrinus</i>    |                             |
|                          | <i>Casuarina equisetifolia</i> | Yenye ushindani             |
|                          | <i>Terminalia mantally</i>     |                             |
|                          | <i>Spathodia nilotica</i>      |                             |
| Okufuga enjuki           | <i>Markhamia lutea</i>         | Gigumira enkuyege           |
|                          | <i>Callistemon citrinus</i>    |                             |
|                          | <i>Calliandra calothyrsus</i>  |                             |
|                          | <i>Albizia chinensis</i>       |                             |
|                          | <i>Cordia africana</i>         | Gigumira enkuyege           |
| Obukomera                | <i>Dovyalis caffra</i>         |                             |
|                          | <i>Calliandra calothyrsus</i>  |                             |
|                          | <i>Gliricidia sepium</i>       | Gigumira enkuyege n'ebyeeya |

Emiti gy'entabaganya z'obulimi obugatte n'ebibira - 2

### 6.3 Engeri obulimi obugatte n'ebibira gye butera okukwaatibwaamu (*common agroforestry systems*)

Entegeka z'okugatta obulimi nnyingi. Ezikozesebwa mu bitundu ebingi ziizino mu kifaananyi ekiddako.



Engeri z'okutabaganya obulimi n'ebibira

### 6.3.1 Okugatta emiti n'ebirime (agrisilviculture)

Abakugu mu by'obulimi okusimba emiti mu nnimiro y'ebirime bakuyita "agrisilviculture". Ensimba z'emiti mu ngeri eno twagyoogeddeko mu kitundu 6.2.3 waggulu. Ezimu ku zo ze zino.

#### a. Okusimba ennyiriri z'obusaka mu birime (Alley cropping)

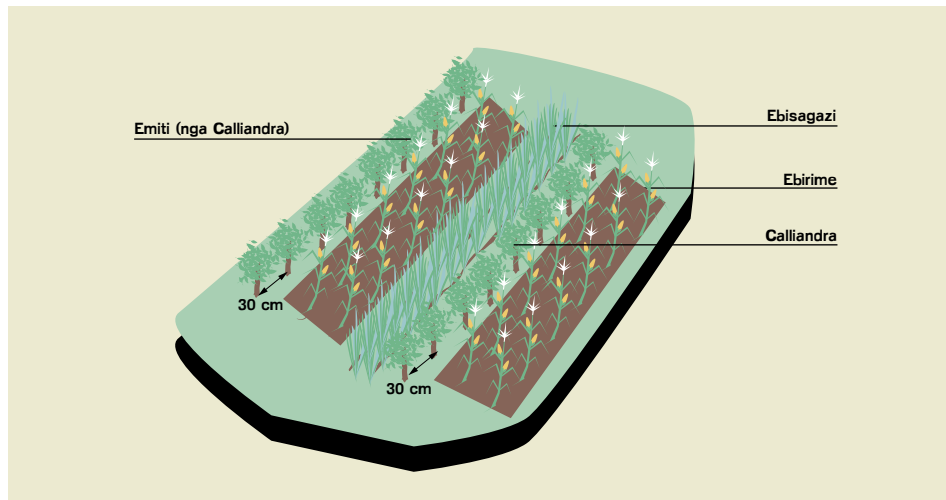
Obusaka busimbibwa mu nnyiriri nga buddirinn'anye, nebuba nga obukomera wakati w'ennyiriri z'ebirime ebimala omwaaka okukungulwa. Enkola eno eyamba okukuuma ettaka n'okuligimusa. Esinga kukozezebwa mu bitundu bya museetwe n'ebyo ebrina obusozi obuseetteddemu.

Bino  
birowoozeeko

Ebyokulabirako by'emiti egisimbibwa nga ennyiriri z'obusaka mu birime: *Sesbania Sesban*, *Gliricidia Sepium* or *Calliandra*.

*Emiganyulo gy'okusimba obusaka busimbibwa mu nnyiriri nga buddirinn'anye:*

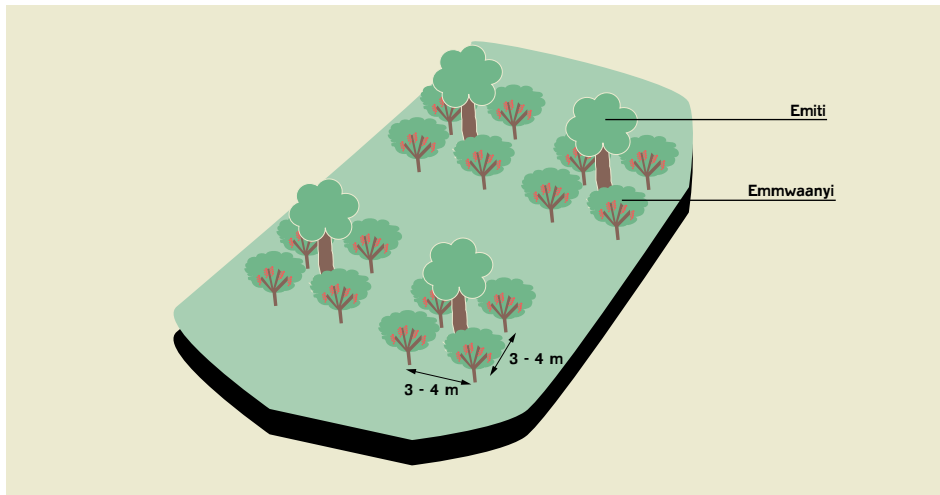
- Okuziyiza ettaka okutwaalibwa mukoka.
- Emiti giziya omuyaga okwoonoona ebirime.
- Emiti ginuuna kaaboni dayokisaidi mu mmpewokye tussa.



Obusaka busimbibwa mu nnyiriri nga buddirinn'anye

#### b. Emiti okusimbibwa wakati w'ebirime ebiwangaazi (Perennial crops)

Emiti giyiza okugattibwa n'ebirime ebiwangaazi, okugeza, emmwaanyi, ebikajjo, ne haai. Ennima eno enyweeza ettaka, eyongera ebigimusa mu ttaka, ebikka ettaka era ewagira omulimi okukyuusakyuusa ebirime (rotation). Mu ngeri eno ettaka terikabalwakabalwa kiyitiridde.

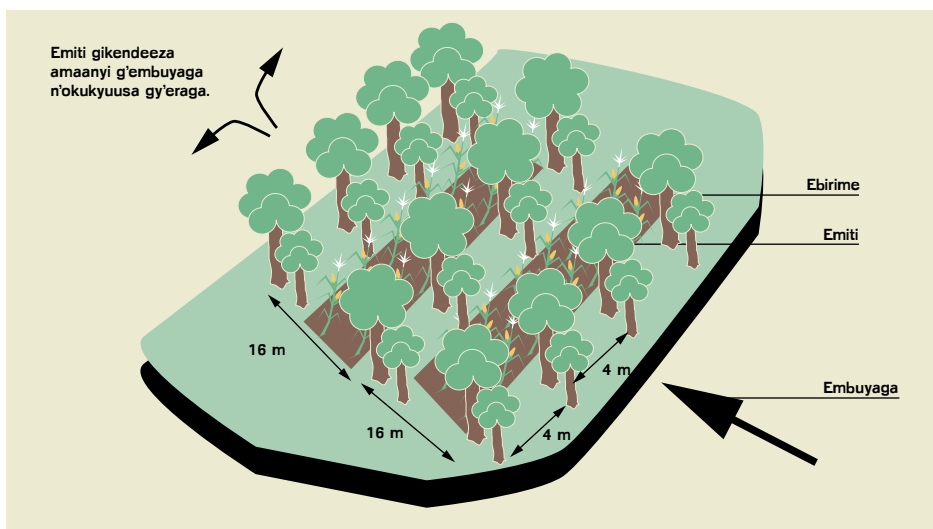


Emiti nga bwegisimbibwa wakati w'ebirime ebiwangaazi (*Perennial crops*)

### c. Emiti egiziyiza omuyaga (*Wind breaks*)

Emiti egiziyiza omuyaga guleme kwoonona mirime (emiti emizibizi) gikeendeeza embiro zaagwo ate negisiikiriza ebirime mu musana. Emiti gino gisaana kusimbibwa nga gya bika bingi n'obuwanvu bwaagyo nga bwa njawula. Gisaana n'okusimbibwa nga gitabikiddwa n'obusaka n'omuddo. Emiti emizibizi tegisaana kwawulwa masa mu makkati ga buli miti ebiri. Amasa gawa omuyaga emikutu mweguyita, nga n'embiro zaagwozeyongedde, negwoonona ebirime. Kijukire nti emitigy'ebibala, emmwaanyi, chaai n'ebirime ebirala bisaana okukuumibwa obulungi omuyaga guleme kugyoonona. Mu bitindu bingi, omuyaga ogw'akabenje gutera kuva ku ludda lumu. Wekenneenye essambayo okakase oludda omuyaga gyeguva.

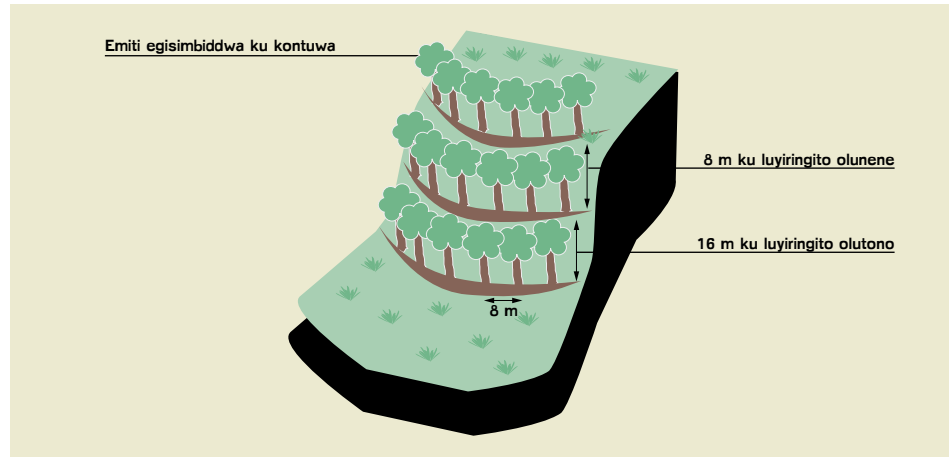
**Kino kikulu:** Ebirime, naddala emit gy'ebibala, emmwaanyi ne kasooli byetaaga akusiikirizibwa omuyaga guleme kubisaanyaawo. Emirundi egisinga, omuyaga ogusaanyaawo ebirime gutera kuva ku luuyi lumu olw'essamba. Wekenneenye essambayo omany embuyaga gyezisibuka.



Emiti egiziyiza omuyaga (*Wind trees/wind breaks*)

#### d. Emiti gya kontuwa

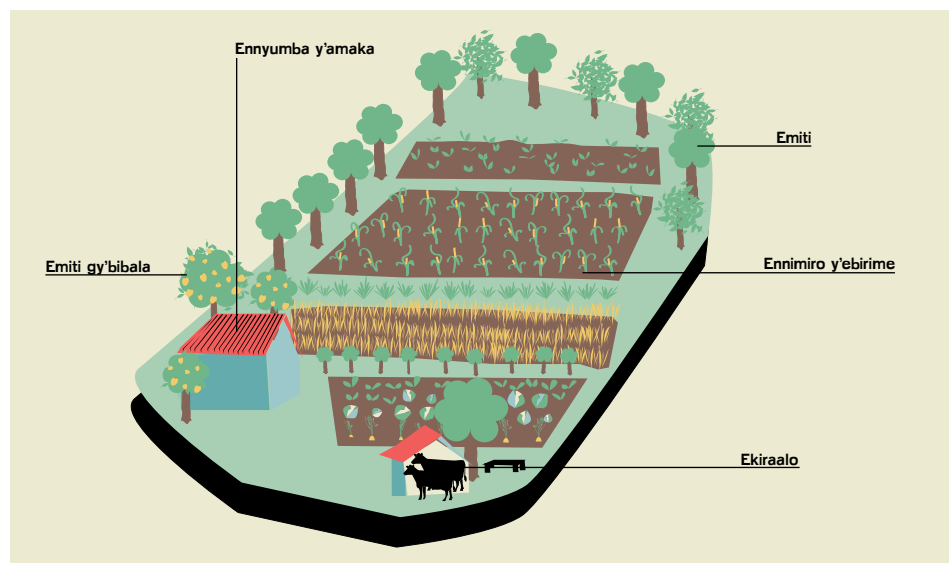
Emiti gya kontuwa gisimbibwa ku buserengeto giziye ettaka oku twaalibwa mukoka. Gikkuuma ettaka n'okukendeeza amazzi okukalira amangu. Emiti gino gikuuma ettaka kubanga gikendeeza embiro za mukoka ate negisobozesa amazzi agasinga okuyingira mu ttaka. Nga bwetwaagambye wagguluko, emitu girongoosa empewo gyetussa nga gijjamu kaaboni dayokisayidi negimuteeka mu ttaka.



Ensimba y' emitu gya kontuwa

#### e. Obubira bw'awaka (*Home gardens*)

Kyetuyita obubira bw'awaka oba "*home gardens*", gye miti egya kintabuli nga mulimu egy'ebibala, egy'emmere y'ebisolo, egy'embaawo, egy'eddagala, n'emirala, gino nga gitabuddwa n'ebibala. Akabira nga kano kabeera kumpi ddala n'awaka oba n'ennimiro omulimi akakungule mu bwangu by'akaagalamu era kakuume ettaka. Emitu gino girongoosa epbewo gyetussa nga gijjamu kaaboni dayokisayidi negimuteeka mu ttaka.



Obubira bw'awaka (*Home gardens*)

#### **f. Emiti gy'ebisiikirize (*Shade trees*)**

Emiti gy'ebisiikirisa gorondebwa na bweegendereza kubanga girina okuba n'amatabi amaagaagavu obulungi agaleeta ebisiikirize ebigazi ebibikka ebirime ebikala amangu, naddala emmwaanyi, ebibala, wadde ebitooke. Eby'okulabirako by'emitu gy'ebisiikirize: *Markamia lutea*, Emiyembe, *Albicia*, Omusambya (*Acacia xanthophloa*).

#### **g. Okuwummuza ettaka (okuzisa) mu ngeri ennongooseemu**

Okuwummuza ettaka mu ngeri ennongooseemu kweetaagisa okusimba emitu egikula amangu. Emitu egissa nayitulojeni mu ttaka n'obusaka bisimbibwa, nga ekigendererwa kw kwongera ebiriisa mu ttaka, okugeza nga naitulojeni, n'ebikoola oba obutiititi obugudde n'ebibala, byonna ebivunda nebifuuka ebirimusa by'ettaka. Ennima eno eganzibwa nnyo mu bitundu ettaka gyelyeetagisa okuwummuzibwa, naddala ebikalu. Emitu girekebwa negikula okumala omwaka, ssinnakindi esatu, ebikiriko nebigungulwa, olwo omulimi n'asiga ebirime.

### **6.3.2 Emitu egisimbiddwa mu ddundiro - “*silvopastures*”**

Okusimba emitu mu ddundiro abalunzi bakukozesa okukuuma emitu gyennyini, okufuna emmere y'ebisolo, n'okwongera ku bulungi bw'obulunzi. Abakugu enkola eno bagiyita 'parkland system' oba “*silvopasture*”.

Ensimba y'emitu mu ngeri eno kukozesebwa abalunzi mu bitundu by'enkuba emala emitu okukula. Emitu gisaasaanyizibwa kyenkanyi mu ddundiro, ggyo gyennyini n'ebimera ebirala bifune ekitangaala ekimala; obakisimbibwa mu nnyiriri oba mu bukuukuulu kisobozese eddundiro okuba n'ebibangiriza ebirerako wamu n'ebisiikirize ebimala, n'emirandira gyaagyo giyambe ettaka.

Ebisolo ebirundibwa kuddundiro ely'ekika kino birikebwa nebyetaaya mu ddundiro oba biyiza okukuumirwa 'okuliira mu kiraalo ebbanga erisinga (*zero grazing*) nga biriisibwa omuddo omgutemeddwa neguleetebwa ku ddundiro (*cut-and-carry system*).

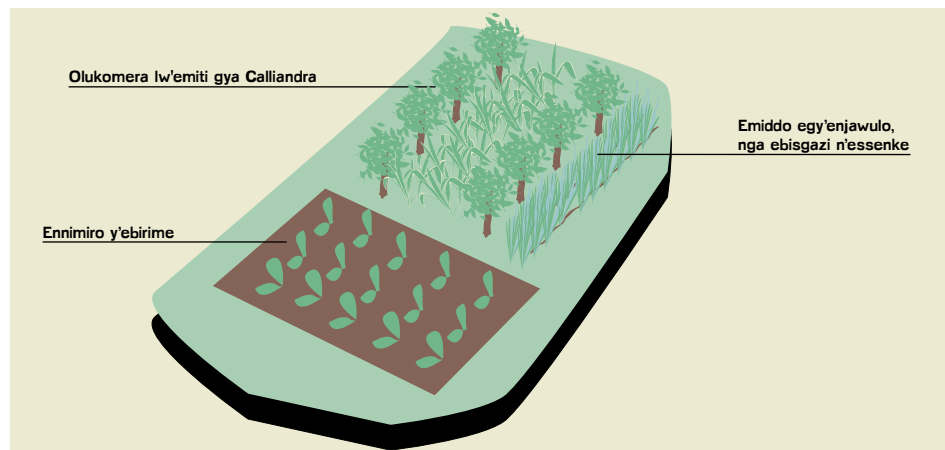
Ennunda eno bw'ekozesebwa obulungi, eyamba okukuuma obugimu bw'ettaka n'okwongera amagoba g'omulunzi ate n'aganyulwa ne mu bibala.

#### **a. Amaterekero gy'ebiriisa by'ebisolo (*Fodder banks*)**

'Amatetekero' gano, mu butuufu ziba nnimiro ezirimu omuddo gw'ebisolo, ebirime ebiriibwa ebisolo, emitu n'obusaka ebisolo byebisobola okulya. Byonna bisimbibwa mu bweegenereza nga ensibuko y'ebiriisa ebisolo ebirunde, nga entez'amata, ezeetaaga okulya obulingi zikamweemu amata amangi ate amalunge. Mu nnima n'enunda eno, omulimi asimba emitu mu bukomera, mu bu puloti obusimbwmu omuddo oba ebibala ate nga usibiddwassenn'enge okukuumuraebisolo ku ddundiro. Emitu egyo givaamu ebiriisa, ebirimusa, ebisasiro ebibikka ettaka, ate negyongera naitulojeni mu ttaka ligimuke nga bwegilikuumu obutatwaalibwa mukoka. Ennima eno bw'essibwa mu nkola mu butuufu, eyongera amagoba agava mu bulunzi olw'ebisolo okulya obulungi, okuywa amazzi agamala nga bigajja mu miti n'obusaka obuli ku ddundiro. Omulunzi asobola n'okukola ggaasi afumba okuva mu busa bw'ebisolo ebyo. Emitu n'ebirime abirimwa mu nkola eno bikendeeza ku nsimbi omulunzi oba omulimi agikozesa z'asasaanya ku ddundiro.

Ekirala, emirandira emiwanvu egy'emitu gikka walako mu ttaka negijjaye ebiriisa n'amazzi emiddo n'ebirime gebitatuuka. Ekyo kisobozesa emiddo n'ebirime okuba n'amazzi ne mu kyeeya. Amaterekero g'ebiriisa gano yinza omuva mu kusiga ensiga oba okusimba obuti obubisi.

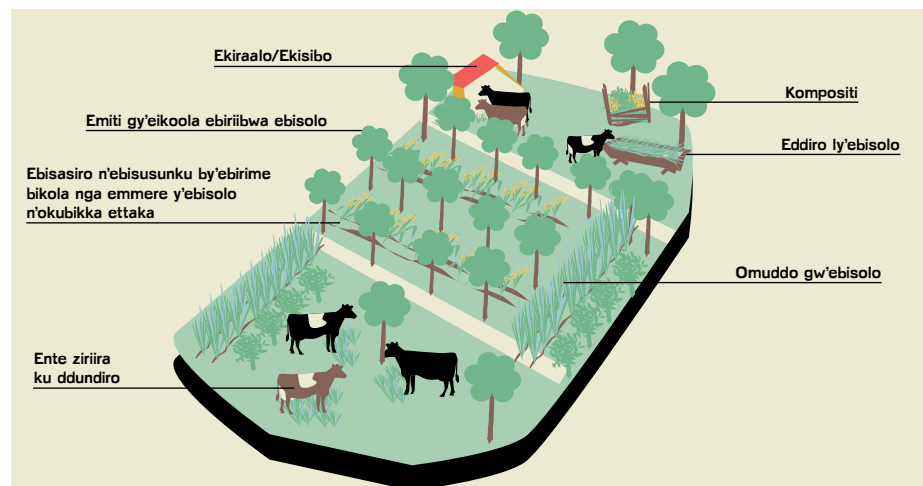
Emitu n'obusaka ebitera okusimbibwa mu 'materekero' gano gye: *Calliandra* spp, *Sesbania sesban*, *Gliricidia sepium*, *Moringa oleifera*, *Leucaena leucocephala* ne *Cajanus Cajan*, emiddo n'ebirime ebiriibwa ebisolo, nga *desmodium*, lucern.



Eterekeero ly'ebiriisa by'ebisolo (Fodder banks)

### 6.3.3 Okugatta emitu, ebirime wamu n'obulunzi – “agrisilvopastoral”

Okugatta emitu, ebirime awamu n'ebisolo kuyitibwa 'ennima engatte' oba (agrisilvopastoral). Emitu gireeta ebisiikirize ebibikka ebirime n'ebisolo okokweggama omusana; gikendeeza kaaboni dayokisaidi ava mu birime n'ebisolo. Emitu gitangira n'omuyaga ogwandyoonoonye ebirime. Mu bisolo muvaamu ebirimusa (obusa) by'ebirime n'emitu; n'ebisolo birya ebirime n'ebikoola by'emitu. Ate ebirime bikozezebwa okukola kompositi n'okubikka ettaka.



Emitu emigatte n'ebirime awamu n'obulunzi – (Agrisilvopastoral)

### 6.3.4 Emiti egigattiddwa n'okukuuma ebiwuka eby'omugaso - "apiculture" ne "sericulture"

Okusimba emitu nga giri wamu n'ebiwuka ebifuge abakugu bakuyita 'entomosilviculture' ate ne bagyaawulamu ebitundu bibiri, okufuga enjuki, kye bayita "apiculture" n'okufuga obusaanyi obukola wuzi za siliki (silk) "sericulture".

#### a. Okufuga enjuki (apiculture) oba apikaacha

Apikaacha kwe kufuga enjuki olw'omubisi gwaazo (honey) n'envumbo eisigala ekolebwaamu emisumaawa. Enjuki zifugibwa mu mizinga emiwanike ku matabi g'emitu wegifunira ebisiikirize. Omubisi gw'enjiki gwa ttunzi nnyo ate gulimu ebiriisa bingi nnyo ebirungi ku bulamu bw'abantu.

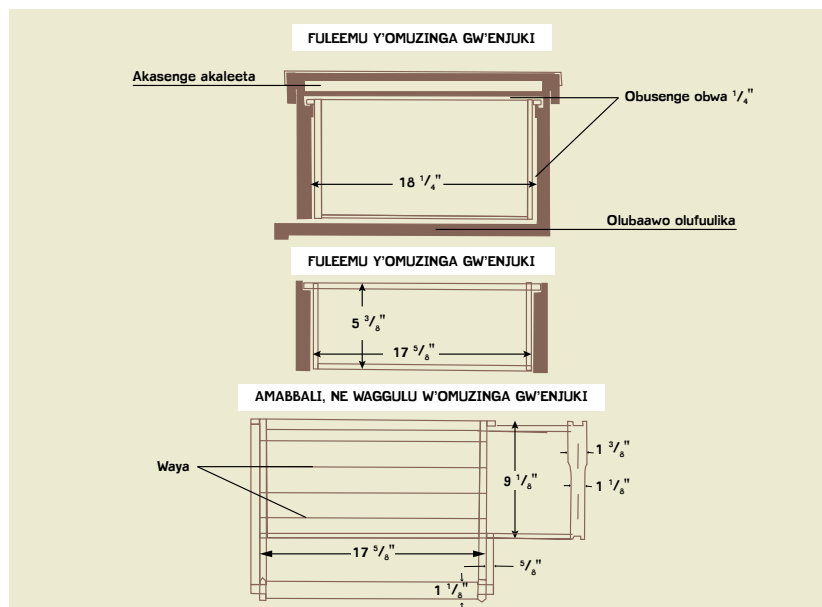
*Emiganyulo gy'okufuga enjuki:*

- Kumpi bili ekiva mu muzinga gw'enjuki kya mugaso; muvaamu eddagala, envumbo, omubisi, obusagwa bw'enjuki (obukozesebwa okukola eddagala eritta ebiwuka).
- Enfunna ennungi ey'omulimi.
- Okuyamba ebimuli by'ebimera okuzaala ebibala n'ensigo.
- Enjuki tezeetagisa bakozi bangi.
- Za busuubuzi bwangu.
- Zeetagisa ssente ntono okutandika okufuga.
- Ebikola ebyeetagisa nabyo bitono.

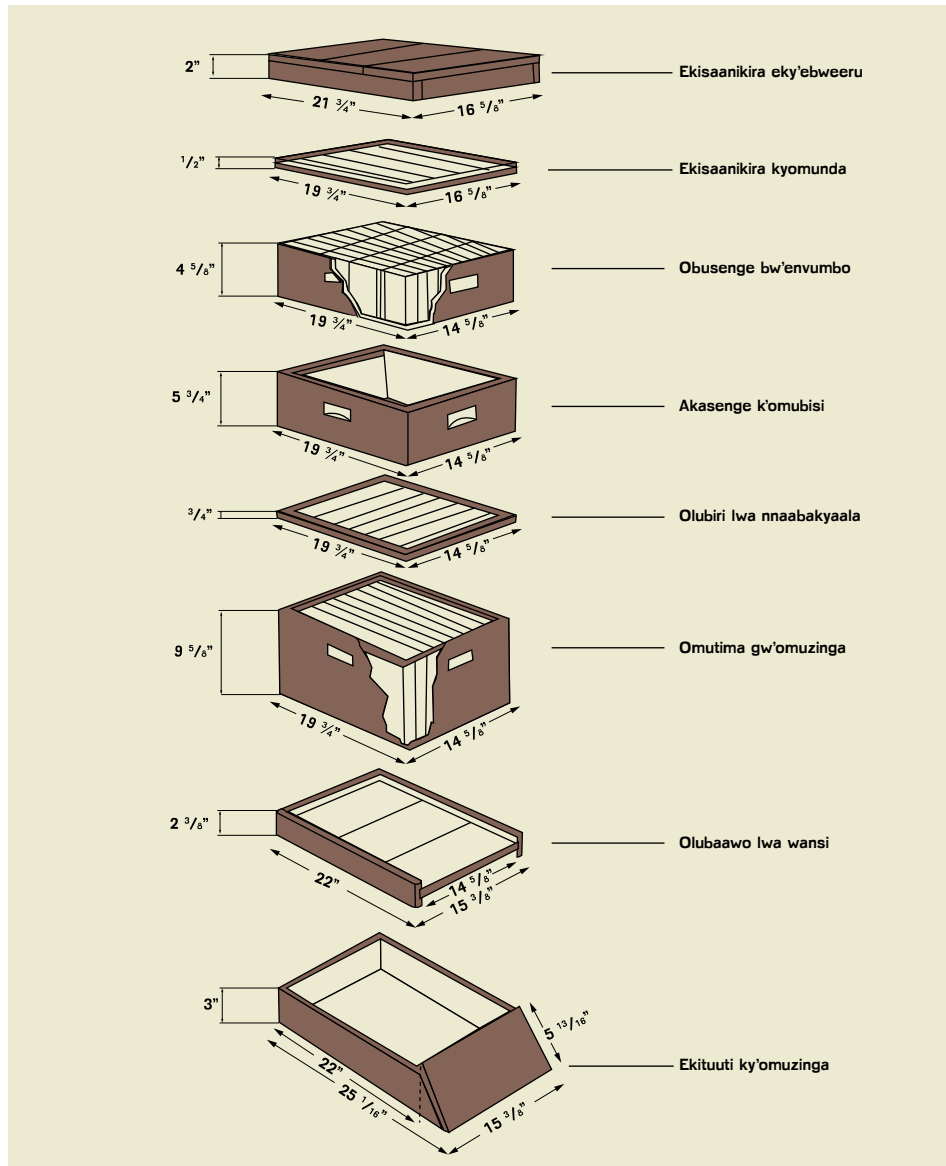
*Ebyeetagisa okufuga enjuki:*

- Amazzi agamala nga tegaggwaawo.
- Emitu gy'ebisiikirize n'ebikoola, naddala eby'emitu gino (*Gliricidia*, *Calliandra*, *Markhamia lutea*, *Grevillea Robusta*, n'emiyembe).
- Ekifo aewatali buyoogaano, muyaga, oba obutonde bw'ensi obwoononeddwa.

Waliwo emizinga ge'enjuki abaagala okuzirunda zebasobola okugula.



Emu ku nziba z'emizinga gy'enjuki (Ekitundu ekisooka)



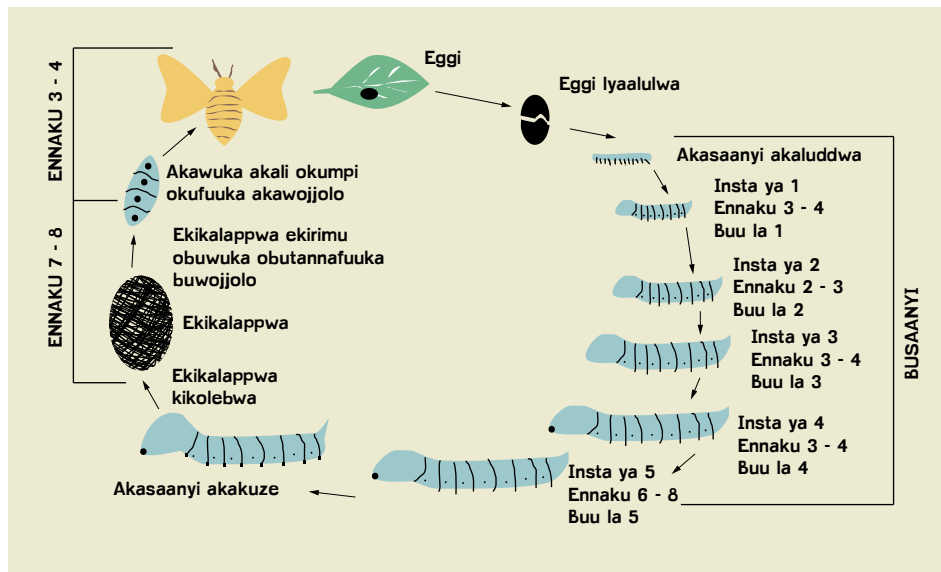
Engeri endala y'okuziba emizinga gy'enuki

## b. Obusaanyi bwa siliki – “silkworms” (*sericulture*) oba serikaacha

Serikaacha kwe kufuga obusaanyi obukola wuzi za siliki ezikolebwaamu egoye. Okukola siliki kyeetaagisa:

1. Okufuga obusaanyi bwa siliki okuva ku magi okutuuka ku busaanyi bwe bukulira ddala nebwezinga mukisawo kya wuzi.
2. Okusimba n'okulabirira ekika ky'emiti egiyitibwa muliberi (*mulberry*). Obusaanyi bulya bikoola bya muti ogwo.

Okukungula siliki kiwa omulime ekkubo eddalaery'oku funa ensimbi.



Enkola ya siliki

### 6.3.5 Emiti emigatte n'ebennyanya (*aquasilviculture*) oba akwasilivikaacha

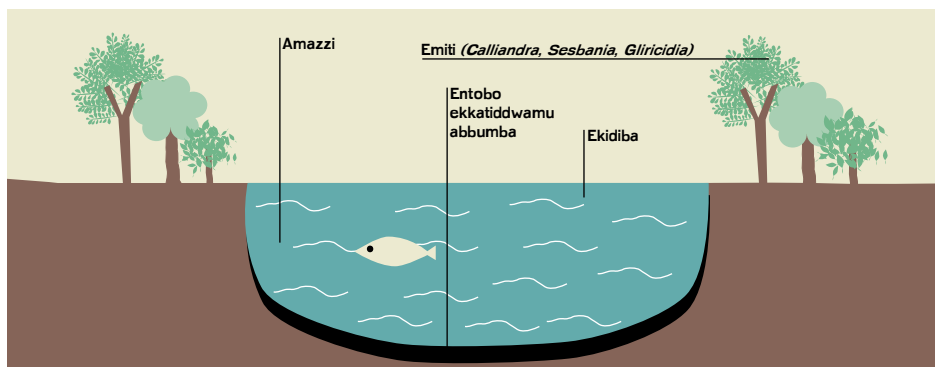
Akwasilivikaacha y'endabirira y'emitu egendera awamu n'ebidiba by'ebennyanya. Emiti n'obusaka bisimbibwa ku mbalama z'ennyanya, omwaala, omugga, oba oba olutobazi, emitu egyo negitabaganyizibwa n'ekidiba nga givaako ebikoola ebyennyanya byebirya oba okuvundavunda nebireetera ebika by'ebirime ebiriibwa ebyennyanya okumera.

Ebika by'emiri egigattibwa n'ebennyanya: *Calliandra*, *Sesbania sesban*, *Gliricidia sepium*.

Bino birowoozeeko

*Emiganyulo gya akwasilivikaacha:*

- Kkubo ery'ennyongereza y'ensimbi ezigattibwa ku z'okuvuba. Ababi abavuba ebyennyanya n'enjaba bafuna ensimbi okuva mukutunda ebibala by'emitu.
- Okukuuma obutonde bw'ensi mu bitundu by'ennyanya, emigga oba intobazi n'ebisolo byomunsiko.
- Okukuuma ensibuko z'emigga n'amazzi.



Okufuga ebyennyanya mu kidiba

## 6.4 Enkoza y'ettaka ezeesigamye ku bibira

Engeri z'okukozesa ettaka ezeesigamye ku miti n'ebibira ziri nnya. Mu 'nkoza y'ettaka' tutegeeza engeri omulimi oba omulunzi gy'asalawo okusimba emiti n'engeri gy'agitabaganya n'ebirime.

*Ebika by'emit*

Ebika by'emit ebikulu mu East Africa bifunziddwa wano wansiko.

| OBUBIRA BW'ENKU                | SSAMBA Z'EBIBALA                | EMITI EMISAASAANYE              | ENSALO N'ENKOMERA                                    |
|--------------------------------|---------------------------------|---------------------------------|------------------------------------------------------|
| <i>Casuarina equisetifolia</i> | <i>Mangifera indica</i>         | <i>Grevillea Robusta</i>        | <i>Markhamia lutea</i>                               |
| <i>Albizia lebbbeck</i>        | <i>Citrus limon</i>             | <i>Albizia coriara</i>          | <i>Casuarina equisetifolia</i>                       |
| <i>Markhamia lutea</i>         | <i>Persea Americana</i>         | <i>Albizia lebbbeck</i>         | <i>Acacia xanthophloea</i>                           |
| <i>Cedrela odorata</i>         | <i>Artocarpus heterophyllus</i> | <i>Acrocarpus fraxinifolius</i> | <i>Maesopsis emnii</i>                               |
| <i>Acacia nilotica</i>         | <i>Psidium quajava</i>          | <i>Podocarpus falcatus</i>      | <i>Grevillea Robusta</i>                             |
| <i>Acacia xanthophloea</i>     | <i>Syzygium cumnii</i>          | <i>Prunus Africana</i>          | <i>Leucaena leucocephala/ Calliandra calothyrsus</i> |
| <i>Acacia polyacantha</i>      | <i>Pasiflora edulis</i>         | <i>Cordia Africana</i>          | <i>Senna siamea</i>                                  |
| <i>Maesopsis emnii</i>         | <i>Eriobotrya japonica</i>      |                                 |                                                      |

Ebikulu nga olonda ebika by'emit

*Ebikulu nga olonda ebika by'emit:*

| EBISAANYIZO               | EMIGANYULO                                                                                                                |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Okuba n'emigaso egiwerako | Enku, empagi, emmere y'ebisolo, ebigimusa (bikoola), eddagala                                                             |
| Okukula amangu            | Emiganyulo n'amagoba gajja mangu                                                                                          |
| Enkula y'emirandira       | Gibe miwanvu gireme kuliirira birime birala                                                                               |
| Okuvuganya kubiriisa      | Gibe nga tegivuganya na birimebirala mu kweegaziya, kku biriisa, ku kitangaala oba amazzi                                 |
| Okuloka amangu            | Gibe nga giddamu mangu okuloka nga gitemeddwa                                                                             |
| Ebiriisa ebiwooma         | Naddala ebiriibwa (abantu n'ebisolo) ebiva ku miti egirondeddwa ate nga tegirina butwa, n'ebikoola ebigonyu               |
| Amatabi                   | Ekitangaala kisobole okuyita mu matabi ate nga galeeta ebisiikirize                                                       |
| Nitulojeni                | Emit egissa naitulojeni mu ttaka negilgiimusa                                                                             |
| Enfuna                    | Gibe nga givaamu ebibala, enku, oba ebintu eb'enjawulo eby'amaguzi                                                        |
| Obutonde bw'ensi          | Gibe nga tegitta bamera birala nga gibikkiriza okuloka, n'okugendera ku mbeera 'obutonde bw'ensi mu kitundu n'okukirungia |

Eby'okwekenneenya mu kulonda emiti gy'okusimba

### 6.4.1 Obubira bw'enku (Woodlots)

"Woodlot" kitegeeza emiti emisaamusaamu egisimbiddwa ku ssamba oba ku ddundiro ng'akabira akatono akavaamu embaawo, empagi, enku oba amanda, n'okuwagira emirimo gy'omulimi emirala, nga okufuga enjuki, ebirime oba ebisolo. Obubira buno busimbibwa ku masamba. Givaamu kaaboni (*carbon pools*). Kya bwegendereza nnyo okusimba emiti eminnansi n'okugitabula n'emigwiira.



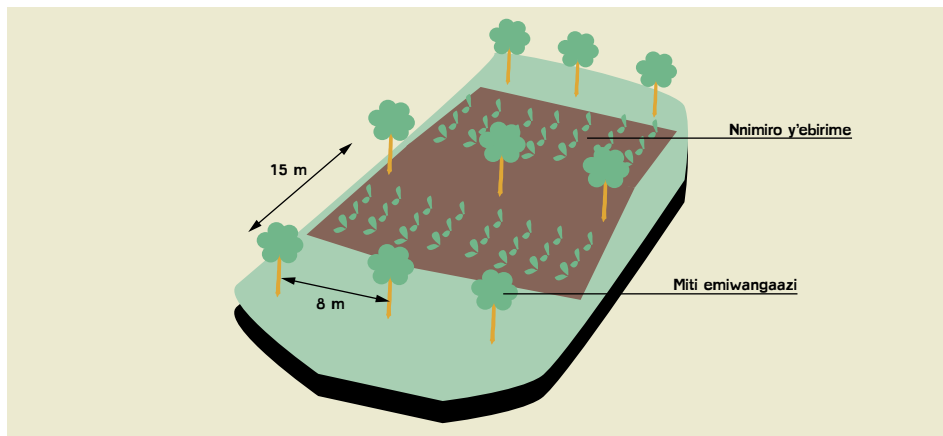
Akabira akatono ku ssamba

### 6.4.2 Essamba y'ebibala

Emiti gy'ebibala giyinda okusimbibwa mu bukuukulu oba okusaasaanyizibwa ku ssamba oba eddundiro giveeko ebibala by'amaka oba eby'okutunda. Ebikoola, ensigo, n'ebibala byakulya birungi nnyo, bivaamu eddagala n'emiganyulo emirala. Ate bwebigwa ku ttaka birigimusa kinene. Kirungi okusimba emiti egikula obulungi mu kitundu mwooli.

### 6.4.3 Emiti emisaasaanye nga bitabuddwa mu birime

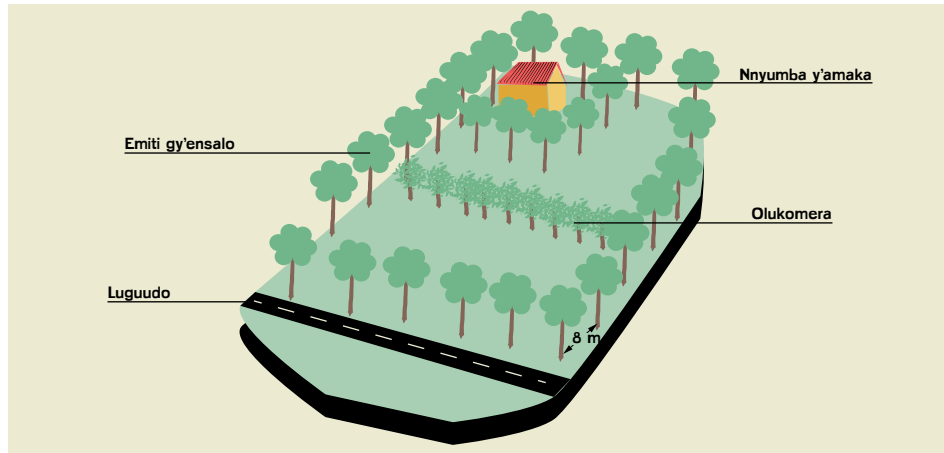
Mu nsimba y'emiti eno, gisimbibwa nga gyessudde ebbanga ate nga giri kumpi n'ebirime. Emiti ginogivaamu ebiriisa, enku, emere y'ebisolo, empagi n'ebirala. Gireeta ebisiikirize ate negiyamba okugimusa ettaka.



Akabira k'enku akatono ku ssamba

#### 6.4.4 Emiti egy'ensalo n'enkomera

Ensimba y'emitu eno egyetooloza emisiri oba eddundiro negibeera ku nsalo zaagyo ne ku nguudo. Giyinda okuba emitu egyeesudde amabanga oba obusaka obukola nga enkomera. Emitu egyo gisobola okufuula embeera y'obudde okwawukako n'ey'ekitundu kyonna, kino nekiyamba ebirime nga giziya omuyaga n'okugumya ettaka; givaamu ne kaaboni.



Emitu egy'ensalo n'enkomera

#### AKAGEZO AKAMPIMPI

1. Wandika engeri gy'ogattamu okulima n'emitu ku ssambayo.
2. Ngeri ki gy'oganyulwaamu olw'ennima eno?

#### 6.5 Endabirira y'obulimiro bw'emitu emitu ("nursery" - naasale) n'ensigo

Naasale kasiri akatono ddala ku ssamba oba okugyeesamba akabanga ensigo mwe zisigwa n'okulabirirwa zimere era ebirime ebitu (*seedlings*) bikulemu ate omulimi abisimbulize bisimbibwe mu ssamba yennyini. Ebirime bino ebitu biyinda okutundibwa oba okutundibwa ebweeru omulimi n'afuna ensimbi okuliisa amaka oba okusitula omutindo gw'essamba. Obusiri buno busobozesa omulimi okufuna ebirime eby'enjawulo mu bwangu ate ku bbeeyi eya wansi. Ensigo ezisigiddwa mu naasale zisinda ensigo obutereevu omukisa gw'okukula kubanga ebirime ebitu biguma mangu nga birabirirwa.

##### 6.5.1 Emiganyulo gy'okusiga ensigo mu naasale

- Osobola okusiga ebika by'oyagala n'omuwendu gwagyo gw'oyagala.
- Obuti obuto buyinda okutundibwa.
- Naasale zeetaaga ensimbi ntono ate nnyangu okulabirira.
- Obuti obuto bubaawo omwaaka gwonna.
- Ebikola ebyeetaagisa byangu okufuna mu kitundu.
- Naasale zisobola okukozesebwa abasomesa n'abatendesi.

## 6.5.2 Eby'okuloowoozaako mu bwegendereza nga olonda aw'okuteeka naasale

*Ebisaanyizo by'ekitundu awasaanira naasale:*

- Amazzi agamala.
- Kumpi n'essamba/nnimiro yo.
- Ettaka eddungi.
- Okwewala awali omuyaga, omusana omungi n'ebisolo.
- Akaserengeto k'oluyiringito olusaamusaamu amazzi g'enkuba gakuluukute mpola.
- Ow'okugaziya naasale.

## 6.5.3 Okuteeka ettaka mu naasale

Ettaka lya naasale lyandibadde ggimu nga teribiridde. Lijje mu kimu ku bitundu by'essamba yo, okugeza, mu kisiikirize ky'omuti oba kumpi n'olukomera kubanga ebifo ebyo biba bigimu. Nga tonnawuukuula ttaka lya kutwaala mu naasale, jjawo ebisasiro byonna nga ebikoola. Sima ettaka n'ekumbi olikunng'unte okujjama amayinja, ebiti n'ebirala ebitagasa nsigo. Tabulamu ebigimusa n'omusenya mutonotono. Awo lijja kuba nga lituuse okugenda ku mutendera oguddako wano wansi.

## 6.5.4 Okuteeka ettaka mu bukebe – pottingi (potting)

"Potting" oba pottingi kiva mu kigambo "pot" (kasuwa oba kakebe). Pottingi kwe kuteeka ettaka mu bukebe oba mu busawo okusobola okusigamu ensigo zimere bulungi nga zikumibwa. Obusawo buno bukolebwa mu bintu ebifunika amangu okumpi ne naasale, okugeza pakiti z'amata, ensawo z'ebipapula, emikebe emikadde, obuleku, n'obukopo bw'ebbumba. Oyinza n'okugula obusawo obukolebwa olw'omulimo guno, nga obusawobwa pulasitiiki obudduavu.

*Okulagirira:*

1. Mansira amazzi kuttaka lyewategese nga bwetwaalaze waggulu mu 6.5.3 naye nga tolinnyikiza kiyitiridde.
2. Teeka ettaka mu kitundu kya  $\frac{3}{4}$  ekyo buli kasawo olikkatire mpolampola liggumire, ate ojjuze ekitundu ekisigadde n'ettaka eritakkatiddwa. Jjukira nti bw'okkatira ettaka eryawaggulu ensigo tezisigika bulungi mangu ate n'emirandira tegiyingira bulungi mu ttaka.
3. Kakasa nti obusawo kwasameye ku njuuyi zombi (wansi ne waggulu) oba nti entobo ogifumiseemu ebituli amazzi gattulukuke bulungi n'emirandira gikule bulungi.

## 6.5.5 Ensigo z'emiti weziva

Enzigo ziyinza okukunng'aanyizibwa ku miti emiramu obulungi oba okuzifuna ku balimi banno. Oyinza okuzifuna ne mu bitongole bya gavumenti ne mu bitongole ebitali bya gavumenti (NGOs), nga ebibiina by'abalimi oba okuzigula mu maduuka agazitunda.

*Enkunng'aanya y'ensigo:*

1. Zuula omuti ogutalina ndwadde nga gulabika bulungi.
2. Noga ensigo ezikuze naye nga tezivunze oba.
3. Ensigo zitegeke ngabwetulaze wansiko.
4. Ensigo kati zituuze okusiga.
5. Kati ensigo zituse okusimbibwa.

| KIKA<br>KY'ENSIGO                   | EBISOOKA                              | ENTEGEKA                                                                                                                                           | EKISEERA<br>KY'OKUM-<br>ERA | ENSIGA                                         |
|-------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------------------------------------|
| <i>Acacia<br/>mearnsii</i>          | Yanika mu musana.                     | Teeka ensigo mu<br>ttaka nga tobiseeko<br>ttaka, teekakako<br>ebisigalira eby'omu-<br>nimiro kungulu oby-<br>ookye. ozirekewo<br>zisobole okumera. | Ennaku<br>3 - 14.           | Siga mu naasale<br>oba mu busawo<br>emyeezi 3. |
| <i>Acacia<br/>nilotica</i>          | Yanika mu musana<br>oyase ekisusunku. | Zisuze mu mazzi<br>agookya<br>agachamusiddwa.                                                                                                      | Ennaku<br>5 - 7.            | Siga butereevu<br>oba mu naasale.              |
| <i>Acacia<br/>polyacantha</i>       | Yanika mu musana<br>oyase ekisusunku. | Zisuze mu mazzi<br>agookya<br>agachamusiddwa.                                                                                                      | Ennaku<br>5 - 7.            | Siga butereevu<br>oba mu naasale.              |
| <i>Acrocarpus<br/>flaxinifolius</i> | Yanika mu musana<br>oyase ekisusunku. | Zisuze mu mazzi<br>agookya<br>agachamusiddwa.                                                                                                      | Ennaku<br>7 - 20.           | Siga butereevu<br>oba mu naasale.              |
| <i>Albizia<br/>chinensis</i>        | Yanika mu musana<br>oyase ekisusunku. | Zisuze mu mazzi<br>agookya<br>agachamusiddwa.                                                                                                      | Ennaku<br>8 - 30.           | Siga butereevu<br>oba mu naasale.              |
| <i>Albizia<br/>coriaria</i>         | Yanika mu musana<br>oyase ekisusunku. | Asuze mu mazzi<br>agannyogoga.                                                                                                                     | Ennaku<br>8 - 30.           | Siga butereevu<br>oba mu naasale.              |
| <i>Albizia<br/>gummifera</i>        | Yanika mu musana<br>oyase ekisusunku. | Tekyetaagisa.                                                                                                                                      | Ennaku<br>7 - 15.           | Siga butereevu.                                |
| <i>Albizia<br/>lebbek</i>           | Yanika mu musana<br>oyase ekisusunku. | Zisuze mu mazzi<br>agookya<br>agachamusiddwa.                                                                                                      | Ennaku<br>5 - 7.            | Siga butereevu<br>oba mu naasale.              |
| <i>Alnus<br/>acuminata</i>          | Yanika mu musana<br>oyase ekisusunku. | Siga mangu nga<br>zikunguddwa.                                                                                                                     | Ennaku<br>6 - 15.           | Siga mu naasale.                               |
| <i>Azadirachta<br/>indica</i>       | Yanika mu musana<br>oyase ekisusunku. | Nnyika mu mazzi<br>agannyogoga<br>essaawa 48.                                                                                                      | Ennaku<br>8 - 28.           | Siga butereevu oba<br>mu naasale.              |
| <i>Cajanus<br/>Cajan</i>            | Yanika mu musana<br>oyase ekisusunku. | Tekyetaagisa.                                                                                                                                      | Ennaku<br>5 - 7.            | Siga butereevu.                                |
| <i>Calliandra<br/>callothyrsus</i>  | Yanika mu musana<br>oyase ekisusunku. | Nnyika essaawa<br>12 mu mazzi<br>agookya<br>agachamusiddwa.                                                                                        | Ennaku<br>4 - 10.           | Siga butereevu.                                |
| <i>Callistemon<br/>citrinus</i>     | Yanika mu musana<br>oyase ekisusunku. | Tekyetaagisa.                                                                                                                                      | Ennaku<br>20 - 28.          | Siga mu naasale.                               |

Entegeka y'ensigo, ebisooka - 1

| KIKA<br>KY'ENSIGO                  | EBISOOKA                                                                                                                                                         | ENTEGEKA                                                                                                                                                     | EKISEERA<br>KY'OKUM-<br>ERA                                                                             | ENSIGA                                                            |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <i>Carica<br/>papaya</i>           | Sala eppaapaali<br>oyanike ensigo.                                                                                                                               | Nnyika essaawa<br>12 mu mazzi<br>agannyogoga.                                                                                                                | Ennaku<br>7.                                                                                            | Siga butereevu oba<br>mu naasale.                                 |
| <i>Casuarina<br/>equisetifolia</i> | Yanika nga<br>b'w'okyuusa<br>ekikalappwa<br>kyaatike.                                                                                                            | Tekyetaagisa.                                                                                                                                                | Ennaku<br>10 - 15.                                                                                      | Siga mu naasale.                                                  |
| <i>Cedrela<br/>odorata</i>         | Yanika mu musana<br>oyase ekisusunku.                                                                                                                            | Tekyetaagisa.                                                                                                                                                | Ennaku<br>5 - 7.                                                                                        | Siga butereevu oba<br>mu naasale.                                 |
| <i>Chlorophora<br/>excelsa</i>     | Yanika mu<br>kisiikirize.                                                                                                                                        | Tekyetaagisa.                                                                                                                                                | Ennaku<br>21 - 60.                                                                                      | Siga mu naasale.                                                  |
| <i>Citrus<br/>reticulata</i>       | Zinnyike mu mazzi<br>essaawa 12<br>oyanike.                                                                                                                      | Tekyetaagisa.                                                                                                                                                | Ennaku<br>10 - 15.                                                                                      | Siga mu busawo.                                                   |
| <i>Citrus<br/>sinensis</i>         | Ensigo zino<br>ziteekwa okuba nga<br>teziweza wiiki 3<br>oba 4. Zinnyike mu<br>mazzi agannyogoga<br>okumala essaawa<br>12, oluvannyuma<br>ozaanike mu<br>musana. | Nnyika ensigo<br>mu mazzi<br>agakyamusiddwa<br>era nga gookya.<br>Tekyeetaagisa<br>kunnyika ensigo<br>bwe ziba ensigo<br>bweziba ezengedde<br>nga ssi nkalu. | Ennaku 10<br>- 15 ensigo<br>bweziba<br>ezengedde<br>nga ssi<br>nkalu.<br>Bwekitaba<br>ekyo, wiiki<br>3. | Nnaasale olyooke<br>ozisse mu bukebe<br>okumala emyeezi<br>3 - 6. |
| <i>Cordia<br/>africana</i>         | Yanika mu musana.                                                                                                                                                | Nnyika essaawa<br>12 - 24 mu mazzi<br>agannyogoga.                                                                                                           | Ennaku<br>30 - 60.                                                                                      | Siga butereevu oba<br>mu naasale.                                 |
| <i>Croton<br/>megalocarpus</i>     | Yasa ekikalappwa<br>olonde ensigo.                                                                                                                               | Tekyetaagisa.                                                                                                                                                | Ennaku<br>6 - 60.                                                                                       | Siga butereevu.                                                   |
| <i>Cyphomandra<br/>betacea</i>     | Zooze oyanike mu<br>kisiikirize.                                                                                                                                 | Zisuze mu mazzi<br>agookya<br>agachamusiddwa.                                                                                                                | Ennaku<br>4 - 6.                                                                                        | Siga mu naasale.                                                  |
| <i>Grevillea<br/>Robusta</i>       | Yanika mu musana<br>oyase ekisusunku.                                                                                                                            | Nnyika essaawa<br>24 mu mazzi<br>agookya<br>agachamusiddwa.                                                                                                  | Ennaku<br>8 - 30.                                                                                       | Siga mu naasale.                                                  |
| <i>Grilicidia<br/>sepium</i>       | Yanika mu musana<br>oyase ekisusunku.                                                                                                                            | Zisuze mu mazzi<br>agookya<br>agachamusiddwa.                                                                                                                | Ennaku<br>7 - 10.                                                                                       | Siga butereevu<br>oba simba akatabi<br>butereevu.                 |
| <i>Hibiscus<br/>sabdariffa</i>     | Yanika mu musana<br>oyase ekisusunku.                                                                                                                            | Tekyetaagisa.                                                                                                                                                | Ennaku<br>4 - 7.                                                                                        | Siga butereevu.                                                   |
| <i>Jacaranda<br/>mimosifolia</i>   | Yanika mu musana<br>oyase ekisusunku.                                                                                                                            | Tekyetaagisa.                                                                                                                                                | Ennaku<br>14 - 21.                                                                                      | Siga mu naasale<br>oba mu busawo<br>emyeezi 3 - 6.                |
| <i>Khaya<br/>anthotheca</i>        | Yanika mu musana.                                                                                                                                                | Tekyetaagisa.                                                                                                                                                | Ennaku<br>7 - 30.                                                                                       | Siga butereevu oba<br>mu naasale.                                 |
| <i>Leucaena<br/>diversifolia</i>   | Yanika mu musana<br>oyase ekisusunku.                                                                                                                            | Nnyika essaawa 4<br>mu mazzi agookya<br>agachamusiddwa.                                                                                                      |                                                                                                         | Siga butereevu.                                                   |

Entegeka y'ensigo, ebisooka - 2

| KIKA<br>KY'ENSIGO              | EBISOOKA                                | ENTEGEKA                                         | EKISEERA<br>KY'OKUM-<br>ERA | ENSIGA                                                    |
|--------------------------------|-----------------------------------------|--------------------------------------------------|-----------------------------|-----------------------------------------------------------|
| <i>Leucaena leucocephala</i>   | Yanika mu musana oyase ekisusunku.      | Nnyika mu mazzi agookya agachamusiddwa.          | Ennaku 4 - 15.              | Siga butereevu.                                           |
| <i>Maesopsis eminii</i>        | Walakata ekibala.                       | Zinyike essaawa 12 - 72 mu mazzi agannyogoga.    | Ennaku 24 - 90.             | Siga butereevu oba mu naasale.                            |
| <i>Markhamia lutea</i>         | Yanika mu musana ojemu ensigo.          | Tekyetaagisa.                                    | Ennaku 4 - 20.              | Siga butereevu.                                           |
| <i>Moringa oleifera</i>        | Yanika mu musana ojemu ensigo n'engalo. | Tekyetaagisa.                                    | Ennaku 9 - 30.              | Siga butereevu.                                           |
| <i>Persea americana</i>        | Walakata ekibala.                       | Teeka mu mazzi agookya otte obuwuka.             | Wiiki 4 - 6.                | Siga butereevu oba mu naasale, oba yunga ku muti omukulu. |
| <i>Podocarpus usambarensis</i> | Walakata ekibala.                       | Yasa ekikalappwa.                                | Ennaku 23 - 100.            | Siga butereevu oba mu naasale.                            |
| <i>Prunus africana</i>         | Walakata ekibala.                       | Asuze mu mazzi agannyogoga.                      | Ennaku 10 - 30.             | Siga butereevu oba mu naasale.                            |
| <i>Psidium guajava</i>         | Zinnyike mu mazzi oyanike mu musana.    | Tekyetaagisa.                                    | Ennaku 5 - 7.               | Siga butereevu oba mu naasale.                            |
| <i>Senna siamea</i>            | Yanika mu musana oyase ekisusunku.      | Asuze mu mazzi agannyogoga.                      | Ennaku 8 - 30               | Siga mu naasale.                                          |
| <i>Sesbania sesban</i>         | Yanika mu musana oyase ekisusunku.      | Asuze mu mazzi agannyogoga.                      | Ennaku 7.                   | Siga butereevu.                                           |
| <i>Tephrosia vogelii</i>       | Yanika mu musana oyase ekisusunku.      | Tekyetaagisa.                                    | Ennaku 8 - 10.              | Siga butereevu.                                           |
| <i>Terminalia brownii</i>      | Yanika mu kisiikirize.                  | Kongola ozisuze mu mazzi agannyogoga.            | Ennaku 10 - 90.             | Siga butereevu oba mu naasale.                            |
| <i>Terminalia catapa</i>       | Zironde oyanike.                        | Zisuze mu mazzi agookya agachamusiddwa.          | Ennaku 20 - 30.             | Siga butereevu oba mu naasale.                            |
| <i>Terminalia mantally</i>     | Yanika mu kisiikirize.                  | Zisuze mu mazzi agookya agachamusiddwa.          | Ennaku 7 - 20.              | Siga butereevu oba mu naasale.                            |
| <i>Terminalia superba</i>      | Yanika mu kisiikirize.                  | Kongola ozisuze mu mazzi agookya agachamusiddwa. | Ennaku 21 - 40.             | Siga butereevu oba mu naasale.                            |
| <i>Toona ciliata</i>           | Yanika mu musana.                       | Tekyetaagisa.                                    | Ennaku 5 - 7.               | Siga mu naasale oba mu busawo emyeezi 3 - 6.              |

Entegeka y'ensigo, ebisooka - 3

### 6.5.6 Okulya emmere

Obudde obw'okusigiramu ensigo z'emiti businziira mu baanga lyezimala okutuuka okusimbuliza, gye myeezi 1 – 3 okusinziira ku kika ky'omuti. Kikulu nnyo okuwa ensigo obudde obuzimala okumera n'okukula okutuuka okusimbulizibwa (20 – 30 cm) n'okuba nga enkuba weetandikira zibe nga zituuse.

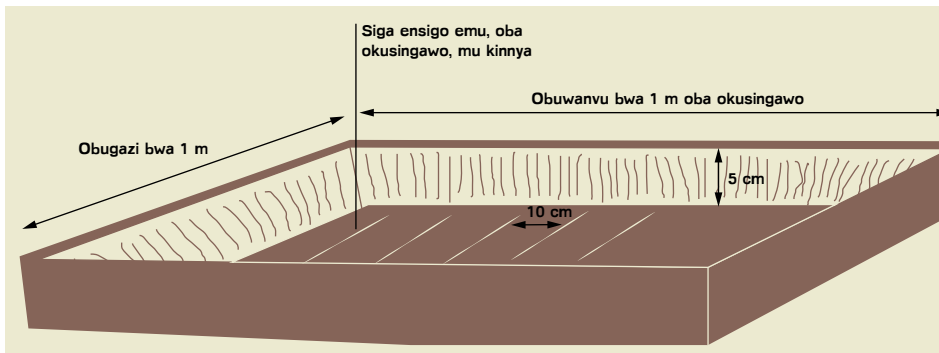
Ziyinza okusigibwa obutereevu oba okusigibwa mu mu bukebe (mu ngeri ya pottingi). Ensigo ennene, nga emiyembe, avocado, neem, *Syzgium*, *Sesbania sesban* ne apple, ziyinza okusigibwa obutereevu mu musiri. Ensigo entono era empewufu, nga emmwaanyi, amapeera, *Markhamia lutea*, *Prunus africana*, n'endala zisaana kisigibwa mu ka puloti k'ensimbuliza (transplant bed) oluvannyuma zissibwe mu bukebe oba obusawo (pottingi) nga zimeze. Kikulu oku tabula obusigo obutone n'omusenyu n'okusaasaanyizibwa obulungi mu ka puloti buleme kweefuutiika n'okukwaatibwa endwadde. Ensigo tozisiga wasi nnyo mu ttaka; ziyinza okuziyira nezitamera bulungi.

### 6.5.7 Entegeka ya ka puloti omumerera ensigo (germination bed)

Kapuloti kano kye kifo ky'omusiri ensigo wezisooka okusigwa zimere. Puloti zino zirimu enjawulo.

#### a. Puloti ey'omu kinnya (sunken bed)

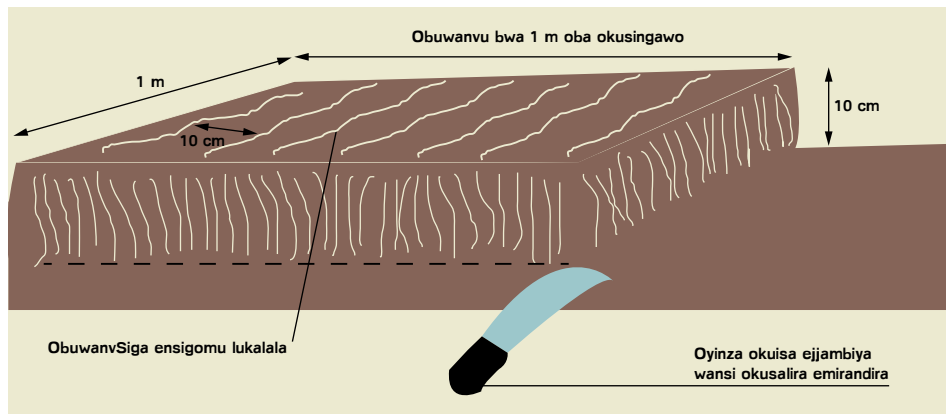
Puloti (oba bedi) eno eringa bbaafu enaabirwaamu; ya metre 5 obugazi ne 5 cm okukka wansi. Puloti zino zikwaasiza ensigo awamu era ziyamba okukuuma amazzi mu ttaka. Zisinga kukozezebwa mu bitundu ebikalu.



Puloti y'ekinnya omumerera ensigo (germination bed)

#### b. Puloti ey'akatuuti (raised beds)

Okukola bu puloti buno ettaka liyibwa wakato w'ebikugiro, nga emigogo gy'ebitooke, neliguumira nga akatuuti akalagirwaako katemba oba abakulu okwoogererako. Puloti eno ya metre wmu mu bugazi, n'egulumira 10 cm waggulu era esingakukozesebw am bitundu eby'enkuba ennyingi. Kino kiyamba okuttulula amazzi obulungi n'emirandira negirema kukka mu ttaka kiyitiridde.



Puloti y'akatuuti omumerera ensigo (raised beds)

### 6.5.8 Okusimbuliza okusooka (*Pricking out*)

Abakugu kyebayita “*pricking out*” kweku kusimbuliza obuti obuto ennyo okuva mu bu puloti mwe bumerera nebusimbibwamu busawo oba obukebe. Okusimbuliza kuno kugoberera emitendera gino wammanga.

1. Fukirira ka puloti nga tonnasimbuliza.
2. Funa bbenseni ogissemu amazzi okutuuka ku kitundu ekya  $\frac{3}{4}$ .
3. Kwaata obikoola bw'akati akato, fumita ekintu nga ekiti ekisongole oba ekkalaamu, kituuke ku mirandira ettakaligonde.
4. Sikamu ekiti mpolampola osike akati akato okateeke mu bbenseni y'amazzi.
5. Fukirira obusawo nga tonnasimbamu kati akato ako.
6. Kozesa ekiti ekisongolw osime akannya mu makkati g'akasawo.
7. Emirandira oba miwanvu nnyo, gikomole ogiyingize mpolampola mu kannya mu bbenseni omukono ogumega gusitudde akati akato nga gukwaata ebikoola. Tokwaata nduli, oyinza okugyoonoona.
8. Fumita ekiti ekisongovu mu ttaka centimetre emu okuva ku kati akato akati katuuke ku buwanvu bw'emirandira.
9. Kumakuma ettaka likwaate nga bw'owanirira akati akato. Kino kijja empewo mu taaka eryetoolodde emirandira; ziba akatuli n'engalo yo; fukirira akati bulungi oka teeke mu kisiikirize.

### 6.5.9 Okusiikiriza n'okufukirira

Ensigo nga zimera n'okukula mu nnaku ezisooka zirina okubeera mu kisiikirize. Zimba akadaala okabikke n' ebintu ebiri okumpi nga ebisubi, endagala, oba ebiwempe.

Fukirira ensigo ku makya n'ekawungeezi ku nnaku z'omusana omungi; kendeeze okufikirira oba kulekera ddala enkuba lw'etonnye. Weegendereze obutamenya nsigo na buti obuto amazzi oba okugayitiriza. Weetaaga liita 20 ku buli buti 1,000. Kizisa akalobo akafukirira oba omukebe omuwummulemu obutuli mu ntobo obutayonoona buti buto oba ettaka lyaabwo.

### 6.5.10 Okukoola

Omuddo gwa kabi nnyo ku nkula y'obuti obuto kubanga guvuganya nabwo okufuna ebiriisa mu ttaka, amazzi n'ekitangaala. Emiddo egimu gireeta n'endwadde. Okugukoola sikamu omuddo mpolampola. Oyinza okutakulatakula ettaka n'engalo oba akati.

### 6.5.11 Okukomola emirandira

Okukomola emirandira kwe kugisala obutindu gireme kuwanvuwa kuyita mu kasawo oba omukebe. Gikomolwa bwegiba nga gisusse obuwanvu bw'akasawo.

Emirandira egitakomoddwa giyita mu kasawo negiyingira mu ttaka. Fukirira akati akato nga tonnakakomola kozesa akazo akoogi ddala okukomola emirandira egikuliridde negiyita mu ntobo y'akasawo. Oyinza okusitula akasawo n'okomola emirandira egikuliridde. Komola emirandira buli wiiki 2 oba 3.

### 6.5.12 Okugumya (*Hardening off*)

Okugumya, mu by'obulimi, kwe kuteekateeka obuti obuto olyooke obusimbulize mu misiri. Kino kikolebwa wiiki 2 oba 3 nga tonnasimbuliza. Kendeeza bufukirira, bufulumyeeko ne mu musana. Okugumya kwongera obuti amaanyi g'okukula nga buvudde webubadde bulabirirwa nga obwaana obuwere.

### 6.5.13 Ensimba y'emiti

Emiti egisinga obungi gisaana kusimba mu biseera bya nkuba. Nga tonnasimba muti, wandiika wansi buli kalonda akwaata ku muti gw'oyagala okusimba wamu n'ebikola bye wetaaga.

1. **Salawo ekika ky'omuti gw'onasimba**, nga olinda obuti obulamu era obugumu ddala.
2. **Londawo ennima egatta emiti n'ebirime**, oba ebisolo, gy'ogenda okugoberera, okugeza nga obubira bw'enku, emiti emisaasaanye mu nnimiro, emiti gyoku nsalo oba obukomera, n'endala. Lamba ebifo w'onasimba emiti.
3. **Tegeka ebinnya mw'onaasimba emiti.**
  - Okukakasa nti ettaka ggonvu okweetoolola ekinnya, kabala 20 cm nga wetoolola ekinnya, nga kya 30cm okukka wansi.
  - Ettaka bwe liba eggumu ekinnya kisime nga kya njuuyi ssatu emirandira gisobole okwegazaanya obulingi mu ttaka. Buli luuyi lube 50 cm obuwanvu ne 50 cm okukka wansi.

**Kino Kikulu:** Bw'oba osimba ensigo, sima akannya ka njuuyi ssatu. Bw'oba osimba akatabi (nga olukomera) sima 30 cm okudda wansi. Goberera emitendera gye tunaakulaga wansiko mu ssomo lino.

  - Yawula ettaka erya waggulu (10 cm okukka wansi) n'eriddirira.
  - Leka ekinnya okuva ku nnaku musanvu okutuuka ku myeezi esatu, okusinziira ku kika ky'omuti.

#### 4. Tegeka ettaka n'ebigimusa:

- Tabula ettaka lya waggulu n'eriddako (ebitundu bibiri ku kimu 2:1) nga obetenda obufunfugu obulimu.
- Litabule n'obusa oba kompositi (ekitundu kimu ku bibiri 1:2).
- Jjuza ekinnya n'ettaka ly'otabudde olileke olunaku lumu okutuuka ku ssatu.
- Leka ekinnya okiwummuzeemu ennaku okuva ku lumu okutuusa ku ssatu.

#### 5. Simbuliza obuti obuto:

- Wuliriza radio oba televizoni omanyee ddi enkuba lw'enaatandika osimbe obuti okuva ku lunaku lumu okutuuka ku wiiki nga enkuba tennatandika. Fukirira ebinnya mpolampola kumakya n'ekawungeezi.
- Sima akannya akatono mu kinene, okugeraageranya n'obunene bw'akati akato n'ekika ky'omuti.
- Oba akati kali mu kasawo kasaleko entobo nga weegendereza obutayonoona mirandira.
- Kawummuze mu kinnya n'obwegemdereza okutuuka wakati w'endul yaako.

**Kino Kikulu:** Siga ensigo 5 – 10 cm mu ttaka. Simba obuti nga obwaawula 30 cm wakati wa buli bubiri ne 10 cm wansi mu ttaka oziike ate oseeteeze ettaka.

- Fukirira akati okutuuka nga ettaka kibiridde.
- Ziika ekinnya n'ettaka lyewatabula, oliseeteeze bulungi.

#### 6. Endabirira y'omuti gw'osimbye:

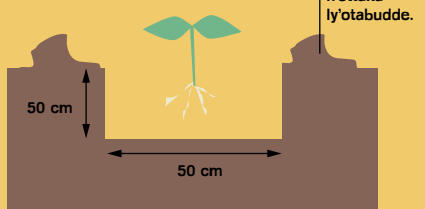
- Saasaanya ebigimusa kweetoolola omuti.
- Bikka amasa wakati w'emiti n'ebintu ebiti ku ssamba.
- Emuti emito gizimbire ekidaala kigisiikirize.
- Koola emiti obutayosa.
- Gisalire bwekiba kyeetagisa.
- Gifukirire emirundi ebiri buli lunaku bwewataba nkuba.
- Saasaanya avvu wetoolooze buli muti okugoba enkuyege n'ebiwuka ebirala nga amayeje n'obunyenyenkule.

#### ETTAKA ETTABULE

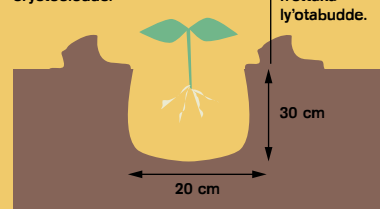
- Tabula ettaka lya waggulu n'eliddako (ebitundu 2:1), mulungula obufunfugu.
- Tabula ettaka linon'ebigimusa n'eliddako (ebitundu 1:2).
- Yiwa mu kinnya kijjule.
- Leka ekinnya ennaku 1 - 3.
- Ziika ekinnya n'ettaka lyewatabula, oliseeteze bulungi.

#### OBUTI OBUTO (SEEDLINGS)

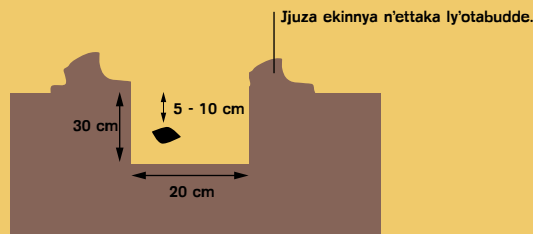
Ku ttaka eggumu, sima ekinnya kya njuuyi nnya.



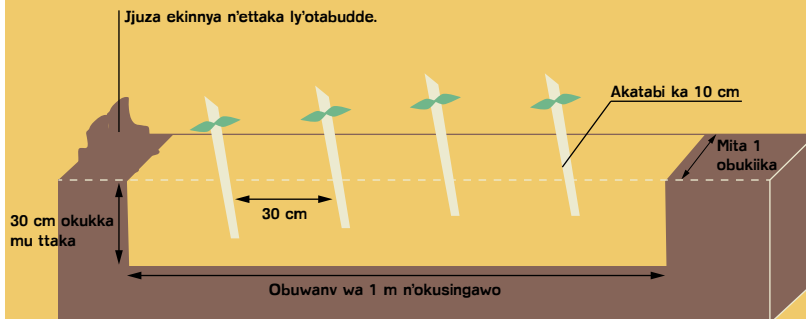
Ettaka aggonvu eryetoolodde.



#### OKUSIGA ENSIGO



#### OBUTI OBUTO (SEEDLINGS)



Ensimba n'endabirira y'ensigo n'obuti obuto (*seedlings*).

### AKAGEZO AKAMPIMPI

1. Wali obaddeko n'akalimiro k'okumereramu ensigo (*nursery*)? Bw'oba nga wakalinako, wakateeka mu kitundu ki eky'essamba yo? Lwaaki wakassa ku ssamba? Jjaye ekifaananyi ky'ennimiro yo olambe wewandyaagadde okussa akalimiro nga kano.
2. Miganyulo mi gy'ofunye mu kuteeka akalimiro kano ku ssamba yo?

## 7. Obulimi obweyambisa ebisasiro mu bwegendereza

### Ennyananjula

Essomo lino engeri enkwaata y'ebisasiro bw'eyinza okutabaganyizibwa n'okukabala okukendeeze nekiyamba okukuuma ettaka n'okwongera amakungula mu bulimi obuwangaazi, obugumira enkyuukakyuuka y'embeera y'obudde. Ggwe nga omulimi, oba n'ebisasiro bingi ebiva mu bikoola n'ebisusunku ebiva mu birime wamu . Osobola okukozesa ebintu bino okubikka ennimiro zo. W'onaamalirako essomo lino, ojja kuba nga otegedde enkabala ez'enjawulo n'emigaso gy'ebisasiro n'ebisusunku mu kukabala.

### Essomo lino lijja kwetaaga essawa 4

#### 7.1 Obulimi obugendera ku ndabirira y'obutonde bw'ensi (*conservation agriculture*)

Okulima nga tugenderera okulabirira obutoner bw'ensi bwe bulimi obuwangaazi. Obulimi buno buyimirira ku mpagi ssatu:

1. Lubeerera okubikka ettaka n'ebisasiro wamu n'ebisusunku okukuuma ettaka n'obugimu bwaalyo.
2. Okukendeeza ennyo okukabala okuteetagisa tuleme kutaataaganya ttaka.
3. Okukyuusa ebirime buli lisiga oluddako.

Bino  
birowoozeeko

#### ENKWAATA Y'EBISASIRO N'ENKABALA ENTUUFU BISOBOLA:

- Okwongera amakungula.
- Okukendeeza omuddo.
- Okukendeeza ensimbi ezisaasaanyizibwa omulimi.
- Okulongooza ettaka n'okwongera obugimu bwaalyo.
- Okukuumira mu ttaka amazzi agamala ebirime n'kugayingiza mu bwangu.
- Okukendeeza okukabala okuyitiridde ekyo nga kikendeeza mukoka okutwaala ettaka.
- Okuyamba obulimi okugumira enkyuukakyuuka mu mbeera z'obudde.
- Okwongera ebivunzevunze ne kaaboni mu ttaka.

#### 7.2 Enkwaata y'ebisasiro ennungi

Mu nkola y'obulimi eno omulimi akwaata ebisasiro n'ebisusunku, n'abikozesa okubikka n'okugimusa ennimiro, era n'okutaaganya obulimi n'obulunzi. Ebisasiro n'ebisusunku bino bya mugaso nnyo mu kuyingiza kaaboni mu ttaka. Kirungi okubisaasaanya mu bwenkanyinkanyi mu nnimiro.

Bisobola okukozesebwa nga ennyiriri za kasasiro (*trash lines*) oba okbikka ettaka (laba essomo namaba 3 ne 4). Ebintu bye bimu bisobola okukozesebwa nga emmere y'ebisolo n'obusa bw'ebisolo bwe buyambako nga ebigimusa.

Bino  
birowoozeeko

### EMIGANYULO GBY'EBISUSUNKU BY'EBIRIME:

- Okwongera ebiriisa mu ttaka.
- Okugumya ettaka n'okulisobozesa okunnyikira amazzi.
- Okwongera ebivundavunda mu ttaka.
- Okukuuma ettak obutatwaalibwa mukoka.
- Okuziyiza ebiwuka, omuddo n'endwadde z'ebirime.

**Kino Kikulu:** Ebisusunku n'ebisasiro biyinza okukozesebwa nga ssibyookye. Okubyookya ku leeta emikka egibuguumiriza ensi era kusaana okwewala. Okkubyookya kukendeeza ebimu ku biriisa n'ebiramu byomuttaka.

## 7.3 Okukabala

Okukabala kwe kutegeka ettaka nga tutema n'kukuba amavuunike n'ennima endala yonna egonza ettaka okusobozesa ensigo okumera, emirandira okukula obulungi n'okutangira omuddo ebirime bikule bulungi. Omulimi ayinza okukabaza enkumbi yomungalo, enkumbi ezisikibwa ebisolo, n'ezisikibwa tulakita.

**Kino Kikulu:** Enkumbi ezisikibwa ebisolo zituuka nga 15 cm mu ttaka ate ez'emikono tezisukka 10 cm. Omala gakabala kuyinza okugumya enyo ettaka ekiyitiridde nelifaananako olwaazi. N'olw'ekyo mu lukabala olusooka enkumbi y'ekisolo yandiyambye okubomola ettaka elikaluba n'kufuukuula ebiriisa bidde kungulu. Kino osobola n'okukikola n'enkumbi y'omukono nga okabala 20cm mu ttaka n'osika ettaka nga otema empangi. Okukabala ne tulakita kwongera emikka egibuguumiriza ensi; tekusaana kukozesebwa kiyitiridde.

*Waliwo enkabala za mirundi ebiri enkulu:*

1. Enkabala eya bulijjo.
2. Enkabala ekuuma obutonde bw'ensi.

### 7.3.1 Enkabala eya bulijjo/Ey'obutaweera

Mu ngeri eya bulijjo, emisiri gikabalwa ku ntadikwa y'okusiga nga ebirime tebinnanyweera mu ttaka. Abalimi bakozesa enkumbi eza bulijjo oba ezisikibwa ebisolo, ensuuluulu, enkubi z'olumbugu n'endala ezisobola okukabala. Wabula, ennima eno erina obuzibu bw'ereeta mu bulimi. Olw'okwewala obuzibu obwo, omulimi aweebwa amagezi akozese ennima eyeyambisa ebisasiro mu bwegendereza.

### OBULABE BY'ENKABALA EYA BULIJJO:

- Kuleka ebisasiro bitono nnyo (wansi wa 15%).
- Kukkatira ettaka okukkira ddala 15 cm wansi mu ttaka nokuziyiza ensigo okumera obulungi n'emirandira okuyingira amangu mu ttaka n'amazzi okuyingira mu ttaka.
- Kutaataaganya nnyo ettaka, erya waggulu nelyeetabula n'eriddako wansi.

### 7.3.2 Enkabala ekuuma obutonde bw'ensi

Enkabala eno ekakasa nti ettaka litabulwa kitono. Ereka ebitundu 30 – 50% ebyokungulu kw'ettaka nga kubikkiddwa ebisasiro oluvannyuma lw'amasimba. Mu nkabala ino ettaka lya waggulu teryeetabula na liddako wansi.

Oyinza okuleka ebisusunku mu nnimiro oluvannyuma lw'okukungula nebibikka ettaka n'okulitaasa embuyaga ne mukoka. Ebususunku bino byetabula n'ettaka nebyongerame ebiriisa ebiyamba ebirime okukula obulungi. Ensuluulu nnungi okutabuza ebisusunku n'ettaka.

Mu nkabala ekuuma obutonde bw'ensi kisoboka okukozesa eddagala eritta omuddo mu lukabala olusooka. Jjukira nti ebisusunku bibikka ettaka ne bikendeeza omuddo.

**Kino Kikulu:** Eddagala eritta omuddo lya bbeeyi, ate bwetutalikozesa na bweegendereza, litta obuwuka bwomuttaka obukola eryokungulu, liyinza okuyingiza obutwa mu ttaka netubunyweera mu mazzi.

### EMIGANYULO GY'ENKABALA EKUUMA OBUTONDE BW'ENSI:

- Kwongera amakungula n'amagoba g'omulimi.
- Kukendeeza omuddo.
- Kukendeeza ebbeeyi y'okukabala.
- Kukuuma ettaka obutatwaalibwa mukoka n'embuyaga.
- Kwongera ebivunzevunze mu ttaka eryawaggulu.
- Kukuuma amazzi mu ttaka.
- Kukendeeza okuchaafuwaza emugga n'ennyanja.
- Kuyamba omulimi okugumira enkyuukakyuuka mu mbeera y'obudde.

*Enkabala ekuuma obutonde bw'ensi ngeri bbiri:*

1. Obutakabala n'akam (*Zero tillage*) okusima obusimi.
2. Okukabala okutono ddala (*Okweetaagisa kwokka*).

### 7.3.2.1 Obutakabala n'akamu (zero tillage) okusima obusimi

Mu nkabala eno ebisasiro n'ebisusunku eby'amakungula bisigala mu musiri. Mu lusiga oluddako, nsigo sisigibwa butereevu mu ttaka nga terikabaliddwa nga omulimi akozesa ebintu ebisongovu okufumita obutuli omusigibwa ensigo.

### 7.3.2.2 Okukabala okutono ddala (okweetaagisa kwokka)

Mu nkabala eno, omulimi alima mu ttaka mu ngeri etasukka eyo yokka esobozesa ensigo okumera, amazzi n'empewo okuyingira mu ttaka, ebirime okukula, n'okuziyiza omuddo. Omulimi asima obunnya obutono ennyo oba asimaasima nga agoberera ennyiriri omunaasigibwa ensigo nga takwaata ku taaka eriri wakati w'ennyiriri. Waliwo enkumbi ez'enjawulo eziyamba okulimi okutuukiriza kino; kyokka nga n'enkumbi eya bulijjo esobola okukituukiriza. Ensigo zisigibwa mu bunnya obuli mu nnyiriri.

Okukabala okutono kuleka ebitundu 15 – 30% eby'ebisasiro n'ebisusunku mu nnimiro.

#### EBYAAWULA OKUKABALA OKUTONO DDALA KU OKWA BULIJJO:

- Kulina emirimo mitono nnyo.
- Tekutaataaganya ttaka kinene.
- Awagenda okusigibwa ensigo wokka wewalimwa.
- Ebisasiro n'ebisusunku tebisimirwa mu ttaka wabula birekebwa kungulu.

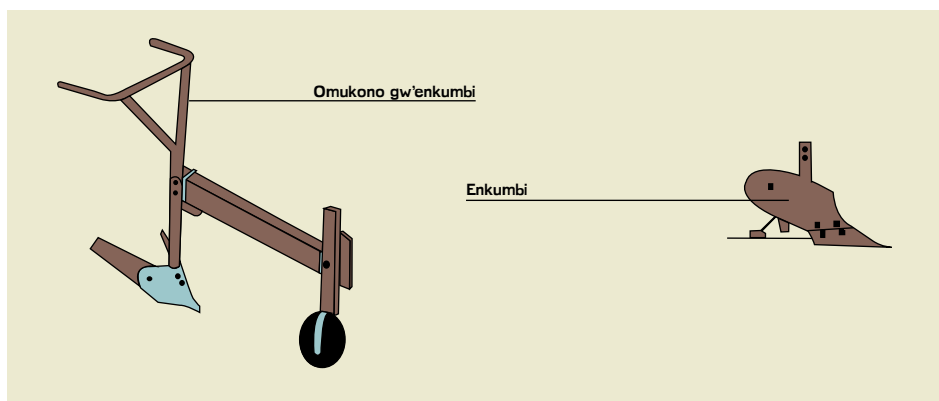
Bino  
birowoozeeko

Waliwo abagamba nti obutakabala n'akamu n'okukabala okutono ddala kuteri okuleeta ebiwuka ebingi n'okukalubya endabirira y'ettaka. Naye omulimi ayinza okukozesa amakubo ag'obutonde (*biological/natural*) okulwaanyisa omuddo, okugeza nga okulima ebimera ebigoba omuddo, okukyuusa ebirime ku buli lusiga oluddako (laba essomo 11), oba okunyiikira okubikka ettaka oba ebirime ebitaasa ettaka (*cover crops*).

Bino  
birowoozeeko

*Obukodyo bw'okukendeeza okukabala:*

- Okusima ebinnya by'okusimbamu emiti oba ebirime.
- Okubikka ettaka.
- Okukola ababibiro okusigibwa ensigo.
- Okusima obunnya n'ebiti.
- Okukabala mu nnyiriri oba okusima awo wokka awasigibwa ensigo.
- Okusima akanyiriri nga okozesa ekintu ekisongovu ekisikibwa ekisolo.



Enkumbi esikibwa ebisolo (*plough*)

#### **a. Ebinnya omusimbibwa ebirime (*Pitting*)**

Emu ku ngeri y'omulimi okweewala okukabala ekiyitiridde kwe kusuna awi wokka w'agenda okusimba ekirime (*Pitting*). Ebitundu by'essamba ebirala ne bisigala nga bibikke okusobola okukuumira amazzi mu ttaka n'okutangira mukoka. Mu myaaka 5 – 10 egisooka, ebinnya bino biyinda okuba eb'obuwangaazi nga tebikyuusibwa. Olina okukakasa nti ebinnya ebyo birimu omuwendo gw'ebikoloby'ebirime bye bimu mu buli yiika y'essamba yo. Kino kituukirizibwa nga tulola entegeka y'ebinnya ebisimbibwaamu omuwendo gw'ebikolo omutuufu. Laba essomo 4 ku binnya eby'enjawulo.

#### **b. Enkabala y'okukozesa ebisusunku n'ebisasiro mu kukabala (*Stubble and residue mulch tillage*)**

Mu nkabala eno, omulimi atemaatema ebitundu 30 – 70% eby'ebisasiro n'ebisusunku n'abimansa mu nnimiro oluvannyuma n'abikabalilamu. Asobola n'okuleka ebisasiro n'ebisusunku bino okubikka ennimiro okugoba omuddo.

Enkabala eno ekozesa enkumbi ez'enjawulo ezikuula omuddo, okugeza, nga ensuuluulu oba enkumbi oba byombi. Akozesa n'emajambia okutemaatema ebisasiro n'ebisusunku nga bwekyeetaagisa.

**Kino Kikulu:** Enkumbi eaikozesebwa oku mu kabala kuno zirina okuba nga zisobola okusimba ebinnya ebyeeramuludde mu nnyiriri olkwewala oukwaama mu bisasiro n'ebisusunku n'okuziikula ensigo.

#### **c. Amabibiro n'ensalosalo (*Ridge and furrow tillage*)**

Enkabala y'amabibiro n'ensalosalo ebaamu ebigulumu bya 10 – 15 cm mu bugulumivu nga birambulukuse mu bukiika bw'obuserengeto. Mu kusiga ebigulumu buseetezwa ku ntikko yaabyo obugulumivu nebukendeera 2.5 – 5 cm. Abalimi abamu bakozesa ebyuuma/nkumbi eby'enjawulo oba ebiti okusimba ebirime ku ntikko z'amabibiro gano, okugeza nga ebikata bya lumonde ebirambulukufu. Ebisasiro n'ebisusunku ebyaava mu lukungula olwasembayo birekebwa mu buwonvu obuli wakati w'ebigulumu.

Enkabala eno ekndeeza akabenje k'ettaka okutwaalibwa mukoka olw'ebigulumu, obuwonvu wamu n'e bisasiro n'ebisusunku nga byonna biri mu ngeri ya kontuwa. Ebirime bisigibwa waggulu ku mabibiro, mu mbiriize zaago, oba wakati waago oba wonna. Amabibiro gano gazimbibwa nkumbi ezisikibwa ebisolo oba tulakita oba enkubi ezabulijjo.

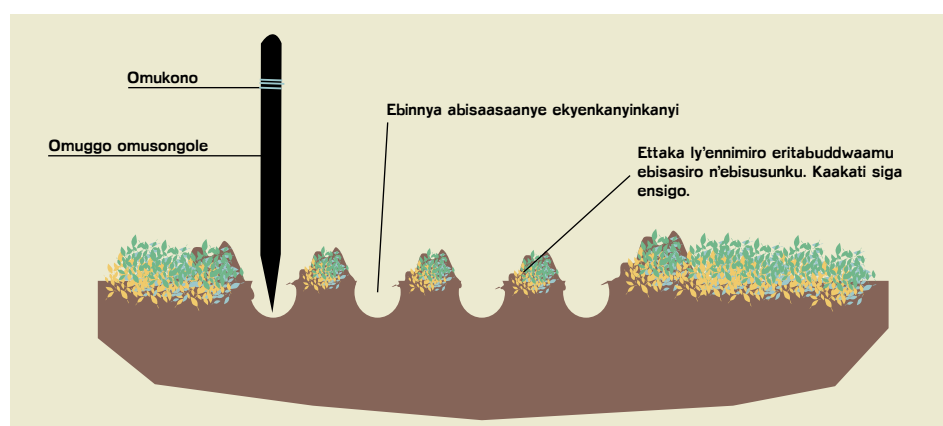
Agamu ku mabibiro gayinza okuba amampi agaddirinng'anye, mu kifo

ky'okulambulukkuka mu buwavu bw'ennimiro yonna, negaziyiza mukoka okukulukuta nga alegama mu bitaba ebirime makkati g'ebigulumu.

Ennima eno esaanira buserengeta obw'luyiringito olutayitiridde, mu bitundu ebikalu oba okulima ebirime nga lumonde, endaggu, ne muwogo.

#### **d. Okusigisa n'omuggo omusongole (*Dibble stick planting*)**

Mu kifo ky'enkubi omulimi akozesa omuggo omusongole okusima obunya oba okufumita ebituli mu ttaka n'okusigamu ensigo oba okusimbulizaamu ebirime ebiva mu naasale, bw'atyo n'atataataaganya ttaka kiyitiridde. Emiggo gino gikozesebwa mu nnimiro etali nkabale ate nga erimu ebisasiro n'ebisusunku. Obunnya buno oba ebituli biba n'amasa ageenkaankana wakati waabyo byonna mu musiri. Ekyo kyanguya okukoola n'okukozesa ebigimusa.

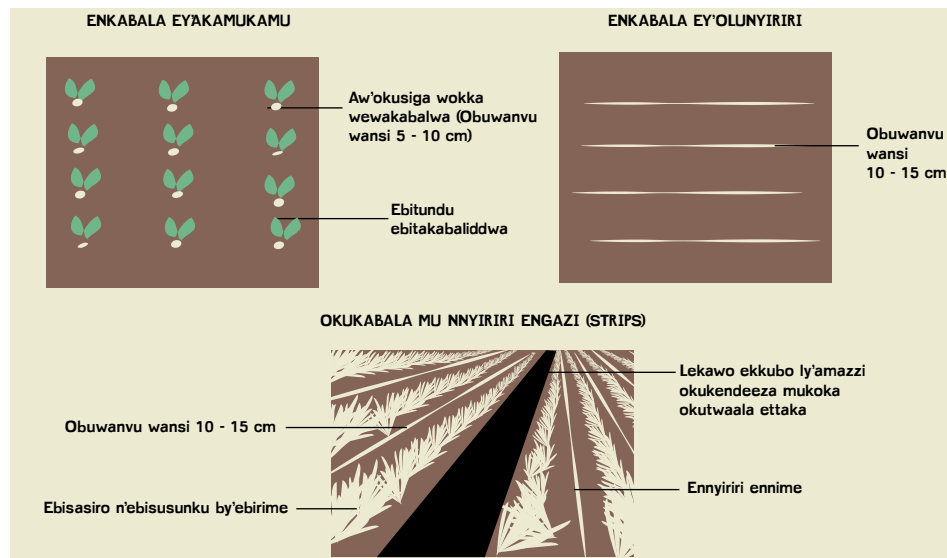


Okusigisa n'omuggo omusongole (*Dibble stick planting*)

#### **e. Okukabala mu bunyiriri oba mu bifo ebironde (*Strip and spot tillage*)**

Mu nkabala eno, omulimi asiga ensigo mu bunyiriri obwefuutiise n'aleka amabanga wakati nga ssimakabale. Awowokka awanaasigibwa ensigo n'okuteeka ebigimusa wewalimwa. Okusima obunyiriri obwo, omulimi akozesa enkumbi ez'enjawulo, okugeza, ezisikibwa ebisolo. Ennima eno, ekuuma ebisasiro n'ebisusunku n'ekuuma n'ettaka era ereka ebitundu ebitaasimbibweemu birime nga tebitaataaganyiziddwa kiteetaagisa.

Ekuuma n'amazzi mu ttaka. Ya mugaso nnyo bw'eba ng egatiddwa n'okulima ebirime ebissa ebiriisa mu ttaka. Ekkiriza n'empewo okuyingira amangu mu ttaka n'okulibugumya mu kipimo ekisaanidde.



Okukabala mu bunyiriri oba mu bifo ebironde (*Strip and spot tillage*)

Laba video y'okulima mu bunyiriri oba mu bifo ebironde (*Strip and spot tillage*) ku muko gwa Intaneti:

<http://www.accessagriculture.org/node/882/en>

#### f. Okutakula ettaka mu nnyiriri (*Ripping*)

Munnima ey'engeri eno, omulimi akozesa enkumbi oba ekikola byonna ekisongovu, nga bisikibwa ekisolo, n'asima akakutu akafunda ng'ountu akutula amusiri nga atakula omusiri n'akati oba esuluulu. Akannya akalambulukufu k'asima ka 5 – 10 cm okukka wansi. Ennmaeno ekozesebwa mu nnimiro ezirina n'ezitalina bisasiro na bisusunku.

### AKAGEZO AKAMPIMPI

1. Ebisasiro n'ebisusunku mu nnimiroyo obikola otya? Ngeri ki gy'oyinza okulongoosa mu nkolazo?
2. Oyinza kukola ki mu nnimiroyo okukendeeza okugikabala ekiyitiridde?

## 8. Okuddaabolula ettaka

### Ennyanjula

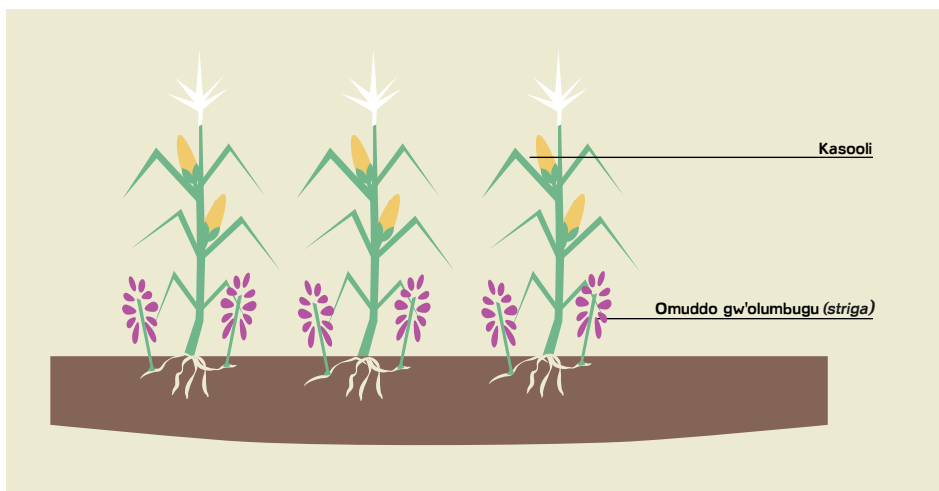
Ettaka bwe liggwaamu obugimu, oba erya waggulu okutwaalibwa mukoka, oba okufuuka ery'olunnya, oba okuggwaamu ebitundu ebivundavunda n'okulumbibwa omuddo omungi, liba lyoonoonose. Ettaka eryoonoonese liba n'amakungula matono n'okulilima kwetaagiza ensimbi nnyingi. W'onaamalirako essomo lino, oja kuba nga oyize okuddaabolula ettaka eryoonoonese n'okulonda ennima ezza ebiriisa by'ebirime mu ttaka, okugeza nga okufuga enjuki oba okulima ebirime by'emmere y'ebisolo.

### Essomo lino lijja kwetaaga essawa 2

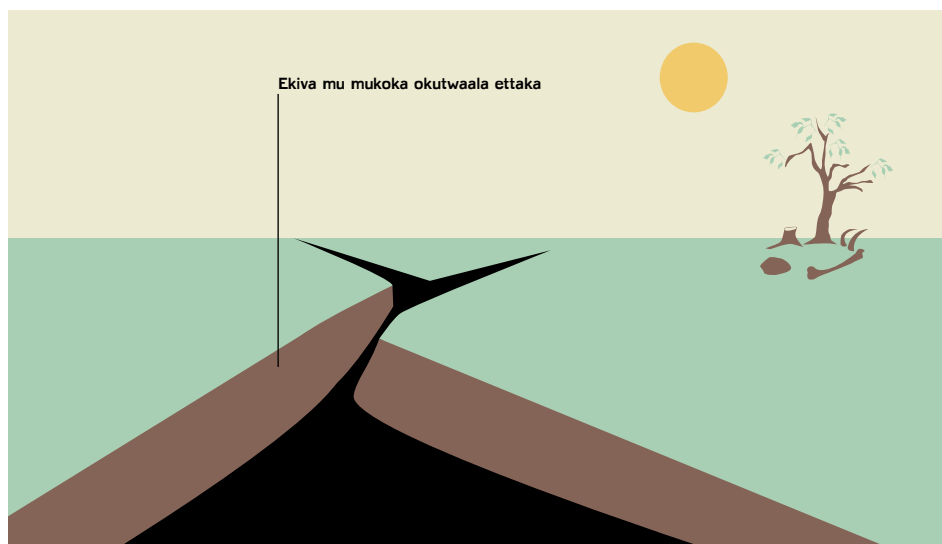
#### 8.1 Okwoononeka kw'ettaka (*land degradation*) kye kiki?

Ensonga nnyingi ezireetera ettaka okwoononeka naye nga ebisinga bisibuka ku muwendo gw'antu (*population*) mu kitundu okuyitirira, enkozesa y'ettaka ey'obulagajavu, n'ebikola ebirara nga bino wansi:

- Okuleka ettaka nga teriiriko miti oba nsiko (*land clearance*).
- Ennima emala ebimusa n'ebiriisa mu ttaka.
- Okulundira mu kitundu ebisolo ebityiridde obungi.
- Okukozesa ebimusa ebigule ebityiride.
- Okulima ekirime ekimu olutatadde (*mono cropping*).
- Ennima eyabulijjo nga ssi nnongooseemu.
- Okutema ebibira okuyitiridde.
- Ebyeeya eby'okumukumu, empiira, n'amataba.



Ettaka eryoonoonese - 1



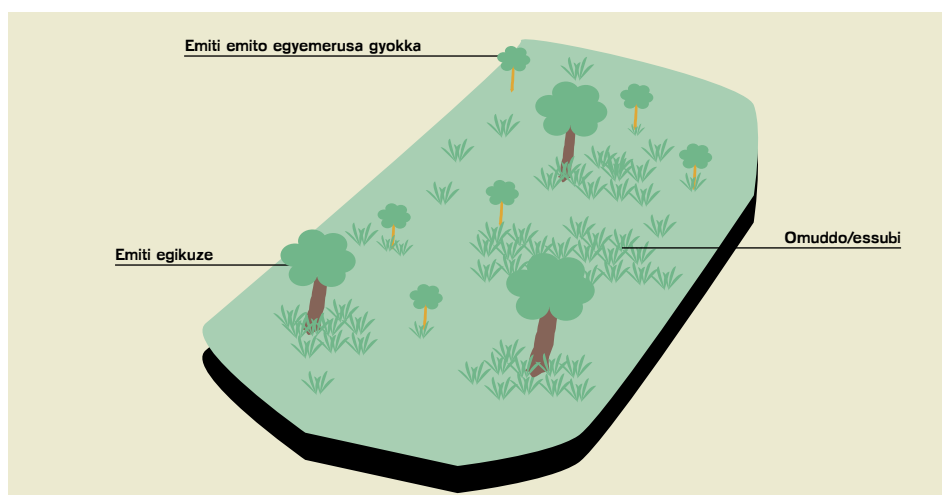
Ettaka eryoononese - 2

Ettaka eryoononese liyinza okuddaabululwa mu ngeri nga zino:

- Okuleka ensiko n'ebibira by'obutonde okudda byokka.
- Abantu bennyini okukola kaweeefube okuzzaawo ensiko n'ebibira eby'ebutonde.
- Ensimba y'ebirime ekozesa obukodyo obuddaabulula ettaka.
- Okuangira n'okulwaanyisa empiira.

## 8.2 Ensiko n'ebibira by'obutonde okudda byokka

Mu nkola eno, kwe kuleka mugenderevu ettaka eribadde lyoononese nga tetulilimaako oba okulilundirako ettale ne lyeegazaanya. Kino tuyinza okukiwagira nga tufuga enjuki mu bitundu ebyo neziyamba ebimuli byomuttale okuzaala ensigo ennyingi okusingawo ebimera nebyaala mu nsiko. Tuyinza n'okuyiwa mu bitundu ebyo ettaka eddala eririmu ensigo netuyamba ebimera mu ttale okukula amangu netufuna n'obubira by'enku (*woodlots*).

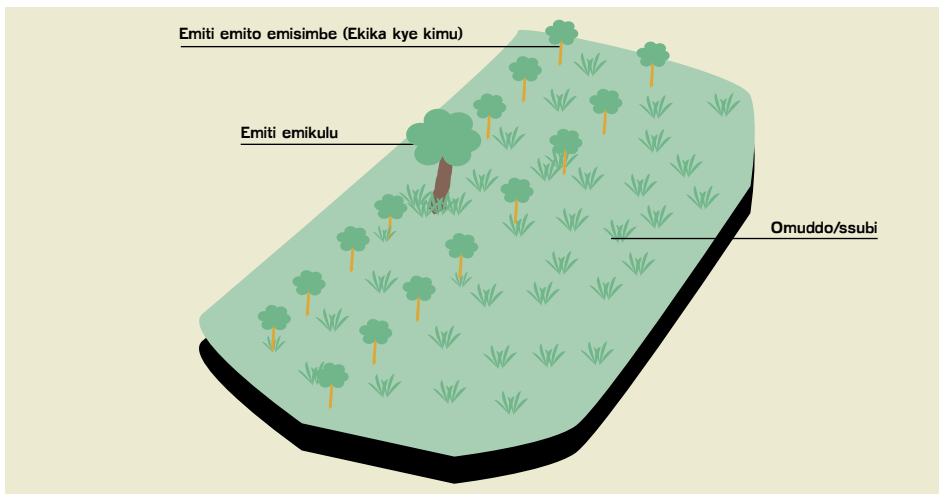


Ensiko n'ebibira by'obutonde ebyeezza byokka

### 8.3 Okukola kaweefube okuzzaawo ensiko n'ebibira eby'obutonde

Mu nkola eno, abalimi bafuba okusiga ensigo z'emiti giri egyaali mu kitundumu butonde bwaakyo negisaanyizibwaawo. Engeri endala kwe kusimba emiti n'obusaka ebyaaliwo nga biriisa ebisolo (*fodder banks*). Oluvannyuma ebisubi n'ebimera ebikula amangu bisimbibwa mu kitundu kye kimu. Mu kiseera kitono, ettaka litandika okuddamu obugimu n'ebimera okulikuuma obulungi nerisobola okuddamu okuleeta amakungula.

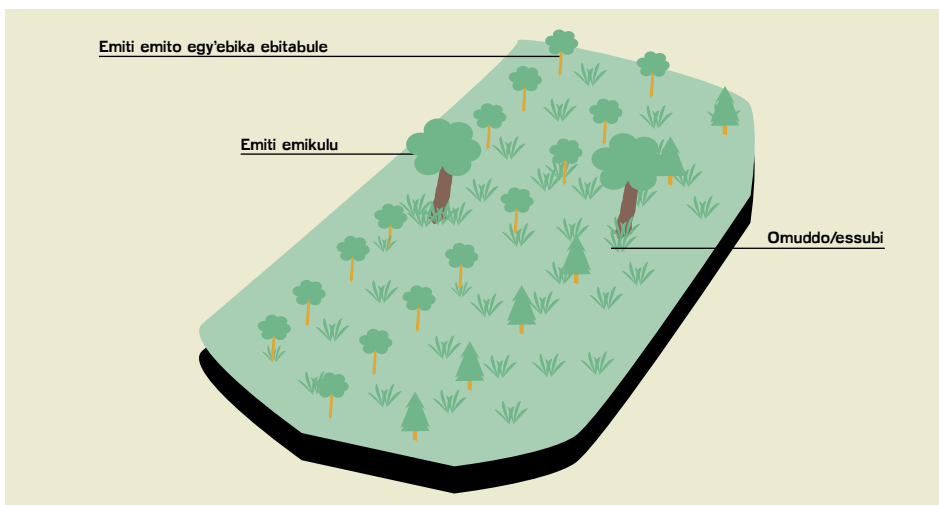
**Kino Kikulu:** Jjukira nti okulunda mu bulagajjavu kwoonoona ettaka nerikaddiwa. Ekisinga kwe kusimba ebimera (emiti, obusaka, omuddo) ebiriisa ebisolo.



Okweddabulula kw'ettale okuwagiddwa ebikolwa by'abantu ebituufu

### 8.4 Ensimba y'ebirime ekozesa obukodyo obuddaabalula ettaka

Kino kya muganyulo munene mu bitundu ebifiiriddwa ebibira byaabyo eby'obutonde ne ku mbalamaz'emugga n'entobazi.



Ensimba y'ebirime ekozesa obukodyo obuddaabalula ettaka

## 8.5 Okuziyiza n'okuzikiriza empiira

Empiira za kabenje nnyo ku butonde bw'ensi wonna awali obulimi, obulunzi n'ebibira. N'olw'ekyo, kyetaagisa nnyo okuzitangira obutakoleera oba kuzikoleeza n'okuzirwaanyisa nga zikumiddwa. Ekyo kiwa emiti, obusaka n'ensiko okukula ebbanga eggwanvu n'okukuuma ettaka.

**Kino Kikulu:** Okwookya empiira (okugenderere n'okw'obutanwa) kibi era kya kabenje; kusaanyaawo ebibira, ebirime, kwonoona ettaka nekukendeeza ebika by'ebiramu (bisolo n'ebimera) mu kitundu (*biodiversity*). Kwonoona obulamu bwa bantu olw'okussa omukka, kusaanyaawo emmaali y'abantu, ssinnakindi nekutta abantu.

### AKAGEZO AKAMPIMPI

Wekenneenye ekifananyi ky'essambayo.

1. Bitundu ki obutonde bw'ensi mwewoonese? Kyaava ku ki?
2. Okola otya okuddaabulula ebitundu ebyo? Lwaaki okola bw'otyo?
3. Nnima ki endala gy'olowooza nti ya muganyulo ku ssambayo era ogissa otya mu nkola? (Kozesa ekifaananyi ky'essambayo)?

## 9. Obulunzi obutabaganye

### Ennyanjula

Ekiruubirirwa ky'essomo lino kwe kukuyamba okutegeera bw'oyinza okukozesa eby'omugaso ebiriku ddundiro ebisinga oba byonna nga olunda mubweegendereza n'obumanyirivu. Enkola eno ejja kukuyamba okuziyiza, okugumira n'obutakosebwa nkyuukakyuuka mu mbeera z'obudde nga okendeeza ebikolwa ebireeta emikka egibuguumiriza ensi.

### Essomo lino lijja kwetaaga essawa 2

#### 9.1 Obulunzi obutabaganye kye kiki?

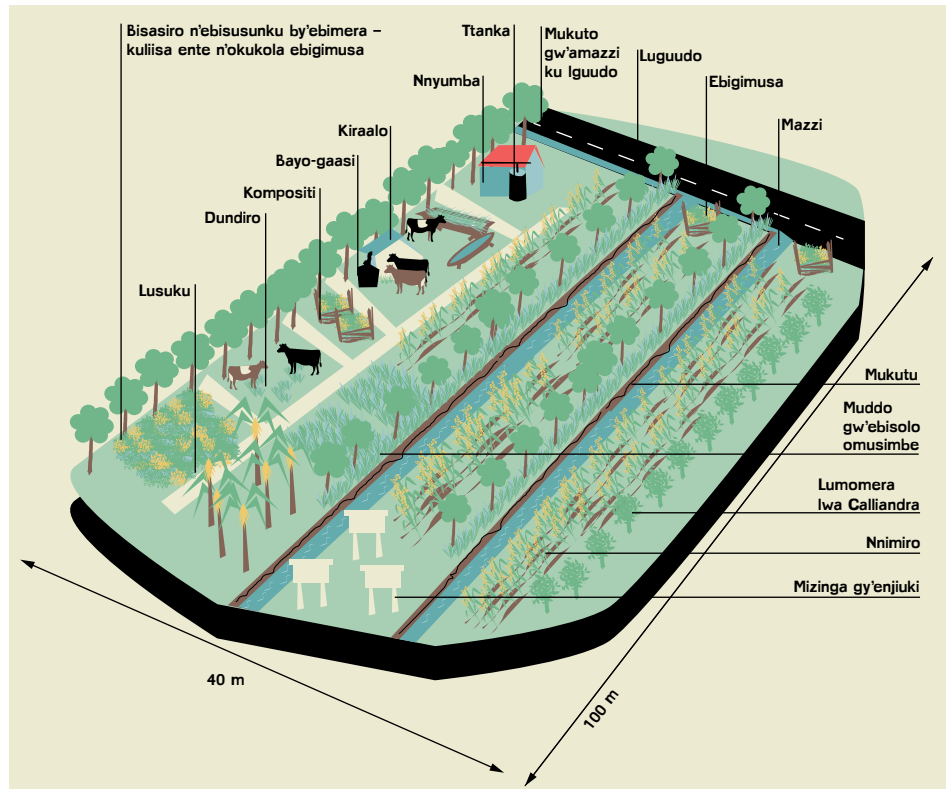
Obulunzi obutabaganye bwa bika bingi, okugeza, ebisolo n'ebirime, oba n'ebirime n'enjuki, oba n'ebyennyanja nga bitabaganye bibiri oba bisatu, n'okusingawo. Entabagana yaabyo eva mu kimu okufulumya ebintu ebikozesebwa mu kirala oba ebirala (okugeza obusa, omubisi, emmere y'ebisolo, n'ebirala). Ekyo kiganyula obulunzi n'ebitongole ebirala eby'essamba okwongera omulunzi amagoba.

*Eky'okulabirako 1: Okutabaganya enjuki, ebirime n'ebisolo*

Enjuki ziyamba okutambuza empumbu y'ebimuli okubisobozesa okuzaala ebibala n'ensigo nezongera amakungula mmu ngeri ey'obutonde. Zireeta n'amagoba okuva mu bintu bingi bye zikola mu muzinga gyaazo, nga omubisi n'envumbo ebisobola okulongoosebwaamu nebitundibwa okwongera kku nfuna.

*Eky'okulabirako 2: Okutabaganya ebyennyanja, ebirime n'ebisolo*

Ebidiba by'ebyennyanja biyinza okuyamba mu kufukirira enva ate enva ezimu ziriibw n'ebisolo nga ente, embuzi, embizzi, obumyu n'ebyennyanja byenyini. Obisolo bivaamu obusa obugimusa ennimi.



Obulunzi obutabaganye (ebisolo, ebirime, enjuki) ku yiika emu

Bino  
birowoozeeko

### EMIGANYULO GY'OBULUNZI OBUTABAGANYE:

- Kwongera ku nfuna y'omulunzi.
- Ebikola byonna bikozezebwa mu bujjuvu awatali kuyiwaayiwa.
- Amakungula eg'eddaala erya waggulu agata leeta bulabe ku butonde bw'ensi.
- Enkizesa y'ettakatekyuukakyuuka kiyitiridde.
- Emikka egibuguumiriza ensi gikendeera.
- Okwonoona ettaka kukendeera.
- Ettaka eryonooneese nerikoowa liddaabululwa.
- Kwongera okuziyiza n'okugumira enkyuukakyuuka mu mbeera z'obudde.
- Kukendeeza ebiwuka n'endwadde mu bisolo n'ebirime.
- Kukuuma obungi bw'ebiramu (*biodiversity*).

## 9.2 Obukodyo obuganzibwa mu kutabaganya obulunzi

Mu bitera okukolebwa mu kutabaganya obulunzi bye bino:

1. Endiisa ennungi eyeyongedde (*diet*) n'amazzi ag'okunywa.
2. Ebiraalo, ebisibo by'ebisolo eby'omutindo.
3. Enzaalisa y'ebisolo ku mutindo omulungi.
4. Enkwaata n'enkozesa y'obusa ennungi.
5. Okuziyiza ebiwuka n'endwadde.

## 9.3 Endiisa ennungi eyeyongedde (diet) n'amazzi ag'okunywa

### 9.3.1 Endiisa

Ebisolo ku malundiro bisinga kuliisibwa middo (egy'obutonde n'emirime) n'ebirime ebirala nga kasooli n'ebikoola. Bino biyinza n'okugulibwa. N'olweekyo, endabirira y'amalundiro ennungi yeetaagisa nnyo okwongera ku mutindo gw'endiisa y'ebisolo. Okulabirira emalundiro okulungi kulimu okwekenneenya ensiga y'emiddo n'ebirime ebisolo birye bulungi ku malundiro. Kyongerera ku bungi bw'eby'amaguzi ebiza ku malundiro, kiyamba ettaka nga kyongeramu kaaboni ate nga bwelikendeeza emukka egibuguumiiza ensi.

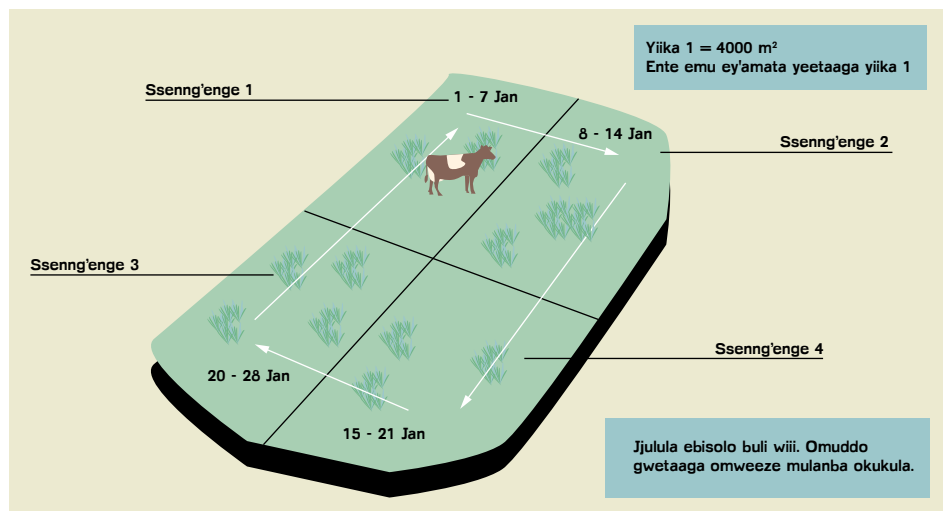
Obulunzi butabaganyizibwa mu ngeri ssatu enkulu:

1. Obulunzi bwokuddundiro eddene (nga ranchi)
2. Obulunzi obutabule
3. Obulunzi obuteetaagisa ttaka ddene

Engeri ezo essatu zissibwa bwezitiu nkola nga otabaganya obulunzi:

#### a. Obulunzi bwokuddundiro eddene (nga ranchi)

Mu nnunda eno ebisolo birundirwa ku ttaka eddene ddala; bisibwa ku miguwa gano oba okuliira mu bibangiriza ebinene ebisibe ne ssenn'enge nga buli kiseera ekipime bijjululwa nebitwaalibwa ku puloti endala, gyebibaddemu ewummule. Ennetoolooza eno (*rotational grazing*) ya mugaso nnyo mu kwongeza amagoba okusinga okusiba ebisolo ku miguwa oba ssenn'enge asiba eddunduro lyonna awamu; ewa omuddo omukisa okuba n'obudde okukula obulungi negubaamu ebiriisa bingi. Ate obusa obiteetumye mu kifo ekumu n'okuvundirawo tebuleeta nnyo mikka gibugumiriza nsi.



Ennetoolooza y'obulunzi (*rotational grazing*) mu ssenn'enge

Okulabirira ettaka, omuddo n'ebisolo ku ddundiro kyetaagisa obukodyo obutuufu mu bulunzi. Ebimu ku byongerera obulungi bw'ebisolo n'ebirime

ku malundiro bye bino: obukodyo n'enkola y'omulunzi, ebika by'ebimera ku ddundiro, ettaka, embeera y'obudde.

Ebiriisa ebisolo nabyo biyinzira okweyongera ku ddundiro olw'okuddaabulula ebitundu ebyaali byonoonese oba okugimusa, okusala omuddo n'obwegendereza n'okufukirira.

Bino  
birowoozeeko

**Obulunzi ku malundiro tebusoboka mu ddungu oba mu bitundu ebikalu, oku jjako nga bifukiriddwa omuddo n'ebirime ebirala bisobole okukula. Kino kyongera obungi bw'ebiva mu bisolo n'okulongoosa ettaka wamu nemiddo ebisolo gwebiyinza kulya n'okukula obulungi.**

## b. Obulunzi obutabule

Mu bulunzi buno, ebisolo n'ebirime bibeera ku ssamba emu. Ebisolo birya emmere eva mu birime n'omuddo oguli ku ddundiro oba ogusaliddwa n'okuleetebwa n'ebiy'okukya ebigule ebweeru.

Puloti omulimwa emmere y'ebisolo (*fodder banks*) – laba essomo 4 – ziyamba okukuuma n'okulongoosa ettaka nerivaamu amakungula amalungi. Ebirime nga omuddo ogulimwa ku puloti zino guliibwa ebisolo ate negubikka ettaka. Okulunda, mu kifo ky'okulima kwokka, kukendeeza okukabala okuyitiridde.

*Eby'kkulabirako by'obulunzi obutabule n'obulime:*

1. Okulabirira ettaka, ebirime n'amazzi awamu.
2. Okulabirira ebirime, amazzi n'ebisolo awamu.
3. Okulabirira ebirime by'mmere y'ebisolo, amazzi n'ebisolo awamu.

*Okulabirira ettaka, ebirime n'amazzi awamu*

Ennunda eno erimu emiganyulo mingi, okugeza, bulijjo okuba n'emmere emala wamu okuziyiza n'okugumira enkyuukakyuuka mu mbeera z'obudde.

| OBUKODYO BW'KULABIRIRA ETTAKA N'AMAZZI                                                                         | EMIKISA BY'OKZIYZA, OKUGUMIRA N'OKUKENDEEZA                                                   |
|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Enkabala ey'obwegendereza etayonoona butonde bwa nsi.                                                          | Okulwaanyisa ebiwuka, endwadde, omuddo, okuziyiza ettaka okwekkatira, obutafirwa naitulojeni. |
| Obubalazabw'amadaala ku buserengeto.                                                                           | Okukuuma ettaka obutatwaalibwa kukoka na muyaga.                                              |
| Okukozesa ebisasiro n'ebisusunku.                                                                              | Okukuuma amazzi mu ttaka.                                                                     |
| Ebirime obiyizingiza ebiriisa ( <i>cover crops</i> ).                                                          | Okuziyiza mukoka.                                                                             |
| Okubikka ettaka.                                                                                               | Okutta omuddo.                                                                                |
| Ebirime ebigimusa ettaka (nga ssi bya kulya oba maguzi).                                                       | Okukuuma n'okwongera obugimu bw'ettaka.                                                       |
| Okukozesa kompositi n'obusa.                                                                                   | Okwongera kaaboni mu ttaka.                                                                   |
| Okugoba ebiwuka (kufuuyira, oba ebimera ebibigoba) n'okubitega (emitego oba ebimira ebibisikiriza n'okubitta). | Okullinnyisa omutindo gw'endiisa y'ebisolo.                                                   |

Obukodyo bw'okukuuma amazzi n'ettaka

*Endabirira y'ebirime, amazzi n'ebisolo awamu n'obwegendereza erimu:*

- Ebirime ebirongooseemu (*improved crops*) ebikozesa amaazi obulungi.
- Enfukirira entuufu ey'omulembe.
- Okugatta enkuba n'okufukirira.
- Amakungula agatayonoona mazzi.
- Oku goberera n'okuyuusa mu kalindalio y'obulimi.
- Obutadiibuuda nku na masannyalaze (*energy*).

*Okugatta ebiriisa by'ebisolo, amazzi n'ebisolo:*

- Ebiriisa ebituufu ate ebijjuvu (*protein, minerals, vitamins and starch*).
- Omuddo ogw'omutindo ogwa waggulu n'ebirime ebiriisa ebisolo.
- Okwongera ebiriisa n'amazzi.
- Okulonda obulungi emmere y'ebisolo.
- Okulabirira obulungi eddundiro ebisolo bwe biriira.
- Okwongeza amagoba agava mu bisolo n'okulabirira obulamu bwabyo (okwebuuzza ku basawo b'ebisolo).
- Okuzaalisa ebisolo eby'omutindo ogwa waggulu (okuzaalisa maleeto, ebigukira ebbugumu era ebikula amangu, n'okukendeeza obungi bwabyo ku ddundiro).
- Okugaziya engeri y'obulunzi (*diversifying*) nga okuva ku birime ebitabule okudda ku malundiro amategeke.
- Okugatta ebirime n'amalundiro.
- Okuva ku kulima kwokka okudda ku bulunzi oba okubugatta ku bulimi.

### **c. Obulunzi obuteetaagisa ttaka ddene**

Obulunzi buno businziira ku kulabirira n'kukozesa obulungi obusa bw'ebisolo, ebisasiro ku ssamba wamu n'emikka egibivaamu. Ennunda eno nnungi nnyo ku balunzi ba bulijjo, okugeza, abalundira ebisolo awaka naddala ab'ebisolo by'amata, embizzi n'ebirala. Kuyamba okwongera enfuna yaabwe (laba wansi awo).

| EBIKOLWA NE SAAYASI                                      | ENKAKASA Y'OBUNGI BW'EMMERE EMALA BULIJO | OKUKYUUKIRA KU MBEERA | OKUKENDEEZA       | EBIZIYIZA                      |
|----------------------------------------------------------|------------------------------------------|-----------------------|-------------------|--------------------------------|
| Bayo-gaasi n'ebigimusa                                   | Nnungi nnyo ddala                        | Nnungi nnyo ddala     | Nnungi nnyo ddala | Bbula lya nsimbi z'entandikwa  |
| Okukozesa kompositi                                      | Nnungi nnyo                              | Nnungi                | Nnungi nnyo       | -                              |
| Entereka n'nkozesa y'obusa                               | Nnungi nnyo                              | Nnungi                | Nnungi nnyo       | -                              |
| Okumanya enkyuusakyuusa y'ebbugumu (temperature control) | Nnungi nnyo ddala                        | Nnungi nnyo ddala     | Nnungi            | Nsimbi ez'entandikwa n'ezikola |
| Okuliimisa n'okunoonyereza ku ndwadde                    | Nnungi nnyo                              | Nnungi nnyo ddala     | Nnungi            | -                              |
| Okukozesa obulungi enku, amanda n'amasannyalaze          | -                                        | Nnungi                | Nnungi nnyo ddala | Ensimbi z'obuyambo             |
| Okulongoosa mu ndiisa                                    | Nnungi nnyo ddala                        | Nnungi                | Nnungi nnyo ddala | Ensimbi ezikola nnyingi        |
| Okuzimba obusobozi bw'okufuna ebyetaago                  | Nnungi nnyo                              | Nnungi nnyo ddala     | -                 | Entabaganya y'emirimu          |

Engeri enkola ezettaka ettono gyeziyambamu mu kutumbula eby'obulimi n'obulunzi.

### 9.3.2 Endiisa ennungi entuufu (*diet*)

Ebisolo byeetaaga endiisa ennungi entuufu okufunamu ebiriisa ebiwagira obulamu bwaabyo mu bujjuvu bituwe ebibirunzisa. Eky'kulabirako, ente eriiisibwa obulungi evaamu amata mange okusinga etakina pulotiini (*proteins*) ezimala. Ebikolo by'endiisa entuufu bye bino:

- 1. Kaabohaiduleti:** Okuwa ebisolo amaanyi, okugeza nga okuddo omubisi n'omukalu.
- 2. Pulotiini (*Proteins*):** Okuzimba omubiri. Eby'okugeza, ebirime ebikungule, nga kasooli omuse, eng'aano, n'ebirala nga omuddo ogulekedwa okusaakaala, emmere y'ebisolo ekoledwa mu soya, kasooli eng'aano n'ebirala ebikolebwa okuva mu pulotiini w'ebisolo n'ebyennyanja.
- 3. Vitamini:** Ebisolo byeeetaaga vitamini ea'enjawulo emirundi emingi eziva mu mmere engule. Obukulu bw vitamini: kuziyiza ndwadde, okwongera ku bintu byetujja mu bisolo (mata, nnyama, ne'birala), okukola emirimu (mbalaasi, ndogoyi), okukula obulungi, okuzaala ennyo era obulungi n'okukula obulungi.
  - **Vitamini D:** Okukula obulungi n'amagumba amagumu, omubiri okusa emmere n'lufulumya kachichi. Vitamini D zisobozesa ebisolo

okuyingiza “*calcium*” ne “*phosphates*” mu byenda. Ebbula lya vitamini D lireetera amagulu g’ebisolo okweeweta n’okuba amanafu ate ngakuleetera ekisolo obutakula bulungi. Vitamini D zisinga kuva mu musana; ebisolo bisaana okugwooa eddakiika ezisukka 30.

- **Vitamini A:** Zisangibwa mu kaloti (*carrots*), “*lucern meal*”, ebikoola bya amarath ebikalu ebise. Omusawo w’ebisolo asobola n’okukuba ebisolo empiso za vitamini A. Ebbula lya vitamini A lireeta amaaso okuziba eddiba okukalappuka, amagulu okuzimba, amagi okukendeera n’okubeera amasumba, embizzi okutabuka obwongo, amagumba okutakula bulungi, obutazaala, n’ukukula empola.
- **Riboflavin – Vitamini B2:** Vitamini zino nkulu nnyo ku ssukaali mu mubiri n’okuyamba ssebusa n’ebyenda. Ebbula lya vitamini B2 lileetera obukoko obuto okusannyalala, obugere okweeweta, okubiika amagi amatonno ate amasumba, okusususu okwoonooneka, okukula amangu, n’mbizzi okufa ennyo oba embimalaasi okuziba amaaso. Vitamini zino ziva mu “*lucern meal*”, ebimera ebya kiragala, ebyennyanya, n’amata.
- **Vitamini B12:** Vitamini zino nkulu mu kukuza, okwongera amaanyi n’okutabula obulungi ebiriisa mu mubiri. Embizzi n’enkoko n’ebinyonyi ebirala ebirunde byetaaga nnyo vitamini zino. Bwe bitafuna vitamini zino bikogga n’okuba nga byewulira nga tebyaagala kulya mmere, biggwaamu omusaayi, bikula mpola nnyo, tebizaala bulungi oba amagi gaabyo gaba nnyo ag’enziriza. Ebbula lino lireeta n’okuddukana n’olusususu n’amatu okulwaala. Vitamini zino zifunika mu soya, ebyennyanya ebise, amata oba mu mpiso za vitamini ezikubwa ebirunde.
- **Vitamini E:** Zino ziyamba ennyama okuba ennungi ate nga tevunda mangu, okulwaanyisa endwadde, n’okuzaala. Ebbula lya vitamini zino lyoonooa ennyama, ekibumba, enzaala y’ebisolo, obwoongo okwoonooneka n’butazaala nnyo.
- **Vitamini K:** Zino nkulu nnyo ku musaayi gw’ebisolo. Ebula lya vitamini zino kuleetera okusaayi okukala amangu ennyo. Ebbula lya vitamini zino lireeta okuvaamu obusaayi. Vitamini zino ziva mu bintu abakugu byebayiita *gliricidia*, *sesbania*, *desmodium* ne *calliandra leaves*, *sweet clovers*, *rumen synthesis*, omuddo omubisi n’ebyennyanya.

**Kino Kikulu:** Embizzi zeetaaga vitamini nnyingi okusinga ebisolo ebirala ku malundiro n’amasamba kubanga zirina ebyenda bimpi ddala.

4. **Minero:** Minero za bika bibiri, ennene n’entono. Wansi ze minero ebisolo zebyetaaga. Kikulu nnyo okweebuza ku basawo b’ebisolo ku nsong eno.

| EKIKOLO      | OMUGASO                                                                                | ENSIBUKO                                                                                                                            | AKABENJE K'EBBULA                                                              |
|--------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Kaasiyuumu   | Okugumya amagumba n'amannyo.                                                           | Laimu ( <i>lime</i> ), ebyennyanya, amata, ebikalappwa ebise, ebikoola by'ebijanjaalo.                                              | Amagumba amanafu, amagumba okwaatika oba okumenyeka.                           |
| Fosiforaasi  | Okukula obulingi, okuzaala amata' amagumba amagumu.                                    | Amagumba amase omunnyu, empeke ense (bisusunku bya kasooli, mucheere, ng'aano), omuddo omukalu ne'bisagazi ebikalu.                 | Okulya ettaka, okugaaya buli kintu, obutalya, okukogga, amata n'amagi amatono. |
| Magineziyumu | Obwongo okukula obulungi, ebyendai okugaaya obulungi emmere.                           | Bijanjaalo, kawo.                                                                                                                   | Obwongo okwonooneka, okuvaamu omusaayi, okubimba ejjovu mukamwa.               |
| Salufa       | Omubiri okusa pulotiini, enjuba z'amagi ennungi, ebyooya ebigumu, okutuuyana obulingi. | Kabigi ( <i>cabbage</i> ), ebikoola bya " <i>amaranth</i> ", <i>Sesbania</i> , <i>Calliandra</i> , " <i>soymeal</i> ", ebyennyanya. | Okukula empola, okukogga, obunafu, ebyooya ebinafu.                            |

Minero ebisolo byezeetaaga

Bino  
birowoozeeko

Emmere y'ebisolo etuufu eyanguyira ebyenda okugisa n'okugiyingiza mu bitundu ebirala eby'omubiri era ekendeeza obwetaavu bebigimusa ebigule.

### 9.3.3 Amazzi

Amazzi yensibukoy'obulamu; makulu mu ndiisa y'ebisolo. Ekisolo kifa mangu bwekitanywa mazzi okusinga nga tekiridde.

**Kino Kikulu:** Ekisolokyeetaaga 1 liita y'amazzi kubuli 10 kgs y'obuzito bwaakyo.

Bino  
birowoozeeko

#### OBUKULU BW'AMAZZI MU NDISSA Y'EBISOLO:

- Amazzi kikulu nnyo mu mibiri gy'ebisolo; gayamba mu ndya yaabyo, gatambuza ebiriisa mu mubiri.
- Gatetenkanya bulungi ebbugukmu ly'omu biri ebisolo bwebituuyana.
- Amazzi gayamba omubiri okuzimba ebiriisa byaagwo gwennyini n'okufulumya kachichi.
- Ebirunde bingi biklia mu mazzi era mwebibeera.

Amazzi g'ebisolo gateekwa okuba amalungi, amayonjo era nga ge matuufu (safe) okunywa. Galina okukuumibwa obulungi galeme kugendamu bujama oba eky'obutwa kyonna. Gayinza okuva mu nnayikondo, emigga, ennyanja oba enzizi n'emifulejje.

**Kino Kikulu:** Wekenneenye nnyo ebika by'ebisolo by'olunda, neby'obijjamu, nga obiwa amazzi. Ebizala amata byetaaga amazzi mangi okusinga eby'ennyama. Gyebikoma okunywa n'amatagyegakoma okuba amangi. Ente ekuwa 36.3 – 45.5 liita ez'amata yetaaga 114 – 155 liita ez'amazzi amayonjo.

## 9.4 Endabirira y'ebisibo by'ebisolo

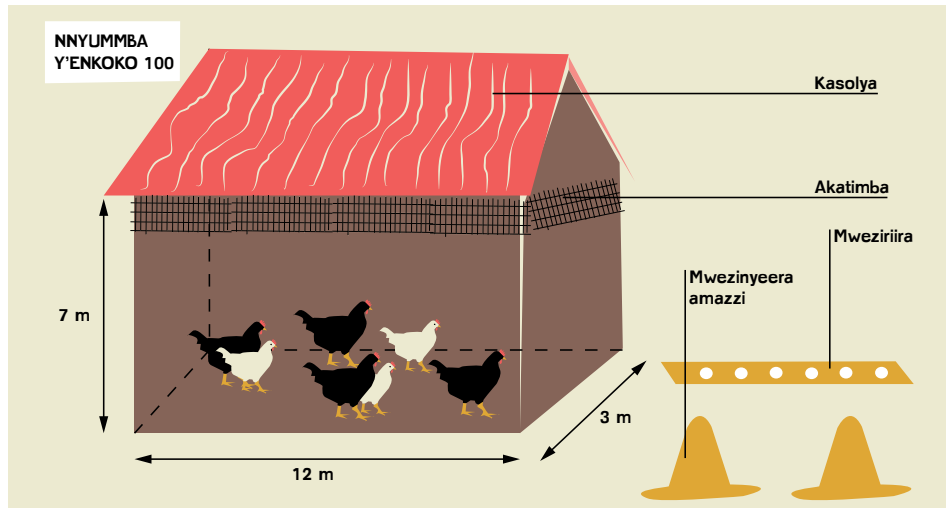
Ebisibo n'ebidaala by'ebisolo ebizimbe obubi bibireka nga tebikumibwa bulungi kwewala ndwadde, ebiwuka, ate biyinza obuteegazaanya bulungi n'obutalya mu ddembe, okwookebwa ennyo omusana oba okukubwa enkuba. Bino byonna bikendeeza enkula yaabyo n'amagoba getubifunamu, nga amata, amagi, n'ebirala. Kiyinza n'okuvaamu endwadde eziwerako. Obisolo byeetaaga n'ebisikirize mu budde obw'omusana biwummule era biddemu amaanyi.

### 9.4.1 Ebikulu mu nzimba y'ebiraalo n'ebisibo

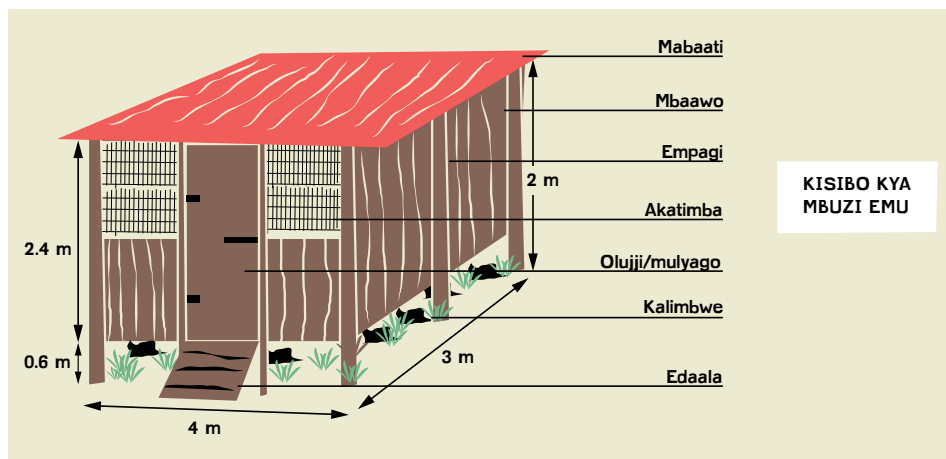
- **Ekika ky'ebisolo oba ebinyonyi:** Ebisolo eby'enjawulo n'ebinyonyi byonna byetaaga enzimirwa za njawulo.
- **Endya y'ebisolo n'ebinyonyi ebyo:** Eno eyawukira ddala nnyo, okugeza, enkoko zibojja, embizzi ziyoola, ente zisenyesannimi. N'olw'ekyo, engeriekisolo oba ekinyonyi gyekiyimiramu okulya nkuluu nga osalawo ennzimbira yaabyo.
- **Ennywa y'amazzi:** Ekiraalo oba ekisibo kirina okuba n'ekifo ekituufu ebinyonyi n'ensolo okunyweeramu amazzi n'kugakuuma nga mayonjo.
- **Enzaala:** Ebisolo birinaokwegazaanya bisobole okutagana mu by'enzaala n'okulera obwaana bwaabyo.
- **Embeera y'obutonde bw'ensi mu kitundu,**
- **Embeera z'obudde:** Ebitundu eby'embuyaga byetaaga ebizimbe ebinywewu ennyo ngabirikumpi n'emitu egitangira. Ebyo ebilumbibwa amataba betaagisa ebizimbe ebizimbiddwa wagguluko ngaku bituuti ewalako n'ensibukoy'amataba ago.

### 9.4.2 Ebika by'ebizimbe by'ebisolo

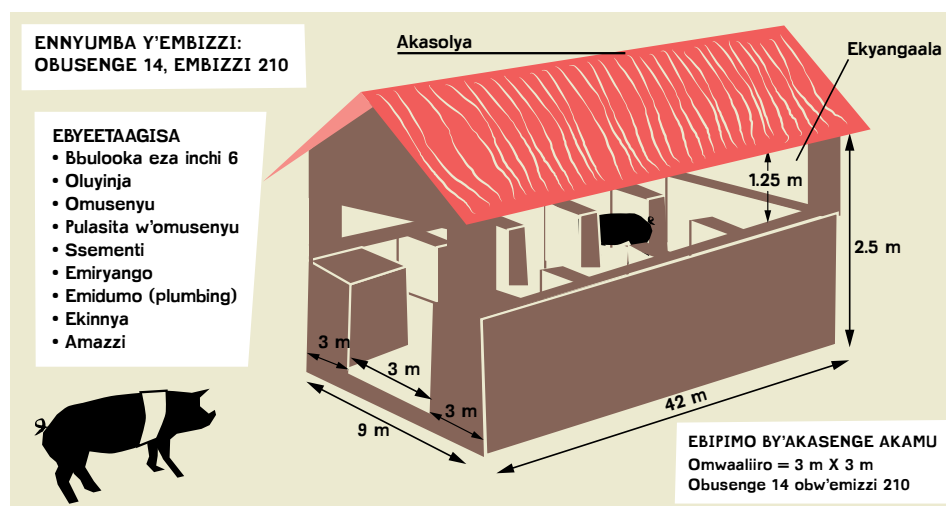
- Miita 4 - 5 buli nte.
- Ekiwonko mu kizimbe.
- Ebidaala (*Loose housing with stalls*).
- Ebisolo by'nnume byetaaga obugazi bwa 12 – 15 m webiriira ne 20 – 30 m webyetayiza n'ebisinge ebigumu.
- Ekiraalo ky'ennyana (kizimbibwa bulungi okuzisobozesa okuyonka obulungi, okulya n'okunywa amazzi).



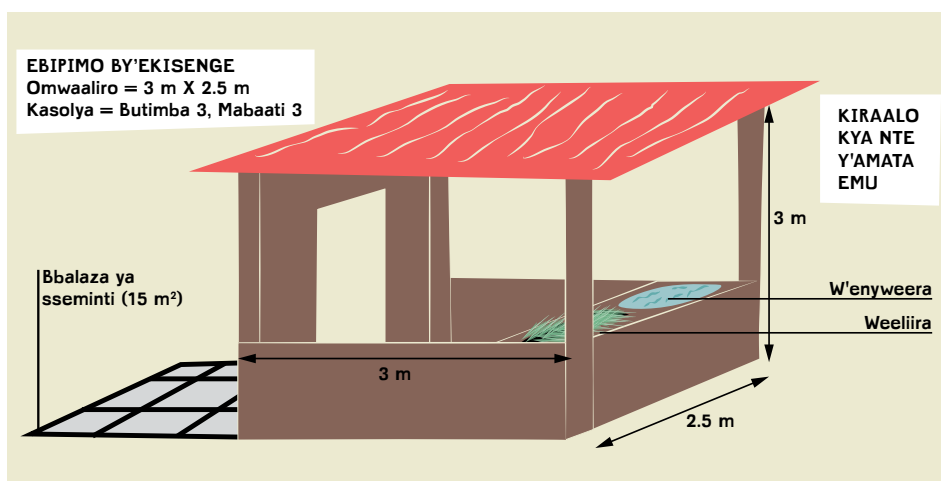
Ennyumba y'enkoko



Ekisibo ky'embuzi ez'amata



Ennyumba y'embizzi



Ekiraalo ky'ente y'amata emu

### AKAGEZO AKAMPIMPI

1. Ebisolo byo olabirira otya obulamu by'ebisolo byo, n'engiri gye bikuwa ekibikulundisa?
2. Oyinza oty okulongoosaamu munkola yo?
3. Jjaye ekifaananyi ky'essamba yo kyewakozesezza mumasomo agaakulembedde. Ebizimbe by'ebisolo byo oba ebinyni wndibizimbye wa?

## 9.5 Enzaaza y'omutindo ogwa waggulu

Okukozesa ensigo z'ebisolo abakugu bye banoobyerezzaako n'okubyongera obulingi n'emiganyulo kuyamba okuzaalisa ebisolo ebiganyula omulunzi. Mu kukola otyo oteekwa kumanya kiki kyyeweetaaga mu bisolo byo oba ebinyni. Eby'okulabirako: okwekuuma ebyeeya, ebiwuka n'endwadde wetaaga ebisolo ebyetaaga amazzi amatono nga tebikufiiriza magoba (nga mu mata), n'ebigumira ebiwuka n'endwadde.

Okulonda oba okuzaaza ebisolo ebitalaeta mikka egibuguumiriza ensi nakyo kikulu ku mbeera.

Okutabula n'okugatta ensigo z'ebisolo mu nzaaza kukuwa ebisolo ebigumira ebbugumu, ebiwuka n'endwadde era eby'amaanyi n'okuzaala nga bizaala bulungi.

Mu kutabula ensigo kuno kirungi nnyo okugatta ebika by'ebisolo ebinnansi mu kitundu ebimanyidde embeera zaakyo n'ebyo ebiva awalala naye nga bibisinga obulungi.

Endabirira y'ebisolo, okuziyiza endwadde n'endiisa entuufu: Obukodyo obw'enjawulo bweetaagisa mu bulunzi busveemu amagoba. Bulina okukola ku bizibu nga endiisa, emikka egibuguumiriza ensi n'okugumira embeera y'ekitundu. Endiisa entuufu n'endabirira y'eby'obulamu ennungi, okugema n'okujjanjaba endwadde kukendeeza obungi bw'ebisolo ebifa n'okusobozesa ebisolo okukula bireete mangu amagoba.

## 9.6 Ekwaata y'obusa n'ebirala ebipamibwa ebisolo (ebigimusa ne bayo-gaasi)

Mukulunda okutabaganye, ebintu nga obusa, omusulo, kalimbwe, ebisasiro n'ebisusunku bikwaatibwa bwebiti:

- Obusa ne kalimbwe bigimusa ettaka n'okuligonza amazzi galiyingire mangu ate bulungi. Ebyennyanya ebimu birya kalimbwe w'enkoko.
- Bivaamu bayo-gaasi. Ate mu kukola bayo-gaasi omulimi funa ebigimusa ebirimu ebiriisa (*of slurry*) ebingi ate nga biyonjo okukozesa. Kalimbe mulungi mu kubikka amagi gaalule. Omulunzi yetaagaa ebinyoni/ enkoko nga 450 (30 kg eza kalimbwe oba obusa buli lunaku) okusobola okukola bayo-gaasi akozesebwa okufumba mu taala ne mu inginiezimu.
- Okukozesa ebigimusa bino kukendeeza oba okumalawo obwetaavu bw'ebigimusa ebigule.

## 9.7 Okuziyiza ebiwuka n'endwadde

Enkyuukakyuuka mu mbeera z'obudde ziyinza okwongera ebiwuka obungi, okuleetera endwadde okweekyuusa neziba nzibu okujjanjaba, okutta ebisolo, okukendeeza amagoba g'obulunzi n'okuleetera abalunzi endwadde.

| ENDWADDE EZITEGEEZEBWA<br>ABAKUKGU OKUZIOLAKO                                                                                                                                                                                                                                                                                                                                                                                    | ENDWADDE ENZIBU OKUTEGEEZA<br>ABAKUKGU OKUZIOLAKO                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Kalusu</li> <li>• Ansirakisi</li> <li>• Numooniya w'ebisolo ebirala akwaasibwa (CBPP)</li> <li>• Rebiizi</li> <li>• Ugonjwa wa ngozi yenye nundunundu</li> <li>• Numoniya w'ente akwaasibwa endalaa (CCPP)</li> <li>• Endwadde ya "New Castle"</li> <li>• Omusujja gw'enkwa (ECF)</li> <li>• Omusujja gwa "Rift Valley"</li> <li>• Mmongoota</li> <li>• Ssenyiga w'ebinyonyi</li> </ul> | <ul style="list-style-type: none"> <li>• Enfaana n'ebirala mu bvenda</li> <li>• Ebuzibu mu kuzaala</li> <li>• Masitiisi</li> <li>• Obubwabwabwa</li> </ul> |

Edwadde z'ebisolo ezirabikalabika mu Afrika y'Ebuwanjuba (*East Africa*)

Emmere entuufu n'endiisa ennungi, amazzi amayonjo agamala, ebizimbe, okugema, eddagala ly'obuwuka bwomu lubuto, okubbika oba okufuuyira eddagala, endabirira y'eddundiro, enzaaza ey'omutindo, byonna biyinza oku kendeeza endwadde. Kiyamba n'okwewala okukuma ebisolo ebingi ennyo mu kafo akafunda n'okwebuza ky abakugu.

*Obuzibu mu busobozi bw'okuziyiza enwadde n'okujjanjaba ebisolo:*

- Ebbula ly'eddagala erigema n'amalwaliro g'ebisolo.
- Obutamanya kimala ku bikwaata ku biwuka n'endwadde.
- Ebbula y'abakugu abanoonyereza n'eddagala erilwaanyisa ebiwuka ku malundiro.
- Obutalwaanyisa nkwa.

- Ba insipekita abatono ennyo mu bulunzi.
- Amateekag'ebyo obulimi obutagonderwa.
- Ebintu ebimu ebilokebwamu nsi n'ebiva ebweeru ebitali bituufu mu ndabirira y'ebisolo.
- Ensimbi, amaanyi, n'ebikola bya gavumenti ebitamala.

**Kino Kikulu:** Bulijjo weebuuzze ku basawo b'ebisolo n'abakugu abalala nga tonnatandika ddundiro ne mu kuliddukanya.

## OKUMANYA ENDWADDE Z'EBISOLO (*DIAGNOSIS*)

Okutegeera ndwade ki: Obubonero obulabika.

Endabika: Eddiba, mu nnyindo munda, amaaso, emimiro, enneeyisa y'ekisolo.

Enkola y'omubiri: Okwaagala oba obutayagala kulya, okutuuyana, enkuba y'omutima, okupama n'okufuka omusulo, amata.

Okuvaamu oluzzizzi: Langi y'olizzizzi n'egeri yaalwo.

Ebizimba: Ebitundu ebizimbye n'endabika y'ebizimba.

## EBIKA BY'ENDWADDE

Endwadde ezitaggwa mu kitundu: Enkwa n'endwadde zezireeta.

Edwadde eziva mu bantu: Obuwuka bw'endwadde okukutula okuva mu bantu nebulwaaza ebisolo.

Endwadde ezisaasaana amangu: Endwadde ezikutte ebisolo ebingi ennyo mu kitundu. (Emisujja gy'embizzi, kalusu, mmongoota).

## OKUZIYIZA N'OKUJJANJABA ENDWDDE

Tuyinza okweekuuma endwade z'ebisolo mu ngeri zino:

1. **Okujjanjaba akafuba (*Bovine Tuberculosis* - *TB*):** Akaleetebwa akawuka ka bakitiriyi "*Bacterium Mycobacterium Tuberculosis*" akakwaata embuzi, embizzi, embwa, kkapu, n'ebisolo ebirala.
2. **Kalusu:** Endwadde eno ekwaasibwa nnyo ebisolo ebirala ekimu bw'ekikwaata. Obubonero bwaayo, musujja, okulemala, amata okukendeera ennyo, kulumizibwa ennyo n'obutalya. Okuziyiza kwetaagisa okujjanjaba amangu, okutegeeza abakugu amangu, okwawula ebisolo ebirwadde, okugema. Ebisolo ebiri mu kussuuka betaaga ekisiikirize, amazzi mangi, emmere enng'onvu, sukaali ggulu (okufuna amaanyi) n'eddagala.
3. **Omusujja gw'enkwa (*East Coast Fever* - *ECF*):** Enkwa bwe ziruma ebisolo zileeta omusujja. Zitera kwelippa ku matu nezizaala n'kusaasaanya obuwuka mu mimi. Obubonero bw'endwadde eno, okukolola empolampola, obuzibu mu kussa, okuddukana (oluusi omusaayi), emyaala gy'ennyama okuseebengerera, amaaso n'ebibuno okufuuka langi, okuzirika n'okufa u wiiki nga ssatu. Omusujja "*ECF*" gujjanjabibwa eddgala "*parvaquone*," "*buparvaquone*" ne "*halofuginone*."

## 10. Ensibuko empangaazi ez'amasannyalaze n'omuliro

### Ennyanjula

Ekigendererwa ky'essomo lino kwe kulaga engeri y'abalimi b'efuna entonotono gy'ebasobola okukola n'okukozesa ensibuko empangaazi ez'amasannyalaze n'omuliro, okusobola okukendenza okunyigiliza kuby'obugagga eby'omuttaka. Ensibuko empangaazi ez'amasannyalaze n'omuliro kiteela kukozesebwa okutegeeza ensibuko empangaazi ez'amasannyalaze n'omuliro ezalayisi ate nga z'amulembe.

### Essomo lino lijja kwetaaga essawa 2

#### 10.1 Ensibuko empangaazi ez'amasannyalaze n'omuliro ky'ekiki ?

Ensibuko empangaazi ez'amasannyalaze n'omuliro okutegeeza okufulumizibwa n'esasanyizibwa ennungamu y'ensibuko empangaazi ez'amasannyalaze n'omuliro oku:

- Kakasa enfulumya y'ettaka
- Okukendeza emikka egibugumiliza ensi
- Kuuma obutonde bwensi

Ensibuko empangaazi ez'amasannyalaze n'omuliro ebiseera ebisinga kiyina emigaso emirala okugeeza nga okulongosebwa muby'obulamu (nga kiva mubukendevu bw'omukka oguva mumulilo gwe'nku).

Era mukukuuma amasannyalaze n'omuliro agakozesebwa mubifo eby'enjawulo eby'obulimi (okugeeza nga okubikka, okukolezan'etambula) kisoboola okukendeeza emikka egibugumiliza ensi.

**Okukolebwa kw'ensibuko empangaazi ez'amasannyalaze n'omuliro n'enkozesa eyamasiga amalongoosemu kilongoosa obulungi bw'ensi mukuyita mubekeendevu bw'okutema emitti okulubirwamu okufuna enku n'amanda.**

Bino  
birowoozeeko

#### 10.2 Ensibuko z'amasannyalaze n'omuliro ezabulijjo

Abalimi mubuvanjuba bwa'firika basingila ddala kukozesa: Enku, amanda, ebikuuta by'enku n'ebisagalila by'ebilime nga ensibuko z'amasannyalaze n'omuliro. Naye ate nga n'ensibuko endala wezili okugenza nga, amanyi nge'njuba, empewo n'ebayo-gaasi (gaasi ava mubuusa). Enkozesa eno ewumbindwawumbidwa wamanga.

| ENSIBUKO<br>Z'AMASANNYALAZE<br>N'OMULIRO         | EKITI<br>KY'ENSIBUKO                        | EKIKA KY'ENSIBUKO<br>Y'AMASANNYALAZE<br>N'OMULIRO | AMAAKA<br>(kubuli kikumi) |          |
|--------------------------------------------------|---------------------------------------------|---------------------------------------------------|---------------------------|----------|
|                                                  |                                             |                                                   | MUBYA'ALO                 | MUKIBUGA |
| Ebisusunku                                       | Ekkinansi                                   | Enku                                              | 90                        | 10       |
|                                                  |                                             | Amanda                                            | 20                        | 80       |
|                                                  |                                             | Ebikuuta by'enku                                  | 3                         | 1        |
|                                                  |                                             | Ebisagalila by'ensolo                             | -                         | -        |
|                                                  | Ebizungu                                    | Bayo-gaasi                                        | -                         | -        |
|                                                  |                                             | Amafuta gabayo                                    | -                         | -        |
|                                                  |                                             | Omwenge                                           | -                         | -        |
| Amafuta<br>gapetuloli                            | Amafuta<br>g'engumbagumba<br>z'ebyasigalila | Amafuuta g'omutaala                               | 94                        | 89       |
|                                                  |                                             | Gasi wamafuta omusegenje                          | 1.8                       | 23       |
| Ensibuko<br>z'amasannyalaze<br>n'omuliro endaala | Ensibuko<br>ezisobola<br>okulongosebwa      | Amasannyalaze                                     | 3.8                       | 15       |
|                                                  |                                             | Amanyi ng'enjuba                                  | -                         | -        |
|                                                  |                                             | Empewo                                            | -                         | -        |
| Biky'emiko                                       |                                             | Batuule n'amanda ng'atooki                        | 2                         | 5        |

Ensibuko z'amasannyalaze, n'omuliro<sup>2</sup>

## AKAGEZO AKAMPIMPI

1. Biika by'ensibuko z'amasannyalaze n'omuliro bimeka by'okozeesa?
2. Wayinzika okubayoensibuko z'amasannyalaze n'omuliro endaala zosobola okukozessa?

## 10.3 Ensibuko ez'amasannyalaze n'omuliro ezongezeka amangu

Ensibuko ez'amasannyalaze n'omuliro ezongezeka amangu kitegeeza amasannyalaze n'omuliro agafunibwa okuva munsibuko ezisobola okukozesebwa emirundi emingi okugeeza nga ebisusunku (enku, amanda), amanyi nge'enjuba, empewo, amazzi oba ebuggumu ly'obutonde bwensi ely'omuttaka. Bayomasi n'amanyi nge'enjubansibuko ez'amasannyalaze n'omuliro ezongezeka ezisobola okukozesebwa abalimi.

### 10.3.1 Ensibuko ez'amasannyalaze n'omuliro eya bayo-gaasi

Ensibuko ez'amasannyalaze n'omuliro eya bayo-gaasi eva mubintu ebilamu oba ebyakaffa ebya bayologiya. Ebimera ebyalangi yakilagala bifuna amasannyalaze n'omuliro okuva mamanyi nge'njuba n'ebigakyusamu amafuuta aga ky'emiko ngabiyita mu nkola emanyidwanga fotosisensi. Mukwogera bayo-gaasi nsibuko y'amasannyalaze n'omuliro eyongezeka amangu era nga eliwakati wa kaboniya.

Okusimba emiti n'ebimeera n'okukozessa obusa obumementufu kisobola okuleetawo okukendeezebwa kwo'mukka gwa kaboni diyokisayidi.

- Emmiti oba enku zomukibila (enku ezifumbisibwa).
- Obufulume obumementuffu okugeza ng'obussa bwente, obubi, n'ebisigalila by'ebimeera.
- Gaasi eza bayo (omwenge).
- Ebibala n'ebilime (okugeza nga kasooli, obuulo, omuwemba, ebijanjalobyasoya, ebikajjo, ebisagazi, emepeeke z'emitti nga kuloton).

| EMIGANYULO                                | EBIZIBU                                                                                              |
|-------------------------------------------|------------------------------------------------------------------------------------------------------|
| Kirina enjuyi nyingi                      | Amasannyalaze n'omuliro gwafulumya bitono ddala.                                                     |
| Ayongezeka mangu                          | Ayinja okuleetawo enkyukankyuka y'ettaka, okufirwa kwe'bilime n'ebisolo eby'enjawulo.                |
| Talina nyo mikka gya kaaboni dayokisayidi | Asobola okukendeeza mufulumya y'ebilime.                                                             |
| Afulumya kitono emikka egibugumiliza Ensi | Ebizibu ebilala omuli: okulunguula ebilisa by'ettaka, ukutwalibwa kwe'ttaka n'okwononebwa kw'amazzi. |

[illegible]

### 10.3.2 Bayo-gaasi (*Biogas*)

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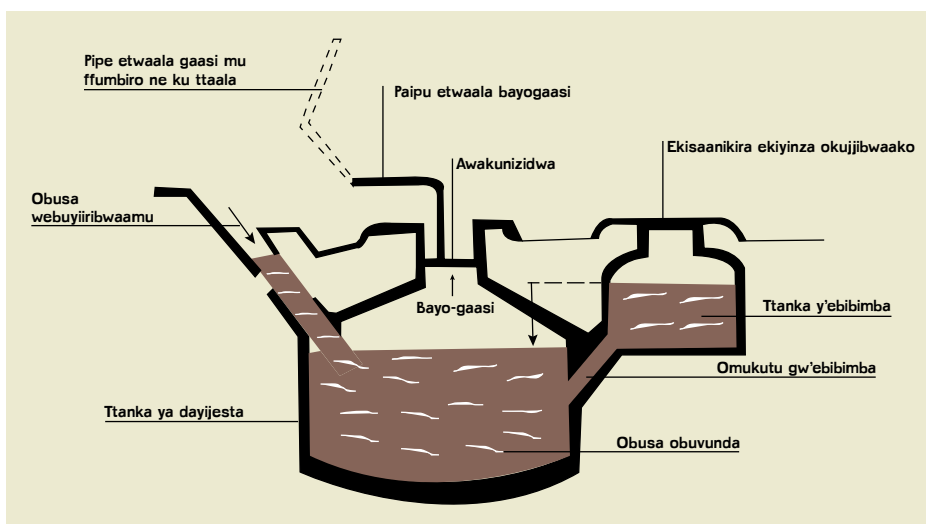
**Bayo-gaasi ye nsibuko y'amanyo agomuliro esinga bbeyi eya wansi ekozesebwa mu kifo ky'enku oba amanda. Okukola bayo-gaasi kwetaagisa ensimbi z'entandikwa mu maandika.**

*Emiganyulo gya bayo-gaasi:*

- Wa bbeeyi ntono okulozesa okufumba ne mu ttaala mu kifo ky'enku n'amanda. Kiyamba enfuna y'amaka bayo-gaasi bw'adda mu kifo ky'amasannyalaze oba dizero.
- Bayo-gaasi mulungi nnyookukozesa mu bulunzi obutabaganye; obusa bw'ebisolo bumukola ate dayijesita n'evaamu ebigimusa ebijonjo ebirimu ebiriisa by'ebirime ebingi.
- Ayamba okukuuma obuyoyo awaka nga akendeeza obujama obuleeta obuwuka bw'edwadde nga dayijesita ebutta.
- Kikendeeza n'endwadde z'amawuggwe mubanga bayo-gaasi avaamu omukka mutono nnyo.
- Okukozesa bayo-gaasi kukuuma n'okulongooza obutonde bw'ensi nga kukendeeza emiti egitemwa okukola amanda oba enku.
- Dayijesita eya pulasitiiki nnyangu nnyo okukola n'okulabirira; omulimi emwanguyira okujjuza.

*Eby'okulowoozaako nga tonnasaasaanya nsimbi ku bayo-gaasi:*

- Kakasa nti amazzi ku faamu gamala; bayo-gaasi yeetaaga amazzi mangi.
- Obusa bulina okuba obungi okumpi ne faamu oleme kumala budde kubunoonya. Kisaana okuba n'ekiraalo ekikyo
- Faamu okuba nga ngazi waliwo awayinza okuzimbibwa bayodayigyesita ya bayo-gaasi.



Dayijesita ya bayo-gaasi

| EBIKOZESEBWA                                                                                     | OBUNGI BWAABYO | BEEYI MU DOOLA (USD) |
|--------------------------------------------------------------------------------------------------|----------------|----------------------|
| Olupiira (omubiri gwa 100 mm) nga lwa 90 - 120 cm obugazi                                        | 6 - 10 m       | 70 .00               |
| Payipu ya 4" obugazi, 1 m obuwanvu ezikozesebwa okujja empewo mu kyoolooni (oba esingwo obugumu) | Ebitundu 2     | 14.00                |
| Payipu ya 1 - 2" obugazi, okujja gaasi mu daijesita okumutwaala mu ffumbiro.                     | Ebitundu 3     | 9.00                 |
| Akasonda ka payipu                                                                               | Ebitundu 5     | 5.00                 |
| Obukoba bw'emipiira okusiba payipu ku dayijestita                                                | Ebitundu 10    | 1.50                 |
| Ekyooto kya gaasi                                                                                | Kitundu 1      | 17.00                |
|                                                                                                  |                | 116.50               |
| <b>EBIRALA</b>                                                                                   |                |                      |
| Obusa obubisi                                                                                    | Engoma 2       |                      |
| Akatimba                                                                                         | Ebitundu 2     |                      |
| Emisumaali 2" - 3"                                                                               | Kilo 1         |                      |
| Abakozi                                                                                          | -              |                      |

Ebyeetagisa mu kuzimba bayodayijesta (*biodigester*) ekola bayo-gaasi

### 10.3.3 Ebisasiro ne kachichi w'eddundiro

Emigasoo gy'okukozesa ebichaafu by'eddundiro:

- Okujjama gaasi.
- Okuyingiza kaaboni mu ttaka.
- Okukozesa ebisuuliddwa mu mirimu emirala.
- Okugimusa ettaka.
- Okukendeeza okuchafuwaza obutonde bw'ensi.
- Okukendeeza okutema emiti.

#### a. Bayomaasi: amanda g'ebisusunku (*Biomass biochar*)

Ebisasiro n'ebisusunku (bikoola ebikalu, bikongoliro, n'ebirala) ebiva mu nnimiro biyinda okukozesebwa okukola ebigimusa by'ettaka (*biochar*), nga byookebwa mungeri etali ya butereevu, n'olukendeeza emikka egibugumiriza ensi.

#### b. Amanda g'ebisusunku (*Biomass briquettes*)

Amanda gano gava mu mpumbu y'embaawo, ebikuta by'emmwaanyi, ebipapula, ebisusunku by'omucvheere, ebikongoliro, ebikuta by'ebinyeebwa, n'ebirala. Binobyokebwa awali okisijeni omutono ddala).



Amanda g'ebisusunku (*Biomass briquettes*)

### 10.3.4 Okwookya amanda mu bwegendereza

Enjokya y'amanda eya bulijjo ya kabenje ku butonde bw'ensi kubanga ereetaokutema emiti emingi ennyo netufiirwa ebibira. Kyokka amanda geetaagibwa nnyo abantu aba bulijjo, naddala mu bibuga, okufumbisa oba okugatunda. N'olw'ekyo kyetaagisa okugookya mu ngeri empangaazi etamalaawo bibia na miti.

Tuteekwa n'okugakozesa obulungi ngatufumba ku ssigiri ezitetaaga mangi obea okugamalawo amangu. Olwo abaana n'abazzukulu balemwe kuba na bbula lyaago oba ely'ebibira.

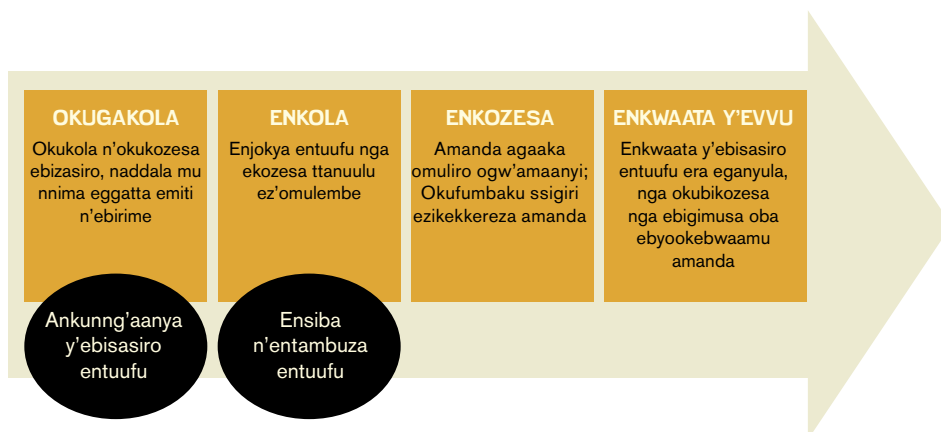
Bino  
birowoozeeko

**Emiti egyokebwamu amanda gisaana kusimbibw ku ssamba oba ddundiro lyo oleme kumalawo bibira.**

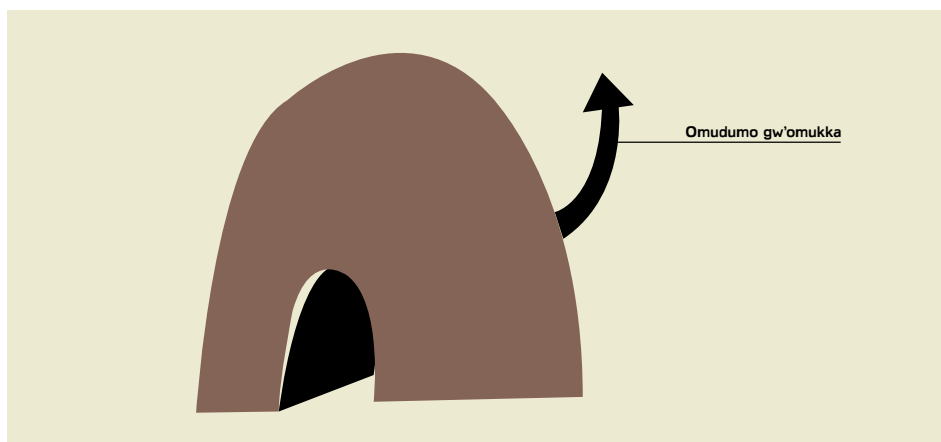
*Eby'okujjukira nga ogenda okwookya amanda mu ngeri etayonoona butonde bwa nsi:*

- Ggwe nga omulimi oba omulunzi olina okugondera amateeka agakwaata ku bibira, okwookya n'okutambuza amanda.
- Oyinza okwetaagalisinsi okukola bino byonna.
- Abalimi bayinza okukakasa nti enjokya y'amanda ya bwegendereza nga bakolaganira mu bibiina by'obulimi bibalage ebirina obumanyirivu ku mitiegikula amangu ate nga givaamu amanda amagumu.
- Weewale okutema emiti egivaamu eddagala, egiri mu ntobaze obaku mbalama z'emigga, n'egy'obutonde bw'ekitundu kyo.
- Kakasa nti enjokya y'amanda ya buwangaazi nga teyonoona butonde nga okudiibuuda ebikozesebwa n'oku leeta emikka egibuguumiriza ensi.
- Enjokya y'amanda ez'obwegendereza ziragiddwa mu bifaananyi obyo wansi.

Enkozesza y'amanda nayo erina okubeera ya bwegedereza galeme kudiibudwa.



Enjokya b'amanda entuufu ey'omulenmbe



Akabiga (ttanuulu entono) omwookebwa amanda

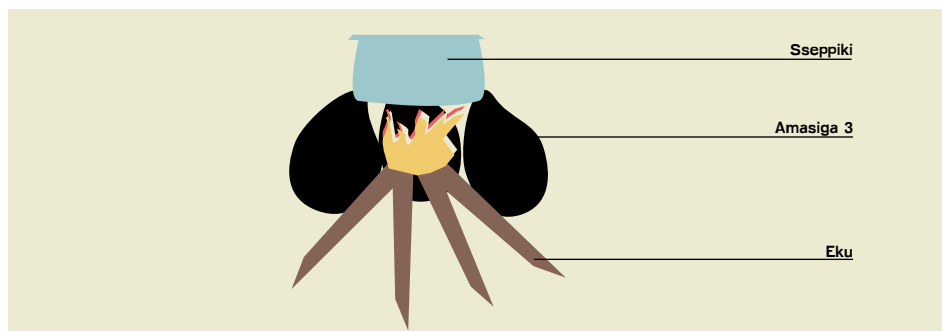
## 10.4 Sayaansi w'ebya masannyalaze n'omuliro getukozesa

Mu sayaansi omulimi oba omulunzi wa bulijjo gw'asobola okukozeamulim: essigiri ezitadiibuuda manda, amaanyi ga sola agava obutereevu ku njuba, bayo-gaasi n'biwujjo by'embuyaga (*windmill*).

### 10.4.1 Amasiga ne sitoovu

#### a. Amasiga aga bulijjo

Amasiga gakolebwa mu mayinja amaneneko asatu oba bulooka. Kyokka amasiga ssi malugi kubanga gakozeza enku nnyingi ate ebbugumu erisiga eriva mu mlir gw'eku ezo kifuumuuka nnga terikozeseddwa. Gavaamu okukka mungi ogw'akabi ku mawuggwe.



Amasiga g'ekinnansi agabulijjo

## b. Amasiga n'essigiri ezikekkereza enku n'amanda

Ssigiri zino n'amasiga ag'engeri eyo bye birungi okukozesa mu kifo ky'amasiga g'ekinnansi. Ensonga eri nti okozesa enku ntono n'amanda natono ddala. N'olw'ekyo, okekkereza ensimbi, n'otaasa n'obudde bwewandimaze nga otyaaba enku. Ssigiri ezo zikendeeza nnyo n'omukka ogukufumuukira nga ofumba, kino nekiganyula obulamu bwo. Bwetukekkereza enku n'amanda tutaasa ebibira n'emiti emirala mu nsi.

*Obulungi bw'essigiri ezikekkereza amanda (oba enku):*

- Zikozesa amanda matonno.
- Zivaamu omukka mutono nnyo (Kirungi ku kw'obulamu bwo) health.
- Zifumba mangu n'otafiirw budde na nsimbi.
- Tezireeta mikka mingi gibuugumiriza nse.
- Nnyangu okukola.
- Nnuangu okukoosa.

Essigiri ekolebwa mu bbumba oba matoffaali era eyinza okubeera nomudumo ogufulumya omukka ebweeru.

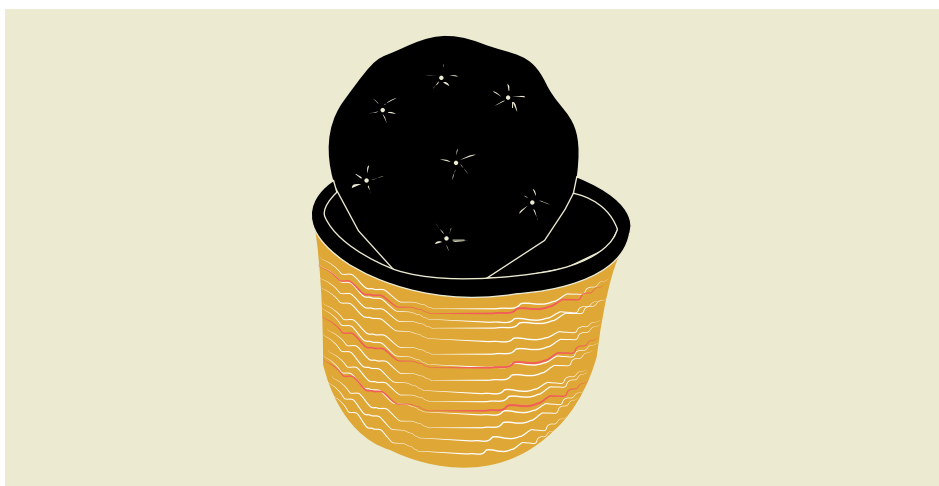


Amasiga agakekkereza amanda (oba enku)

**c. Ebyooto ebitakozesa muliro, obifumbisa bya sola n'obubiga (oven) obwa sola**

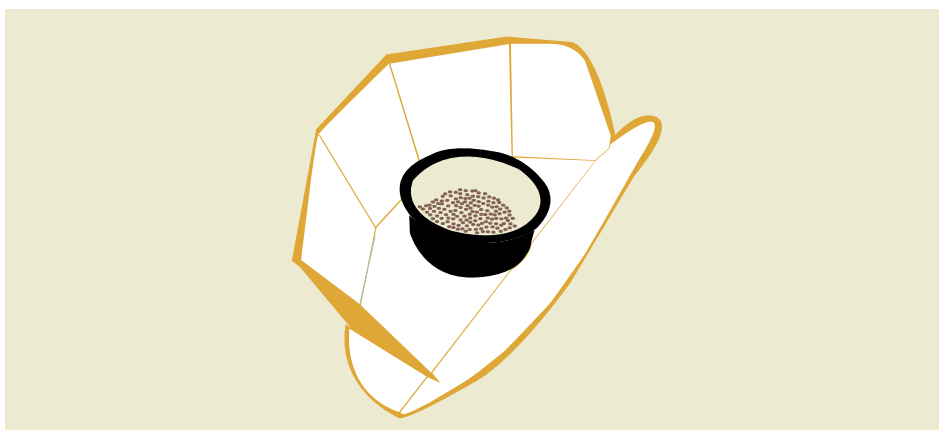
Ebino byonsatule bikendeeza obweetaavu b'okutema emiti olw'enku.

**Ekyooto ekitakozesa muliro** kikozezebwa okumaliriza okufumba ebimaze okweesera, n'okukuuma emmere nga eyokya. Okukikozesa, sooka ofumbe emmere oba enva oba obuugi byesere nga okozesa ssigiri ekekereza amanda. Oluvannyuma sseffuliya oba ensumbi giteeke mu kyooto ekyo. Ekyooto kino kikolebw amu kikabu ekirina ebitambaala ebikkuziddwamu ppamba oba ebiwero ebigaana ebbugumu okufuluma. Efumba mpola naye etaasa amanda n'enku bingi nnyo. Fumba emmere egonda, nga amatooke, limonde, oba omucheere okumala eddakiika nga ssatu oba okutuuka nga etokose, olyooke ogiteeke mu kyooto kino okumala eddakiika nga 25. Emmere enkalu esaana kumala kunnyika egonde; oluvannyuma gifumbe eddakiika 25 ku ssigiri olyooke igiteeke mu kyooto kino okumala essaawa 2.5.



Ekyooto ekitakozesa muliro

**Okukola ebifumbisa bya sola (solar kit)**, kozesa amabaati amagonvu ogasengekemu obupapula bwa aluminियumu (*aluminium foil*) oba feeza nga bikooneddwa bifuuke nga empawo ezza omusana ku sseffuliya enzirugavu omuli emmere gy'ofumba.



Essiga lya sola ekkole mu mabaati agamasamasa

### 10.4.2 Okulongoosa amazzi ne sola

Mu kifo ky'okukyamusasa amazzi, kozesa sola, okugeza nga. Solvatten ("Swedish", kitegeeza amazzi ga sola); ya pulasitiiki nga ate nzirugavu. Egendamu amazzi ga 10 liita nga erimu ebitundu bibiri ebigendamu 5 liita z'amazzi. Jjuza amazzi mu Solvatten ogyaanike mu musana. Munda mulimu ekisengejja ekilongoosa amazzi ng bwegeefumba. Kino kitta obuwuka nekikuwa amazzi agataleeta ndwadde. Teeka Solvatten awatalibbugumu ewole.

*Emigaso gya Solvatten emikulu:*

- Eziyiza endwadde eziva mu mazzi amakyaafu.
- Etaasa obudde n'enku/amanda/amasannyalaze/amafula.
- Ekendeeza ebibira okutemebwa, n'etaasa ettaka, n'okukendeeza kaabonidayokisayidi okufuumukira ennyo mu mpewo.
- Terina kabenje era nnyangu okukozesa.

**Kino kikulu:** Amazzi bwegabaamu obutwa, Solvatten tesobola kubujjumu.



Solvatten

### 10.4.3 Ebyuuma bya sola ebisa kasooli (oba bulo n'omuwemba)

Ebyuuma bino bigulwa bugulwa nga wetaaga doola (US) 4,600. Biyinza okuzimbibwa wansi oba oku waggulu ku kasolya.

#### AKAGEZO AKAMPIMPI

1. Osaasaanya ssente mmeka ku nku oba amanda? Kisoboka okukendeeza ku ssente ezo? Oyinza otya okuzikendeeza?
2. Ofumba oya oba okulongoosa mazzi go?
3. Waliwo engri endala z'oyinza okukozesa?
4. Miganyulo ki engeri zino gyeziyinda okuleetera amaka go n'obutonde bw'ensi?

## 11. Engoba y'ebiwuka by'endwadde z'ebisolo n'ebirime

### Ennyanjula

Ku nkomelero y'omusomo guno, ojja kuba omanyi okulwanyisa ebiwuka, endwadde z'ebisolo n'ebirime nga okozesa obukodyo obw'enjawulo ate nga bw'okeNdeeza okufirwa mu by'enfuna, nga teweereetera kabenje, oba okwoonooni essamba yo n'obutonde bw'ensi.

### Essomo lino lijja kwetaaga essaawa 2

#### 11.1 Engoba y'ebiwuka by'endwadde z'ebisolo n'ebirime kye kiki?

Engoba y'ebiwuka by'endwadde z'ebisolo n'ebirime kiteegeza mutendera gwo'kukuza mu oba okufulumya n'okukuma ebimeera. Kikozesa obukodyo obw'enjawulo okuziyiza obuwuka obuleeta obulwadde, ebiwuka, n'ebimera ebitetagisa okwentangira okufirwa mu nfuna y'ebirime okusobozesa ensi nga ya sente ennunng'amu wamu n'okukuuma obutonde bw'ensi. Mu bigambo ebirala, kakodyo ako buwangaazi akalubililwa mu okutangira obuwuka n'endwadde okweyongera.

*Kino kikolebwa na:*

- Okukozesa (kuteeka ku faamu) ebiwuka by'omugaso, ebirya oba ebitta eby'akabi (okutangira okw'obutonde).
- Kukozesa ebirime eby'enjawulo ebisobola okulwanyisa obulwadde.
- Okulongosa mu by'obuyonjo.
- Okukozesa obukodyo bw'obulimi nga okusalira ebirime, okufuuyira, eddagala ery'obutonde erirwanyisa ebiwuka n'okukozesa ebigimusa eby'obutonde.

**Kino kikulu:** Mu ngeri ezimu, eddagala lya kemiko n'ebigimusa bisobola okukozesebwa awamu n'enkola endala. Esonga eri nti okukozesa eringi eriyitiridda ekendeeza obugimu bw'ettaka n'okulikaza nga kw'ogasse n'okulifuula ery'olunnya.

Eby'okulabilako by'obuwuka bw'ebimera n'endwadde mulimu: olumbugu, ndiwulila, obuwojjolo obweru, obulwadde bw'emwaanyi.

*Obulabe bw'ebiwuka (obuwuka obusaasaanya obulwadde, ebiwuka n'ebirime ebiteetaagibwa) ku ssamba entono.*

- Obukendeavu bw'amankungula g'essamba nga buva ku kwonoonebwa ebiwuka.
- Obukendeavu bw'omutindo gw'eby'eby'obulimi.
- Okufirwa kw'abantu/obulamu bw'ebisolo nga kuva ku njala n'obutwa mu mmere.
- Endya embi.
- Okufirizibwa mu by'enfuna.
- Okufirwa emirimu egyesigamye ku bulimi.

- Okusenguka kw'abantu okuva mu byaalo nga badda mu bibuga.
- Okufiirwa ensigo z'ebimera ezitali zimu.
- Ensasaanya eya wangulu olw'ensibi ennyingi ezeetaagisa kutangira ebizibu by'ekika kino.
- Okwoonoona obutonde bw'ensi olw'okukozesa eddagala eringi erirwaanyisa ebiwuka.
- Okufiirwa emikago gy'obusuubuzi emitala w'amayanja.
- Okuggwaawo kw'obusobozi bw'okutuusa eby'egguzi byaffe mu butale obupya.

*Ebigendelerwa by'enteekateeka y'engoba y'ebiwuka by'endwadde z'ebisolo n'ebirime:*

1. Okwetangira oba okukendeeza ebiwuka ebireeta obulwadde ebisokerwaako.
2. Okukendeza obusobozibw'ebiwukabino.
3. Okwongera obuvumu bw'ebimera ebikwatibwa obulwadde (obuvumu obw'obutonde oba obupaatiike).
4. Okulindiiizibwa kw'obulumbaganyi bw'ebiwuka ebirya ebirime.
5. Okulwiisibwaawo kw'okubuna kw'ebiwuka bino oba edaala ery'kubiri.

Ezimu ku nkola ezikakasiddwa okuba ensukulumu mu kugoba ebiwuka by'endwadde z'ebisolo n'ebirime

## 11.2 Engeri z'okugoba ebiwuka n'endwadde

### 11.2.1 Ebiwuka

Ekiwuka kitegeeza ekiramu kyonna ekirya ebirime oba ekireeta endwadde mu birime ne mu bisolo by'omulunzi oba omulimi.

*Waliwo ebiwaayi eby'ebiwuka bya mirundi ena:*

1. Ansilopodi, (okugeza ebitalina magumba, nga ebiwuka).
2. Pasojeni (okugeza nga fangasi – obukuku, bakitiiriya, vayiraasi n'ebyenyogootola).
3. Ebimera (okugeza ebirime ebiteetaagibwa, n'ebiwuka ebirya biwuka binnaabyo).
4. Ebisolo ebirina amagumba (okugeza nga emmese).

### 11.2.2 Endwadde z'ebimera

Obulwadde kitegeeza enkyuukakyuuka mu bulamu n'empera ya bulijjo bw'ekirime oba obw'ekibala. Endwadde zireetebwa obuwuka obulamu n'empera y'obutonde (okugezao bunnyogovu). Akawuka akaleeta obulwadde bwe kaba nga kaleetebwa obuwuka obulamu kayitibwa bayotiki ejenti (okugeza bakitiiriya kyokka nga obwo obuwa ku butonde bw'ensi buyitibwa a-bayotiki ejenti).

Obubonero bw'obulwadde kifaananyi kirambulukulufu era kiraga nti ekirime kirwaanyisa obuwuka obuleeta endwadde. Obubonero bw'obulwadde buboneero obulaga ekiwuka ekireeta obulwadde oba ekitundu ky'ekiwuka ekirwaza obulwadde. Okugeza obutolobojjo, okugwa kw'ebikoola, okuvunda, okufuma langi y'ebikoola, okw'efunya kw'ebikoola n'okubuzibwaawo kw'emisuwa.

Waliwo obubonero bw'endwadde bwa bika ebigaazi bya mirundi esatu nga bitemeddwatemedwaamu wammanga:

- **Nekulotiki:** Kitta bubbuloka obukola omubiri, emiwula oba ebintundu by'omubiri.
- **Ayipapulasitiki:** Kireetera emyaala gy'ebisolo okukula mu ngeri embi ey'okutuntumuka.
- **Ayipopulasitiki:** Kireeta okuzinng'ama.

### 11.2.3 Obukodyo bw'okugoba ebiwuka by 'endwadde z'ebisolo n'ebirime

Waliwo emitendeera gya milundi etaano egy'okugoba ebiwuka by'endwadde z'ebisolo n'ebirime: okwawula, okumulawo, okukuma, okubudabuda n'okulwanyisizibwa kwo'mukyazza.

|   | Obukodyo bw'okugoba ebiwuka by'endwadde z'ebisolo n'ebirime obwa bulijjo | Okulambulula/Okunnyonyola                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Okwawula                                                                 | Okuziyiza okuyingira n'okubeerawo kw'ebiwuka (okugeza okukozesa ensigo ezitalina biwuka n'ebikozesebwa n'obukodyo bw'okulima obulungi).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2 | Okumulawo                                                                | Okusaanyaawo oba okujjawo ekiwuka ekiba kiri kukimera okugeza nga: <ul style="list-style-type: none"> <li>• Okusaanyaawo ekintu oba ekimera kyonna ekiba kirumbindwa ebiwuka.</li> <li>• Okufuuyira ekimera oba okw'ebitundu ebirumbiddwa nga okozesa eddagala ly'ebiwuka.</li> <li>• Okujjanjaba ekitundu kyennyini eky'ekirime oba ebimera.</li> <li>• Okukyuusa ebirime mu musiri buli lusiga.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                             |
| 3 | Okukuuma                                                                 | Okuziyiza ekisolo oba ekimera ekisaasaanya endwadde nga endwadde ze kisaasaany tezinnatuuka, okugeza nga okukozesa: <ul style="list-style-type: none"> <li>• Okubimma empewo y'okussa.</li> <li>• Ebisenge ebirabika.</li> <li>• Eddagala ettabule eritta ebiwuka.</li> </ul> Obukodyo bwa sayansi obuziyiza: <ul style="list-style-type: none"> <li>- Ebiwuka nga birya ebiwuka ebirala; oba obuwuka obutala bika na maaso obulumba ebiwuka nebubikwaasa endwadde ezibisaanyaawo oba okubirya obuterevu.</li> <li>- Okuziyiza ebiwuka okuzaala n'okukula.</li> <li>- Ebikamule by'ebimera ebirimu eddagala eritta ebiwuka nga okunyookeza, wamu n'ebyo ebisikirisa ebiwuka nebibitta.</li> <li>- Ebikamule by'ebimera ebirimu eddagala eritta ebiwuka ebitalina kabi ku bantu oba ku bisolo.</li> </ul> |

Engeri ttaano ez'okulwaanyisa ebiwuka ebireeta endwadde mu birime ne mu bisolo - 1.

|   | OBUKODYO<br>BW'OKUGOBA<br>EBIWUKA BY'END-<br>WADDE Z'EBISOLO<br>N'EBIRIME OBWA<br>BULIJJO | OKULAMBULULA/OKUNNYONNYOLA                                                                                                                                                                                                        |
|---|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | Okubudabuda                                                                               | Okujjanjaba ekirime okusannyalaza ekiwuka ky'endeadde nga okozesa:<br>• Eddagala ettabule eritta ebiwuka.<br>• Okunyookeza oba okwookya n'omuliro.                                                                                |
| 5 | Okulwanyisizib-<br>wakwo'muk-<br>yazza.                                                   | Simba ensigo ezisobola okulwaanyisa ebiwuka bino nga:<br>• Okulonda eddagala erikola ku nzaala n'enkula y'ebiwuka wamu n'okugatta ensigo ez'enjawulo mu kusiga.<br>• Obukodyo obwa bulijjo oba oba sayansi busobola okukozesebwa. |

Engeri ttaano ez'okulwaanyisa ebiwuka ebireeta endwadde mu birime ne mu bisolo - 2.

*Kozesa amagezi n'obumanyirivu bwonna bw'olina:*

Ennwaanyisa y'ebiwuka entabaganye mu bulime n'obulunzi esobola okubeera ey'omugaso era ey'amagoba singa buli ky'omanyi kyonna kitwaalibwa oku ba ekukulu. Mu kumanya kuno mulimu bino wamanga:

- Ebimera oba ebika by'ebimera.
- Ebiwuka oba ebikaby'ebiwuka.
- Ebyafaayo by'ebiwuka mu kitundu.
- Obugumu bw'omukyaaze/obugumikiliza/obusobozi.
- Embeeraz'obuddeeziliwo.
- Ekifo/ekitundu ekilumbiddwa.
- Ebikozesebwa ebiliwo.
- Obukozi.
- Esimbi ezatagisibwa.

*Engeri z'okugoba ebiwuka by'endwadde z'ebisolo n'ebirime:*

- Abakugu okukebera ebisolo n'ebirime mu budde kikulu mu kugoba ebiwuka.
- Okulwaanyisa ebiwuka by'otalina ky'obimanyiiko kizibu kiyinza okudiibuuda ensimbi.
- Kya buvananyizibwa nnyo okw'ebuuza ku bakugu ku bukodyo obutuufu.
- Okuyiga ekizibu ekiri mu kulwaanyisa ekiwuka kiyinza okukwanguyira naye mu ngeri endala kizibu era kitwaala ebbanga.

*Okulwaanyisa ebiwuka by'endwadde z'ebisolo n'ebirime okutabaganye n'obulimi:*

Okulwaanyisa ebiwuka by'endwadde z'ebisolo n'ebirime okutabaganye n'obulimi kutwaalira wamu era buli ekikwaata ku bulimi n'obulinzi era kukozesa obukodyo obutaano bwetuyize wagguluko; kwo saako endabirira ennungi ey'ebirime n'ebyeetagisa/ebikola eby'obutonde. Enkola eno yeesigamye ku mpagi bbiri:

1. Okukozesa akakodyo akamukamu kumala obudde era kulimu ebizibu ebirala, nga obutamalaayo byeetaagibwa okutuuka ku ky'oluubirira.
2. Waliwo obweeraliikirivu bungi ku ngeri enkozesa y'eddagala eggule gy'esekeetereramu obutonde bw'ensi.

### 11.3 Enkozesa y'ebitonde ebiramu okusaanyaawo ebiwuka by'endwadde

Enkozesa y'ebitonde okusaanyaawo ebiwuka by'endwadde kitegeeza okukozesebwa kw'ensolo ezirina amagumba okukendeeza ebiwuka bulijjo. Enkozesa y'ebitonde okusaanyaawo ebiwuka by'endwadde kitwalilamu okuvuluga enzaala n'enkula y'ebiwuka, okugeza, nga okusiga mu budde obutuufu ebirime bisobole okugumira ebiwuka ebiba bibirumbye oluvannyuma. Bulijjo jjukira nti ebiwuka bitabagana n'obutonde mu nzaala n'enkula yaabyo.

Abalimi bayinza okweyambisa ennima n'ennunda ezisikiriza ebitonde ebitakolagana na biwuka, ssinnakindi n'okubirya. Kino kisoboka singa omulimi akola ekyo kyonna ekiyinda okuwa ebitonde nga bino embeera ebireeta n'okweegazaanya mu ssamba. Ebimu ku bitonde bino bye biwuka ebirala eby'omugaso, nga amavuuvuumira ag'enjawulo agalya enkuyege, nnabe n'ebiwuka ebirala. Ennuba oba enjuki nazo zisobola okulwaanyisa ebiwuka eby'akabenje.

### 11.4 Enkozesa y'emitego egy'engeri egitali gimu okusaanyaawo ebiwuka

Ebiwuka bisaanyizibwawo emitego ey'enjawulo. Eby'okulabilako mulimu: okubironda/kukwaata n'engalo, okukoola emiddo egiteetagisa, nga kw'ogasse kutega okusobola okwata ebiwuka n'emese.

### 11.5 Enkozesa y'eddagala okusaanyaawo ebiwuka by'endwadde

Eddagala elisaanyaawo ebiwuka litabulwa mu bweegendereza nelifukibwa oba okufuuyirwa mu bugenderevu nnimiro oba mu malundiro oba butereevu ku birime n'ebisolo, nga ekigedererwa kuziyiza, kusaanyaawo, kwewala, kutuusa bulabe oba okutta ekintu kyonna ekitwaalibwa nga omulabe w'obulimi n'obulunzi. Kino kyaawukana ku kimanyiddwa abantu abasinga nti eddagala lino lyonna likolebwa mu makolero.

|    | EKIBINJA EKIMANYIDDWA     | KIREETA OBULABE/EKITTA |
|----|---------------------------|------------------------|
| 1  | Eddagala ly'ebiwuka       | Ebiwuka                |
| 2  | Eddagala ly'enkwa         | Enkwa                  |
| 3  | Eddagala l'omuddo         | Ebilimeebitetagisibwa  |
| 4  | Eddagala ly'obukuku       | Fangayi                |
| 5  | Eddagala ly'emese         | Emmesse                |
| 6  | Eddagala ly'amakovu       | Amakovu                |
| 7  | Eddagala eritta bakitirya | Bakitiliya             |
| 8  | Eddagala ly'amagongolo    | Amagongolo             |
| 9  | Eddagala lya vayiraasi    | Vayilasi               |
| 10 | Eddagala ly'olukonge      | Lukonge                |
| 11 | Eddagala ly'enkuyege      | Enkuyege               |

Eddagala ly'ebiwuka ne'bintu ebirala ebireeta endwadde

**Kino kikulu:** Lowoza kukozeza eddagala eritta ebiwuka ettuufu ku biwuka osobole okwewala okufyira okuteetaagisa. Okugeza, eddagala ly'obukuku (*Fungicides*) liyinza obutaba na bulabe bwona ku nkuyege era lyonna terimalaawo buli kika kya bukuku.

### 11.5.1 Enkozeza y'eddagala eritta ebiwuka

*Okutabula:*

- Okutabula eddagala eritta ebiwuka n'ebyuma ebituufu n'okukozeza obulungi ebipimo ebiragirwa kya mugaso nnyo.
- Okutabula n'okusaabulula kw'eddagala okutuufu ly'edaala erisooka mu kawefube w'okusaanyaawo ebiwuka bino.
- Bulijjo eddagala ly'ebiwuka litundibwa/ligulibwa nga liliko ebiwanddiko by'endagiriro y'enkozeza yaalyo.

*Embalirira:*

- Obunene bw'ettaka (puloti) eryeetagibwa bubalirirwa ngo okozeza fomula egindana nobutonde bw'ekitundu.
- Kikulu nnyo okumanya ebipimo by'ebikolo by'eddagala ly'oyagala okutabula.
- Ebipimo ebitono/ebitamala byoonoona eddagala ly'otabula ate ebinene ekiyitiridde bya kabenje ku kitundu mw'olifuuyira.
- Bulijjo eddagala eritundibwa mu maduuka libaako endagiriro y'ebipimo n'enkozeza olyooke oleme fufaabiina na kubalirira bipimo.

## 11.6 Obukodyo obw'ekinnansi

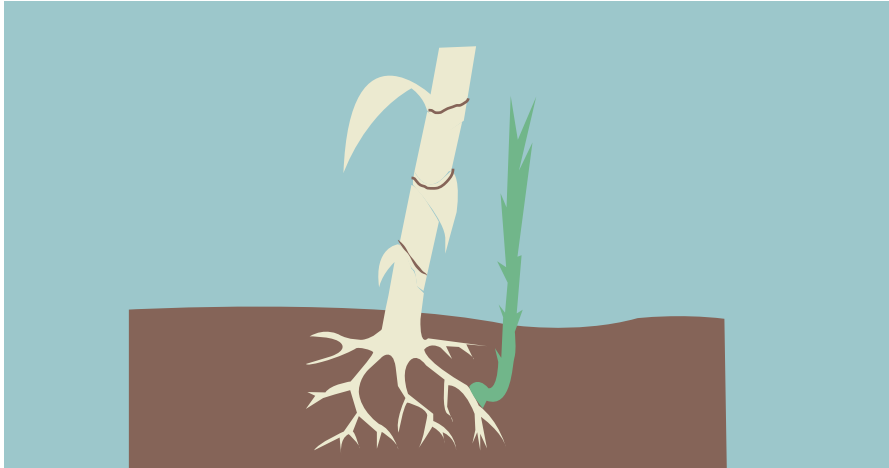
Ebiwuka bisobola okusaanyizibwaawo oba okukendeezebwa nga tukyusakyusa mu mbeera y'obutonde ebirime mwe bikulira.

*Eby'okulabirako:*

1. Okufukirira n'okukozeza ebirimusa mu ngeri entegeke obulungi.
2. Okusiga amangu.
3. Okunyweerera ku nkola ez'obuyonjo.
4. Okutabula ebirime (okukyuusakyuusa mu birime n'okusiga mu ngeri ennyungirire).
5. Okukozeza ensigo z'ebimera ezirongooseddwamu abakugu.

### 11.6.1 Ennima y'okutabikatabika ebirime

Ennima eno kakodyo kasuffu mu kulwaanyisa ebimera ebiteetaagibwa. Kalimu okulima enva endiirwa. Enva ezo ziyamba okuziyiza ebimera/emiddo egisiikiriza ekitangaala ky'ebirime, okubinyigiliza n'okuziyiza okumera kw'emirandira gyaagyo. Wabula nga ogyeeko emiddo emirala, olumbungu telweekwata kubirime nga enva endiirwa. Ensingo z'olumbungu zifa. Eby'okulabirako bye birime ebilira ebisobola okutabikibwa mulimu taaba, entungo ne ppamba.



Emirandira emikulu

### *Entabika y'ebirime.*

1. Simba ennyiriri z'ebirime bino n'eby'embeke n'amabanga amatono, okugeza' olunyilili olumu olwa soya lugobereze enyirir bbili ez'ebinjajalo.
2. Teeka mu ttaka ebijimusa ebyo'butonde.

**Kino kikulu:** Kijja kutwala wiki mukaaga ebilime okubunduka nebibikka ettaka wonna.

3. Teeka kompositi mu ttaka.

## 11.6.2 Olumbugu

Olumbugu muddo ogukwaata ku mirandira gy'ebirime eby'embeke n'omuddo omusimbe n'ekiginuunamu amazzi n'ebiriisa. Ekiddo kino kyegazaanya mangu. Okugeza, olumbugu luyinza okuwagamira mu kinuulo ky'ente eba elekeddwa okulya omuddo neruyingira mu ssamba. Olumbugu era lusaasaana mangu mu famu singa ente eba eriiridde werumeze.

Waliwo ebika by'olumbugu (*striga*) bitaano (hemonsika, aziatika, asipera, fobesi, ne gesineriyoyidesi).

Olumbugu luzibu nnyo okulwaanyisa, naye osobola okulumala mu musiri nga okozesa obukodyo obwe'njawulo.

### *Engeri y'okulwaanyisa olumbugu:*

1. Fuba okutegeera enkula n'engeri ekiddo kino gye kyeyisaamu, bwekiranda, n'engeri gy'oyinza okukisaanyaawo nga okozesa obukodyo obw'obutonde.
2. Yongera okugimusa ettaka ku ssamba kubanga olumbugu luteru okulumba ebitundu by'ettaka eritaliggimu.
3. Okukolagana ne balimi banno booliraanye kiyamba okulwanyisa olumbugu. Kikusobozesa okutangira olumbugu okusaasaana era nerugoberwa ddala ku kyaalo.
4. Kozesa obukodyo nga busatu, n'okusingawo, obw'okutangira n'okulwaanyisa:
  - Kozesa kompositi okukuuma amazzi muttaka n'okuyamba ebirime okunuuna amazzi n'ebiriisa ebisingawo. Oba kisoboka, gattamu ekipimo ekitono ddala eky'ekigumusa ekiddugavu; obutundu 2 kubuli

kigulumi (bw'oba okozesa ennima ya kontuwa ey'amabibiro). Oyinza okwongeramu layimu.

- Kuula n'engalo olumbugu oluba lusigadde mu nnimiro okusobola okukendeeza ensigo zaalwo mu ttaka.
- Tabula ebirime ennyiriri bbiri ez'enva endiirwa n'endala bbiri ez'ebimera by'empeke oba omuddo gw'ebisolo. (Soma ekitundu ekyoogera ku ntabika y'ebirime).



Engeri y'okusaanyawo olumbungu

Oyinza okulaba n'okuyiga obukodyo bw'okulwaanyisa olumbugu ku miko gya Intaneeti (*Internet*) gino:

<http://www.accessagriculture.org/node/255/en> ne  
<http://www.accessagriculture.org/node/243/en>

### 11.6.3 Ennima y'okuleka ebikuubo wakati (Essomo 5)

### 11.6.4 Ennima ya kontuwa (Essomo 5)

### 11.6.5 Okukyuusa ebirime mu misiri gy'essamba n'okuyungirira ebirime “*relay cropping*” (Essomo 5)

### 11.6.6 Okusiga ensigo ezirongooseddwamu abakugu

Obulimi bw'okusiga ensigo ezirongooseddwamu abakugu (okugeza, kasooli owa maleeto) kusobola okuziyiza ebiwuka n'obulwadde) Ebirime ebikumira endwadde, nga muwogo n'endaggu, bisobola okuziyiza ebiwuka eby'enjawulo.

## 11.7 Entegeka z'okusaanyaawo ebiwuka by'endwadde

- **Londa emirimu gy'obulimi n'enzirukanya y'eby'enfuna ku ssamba yo:** Oba oli awo wettanira nnyoeky'essamba you okuvaamu, kasooli, ennyaanya, ebijanjaalo, amatooke, ebinyeebwa, lumonde, ente z'amata n'omuzigo, embuzi, endiga n'obumyu. Salawo emirimu egikusingira obukulun'ebiwuka ebisinga okugootaanya emirimu gino nebisekeeterera ebigendererwa byo mu by'enduna.

- **Tongoza ebiwuka ebisinga okulumba buli gumu ku milimu egyo:** Londamu ebiwuka ebisinga okusumbuwa buli mulimi, wamu n'ebizibu bwebireeta, obiwandiike ku lukalala nga otandika n'ebisinga okuba eby'akabenje.
- **Zuula entegeka z'okusaanyaawo ebiwuka by'endwadde ku faamu yo:** Zuula entegeka z'okusaanyaawo ebiwuka by'edwadde nga weyambisa eddagala, obukodyo bw'kinnansi, obuyonjo n'ebitonde ebirwaanyisa ebiwuka by'endwadde, oba ebirime ebigumira ebiwuka n'endwadde, kikusobozese okukendeeza ku kufirwa ku famu yo.
- **Buli kirime oba mulimu bibagire obukodyo oba enkola z'okusaanyaawo ebiwuka by'endwadde ku faamu yo:** Soma oba buuza abakugu ebikwatagana n'entegekaz'okusaanyaawo ebiwuka by'endwadde by'osobola okukozesa mu kitundu kyo ku birimeoba ebiaolo by'olunda, era olonde ng'onsizila ku funa yo, obuyivu/ bumanuirivu bwo, obulabe eri obutonde bw'ensi, n'ensonga endala ezikwaatagana n'ensalawo yo.
- **Enkwaata n'enkozesa y'eddagala elitta ebiwuka:** Londa akakodyo oba obukodyo bw'okulwaanyisa ebiwuka bwetuyize mu ssomo lino osobole okutagira ebiwuka. Obwegendereza, enkozesa entuufu n'emitendera emilara egikozesabwa bikulu nnyo olw'obweetaavu bw'okukendeeza obungi bw'eddagala elitta ebiwuka ly'okozesa ku ssamba; bwekiba kyeetaagisaiza ddala okulikozesa likozese na bweegendereza.
- **Wekenneenye bulungi amateeka agafuga enkozesa ye'eddagala mu nsi yo:** Nga omazeokw'ebuuza ku offisa atwaala ekitundu, kakasa oba eddagala ly'okozesa likkilizibwa mu mateeka agafuga eggwanga oba ag'ekitundu kyo.
- **Londa enkola oba obukodyo obusinga obulungi:** Londa enkola ezisinga obulungi ngazeesigamizibwa ku bumanyirivu mu kutangira ebiwuka olwo nno otandikewo entegekaz'okusaanyaawo ebiwuka by'endwadde nga weebuza n'okuddamu ebibuuzo: Kiki? Wa? Ddi? Kitya/Otya? Ani?
- **Londoola buli ky'okola era owandiike ebikikwaatako:** Kino kye kimu nga okukubapekiseeni yo ggwewennyini. Teeka entegeka zo mu buwandiike; salawo obinaakulaga ntioluubirira ebigendererwa mu ntegeka ezo ne ddi lw'olina okubituukako. Manya erawandiika buli kalonda akwaata ku ngeri gy'okozesaamu eddagala naddala obungi bwaalyo, ebyuuma by'okozesa, engeri gy'okwaatamu ebisasiro n'ebisigala nga okozesezza eddagala.

### EMIGASO GY'ENNWAANYISA Y'EBIWUKA ENTABAGANYE MU BULIMI (IPM):

- Okukendeeza obungi bw'eddagala ettabule erikozesebwa ku ssamba kikendeeza obulabe eri obulamu bw'abalimi.
- Okukendeeza okozesa eddagala ettabule kijja kukendeza akabenje k'okwonona ettaka.
- Okukendeeza obungi bw'eddagala ettabule erikozesebwa ku faamu kitaasa ensimbi.
- Okulongooza mu mbeera y'obutonde bw'ensi.
- Ennwaanyisa y'ebiwuka entabaganye mu bulimi eyinza okuba nga ye ngeri yokka ey'okweewala ekizibu kye'biwuka eddagala ettabule nga liremeddwa.

### AKAGEZO AKAMPIMPI

1. Bika bya biwuka ki na ndwadde ki eziri ku faamu yo?
2. Ngeri ki gy'olwaanyisaamu ebiwuka ebyo n'endwadde?
3. Obukodyo obwo bukuganyula? Oba tebukola, oyinza otya okubulongoosaamu?
4. Baga entegeka z'okusaanyaawo ebiwuka n'endwadde ku faamu yo?

## Amakulu g'ebigambo ebifunze

**IPM** – Ennwaanyisa y'ebiwuka entabaganye n'obulimi (*Integrated Pest Management*)

**ILM** – Obulinzi obutabaganye n'emirimu emirala ku faamu (*Integrated Livestock Management*)

**SALM** – Endabirira y'ettaka ewagira obulimi bw'obuwangaazi (*Sustainable Agriculture Land Management*)

## Ebigambo ebikulu n'amakulu gaabyo

**BBIBIRO** – Ekigulumu kyerambuludde mu bukiika bw'akaserengeto okuziyiza mukoka okuutwaala ettaka.

**BIGIMUSA EBIRAMU** – Ebimera ebisobola okugimusa ettaka nga byongeramu ebiriisa.

**BIRIISA EBISOLO** – Emmere y'ebisolo ebilundibwa.

**BIRIME EBIZZAAMU** – Ebirime ebisobola okukendeeza mukoka okukulukusa ettaka n'okukuuma oba okwongera obugimu bw'ettaka.

**BISASIRO (BY'ENNIMIRO)** – Obuti oba oenduli entono ezisigala mu misiri oluvannyuma lw'amakungula.

**BUDIBA** – Ebinnya ebimpi mu bulambulukufu bwaabyo bileganye amazzi/mukoka.

**BULIMI BW'EBY'ENFUNA (AGRONOMY)** – Enkozesa y'ettaka oba ennima erabirira ettaka ng'eronda ebirime n'ebisolo ebituufu okwongera amakungula n'amagoba.

**BULIMI OBUWANGAAZI** – Okulima n'obwegendereza mu ngeri etayonoona butonde bwa nsi.

**BUTONDE OBW'AKABI** – Akabenje k'okulumizibwa oba okukosebwa oba okufiirwa obusobozi bw'okulwaanyisa ebyo ebyonoona obutonde bw'ensi, naddala ebireeta enkyuukakyuuka mu mbeera y'obudde.

**BUVUMU MU MBEERA** – Ebyo ebissibwa abantu mu nkola basobole okuvvunuka ebizibu nga tebibakosezza kiyitiridde. Ebimu ku bikolwa bino bya kabenje ku butonde bw'ensi, okugeza nga okukozesa amadagala agayitiridde n'ebigimusa ebigule ebingi ennyo mu bulimi ne mu bulunzi.

**EBIRIISA EBISOLO** – Amazzi n'emmere y'ebisolo.

**EKITUNDU KY'OBULIMI EKY'OBUTONDE** – Ekitundu obulimi mwebweesigama obutereevu ddala ku butonde bw'ensi.

**EMIKKA EGIBUGUUMIRIZA** – Buli mukka ogukuumira ebbugumu eriyitiredde mu bbanga eryetoolodde ensi.

**ENKOLA Y'EBY'OBULIMI (AGRICULTURAL SYSTEM)** – Ebintu n'ebikolwa eby'enjawulo ebitabagana, oluusi nebiwagiragana, okusobozesa obulimi obutuufu mu kitundu ekimu, nga ekyaaloba oba essaza, n'okusingawo.

**FODA (FODDER)** – Ebimera ebisigwa kulw'okuliisa ebisolo ebirunde.

**FUKIRIRA, KU** – Okukosesa amazzi agava ewalala negatuusibwa mu ssamba n'okusaasaanyizibwa gatuuke butereevu ku bimera byennyini.

**FFULEMU YA A** – obubaawo (oba buayimbwa) buna obuyungiddwa nebubaanana ennukuta A; bukozesebwa okukuba ennyiiri, zetuyita kontuwa (*contours*), ezigatta obifo ebiri ku buwanvu obumu ku lusozi oba akaserengeto.

**GIMUSA, KU** – Kwongera ebiriisa byomuttaka n'okukuuma wamu n'okwongera obugimu.

**KABALA, KU** – Okutema n'okukuba amavuunike mu omusiri okweetegekera okusiga.

**KABENJE K'EMBEERA Y'OBUDDE** – Ekikolwa oba embeera eyinza okwongera akabi k'okulumizibwa oba kufiwa ebirime, obulamu, amagoba n'kwoonona obutonde bw'ensi.

**KABENJE K'OBUDDE** – Embeera y'obudde eyoonese n'ereeta obuzibu mu bantu oba mu butonde bw'ensi mu kutundu, okugeza, amaba, omuyaga, laddu, ekyeeya ekiyiriridde, n'ebirara.

**KAWUKA** – Ekiramu kyonna ekirya ebirime oba ekireeta endwadde mu birime no mu bisolo by'omulinzi oba omulimi.

**KEEYA, KU** – Kukendeeza akabi, akabenje akakwaatagana n'obikolwa by'abantu.

**KIWAGIZI KY'OBULAMU** – Ekintu kyonna ekisobola okukozesebwa abantu okweetsusaako ebyetago byaabwe eby'obulamu.

**KOMPOSITINGI** – Okukola ebirimusa (kompositi) ebiva mu bintu ebibadde ebiramu, oba ebiva mu biramu, okuvunda.

**KUGUMIRA EMBEERA** – Obuvumu mu bantu oba ebisolo, oba mu butonde bw'ensi obusobozesa okuyita mu bubenje n'ebizibu ebireetebwa okwoononeka kw'obudde. Obuvumu obwobuyambibwa nnyo enkola ya SALM, okugula insuwalensi, okutereka amakungula, n'ebirala.

**KUKYUUKA (ADAPTATION)** – Okukuusya mu nkola okutuukana n'enkyuukakyuuka y'embeera eriwo.

**KUSEETEEZA (OBUSERENGETO)** – Okukendeeza oluyiringito ku busozi nga tutema obubalaza obuddirirng'anye neburabika nga amadaala.

**KUSIMA** – Okuwuukuula ebinnya omusimbibwa ebirime.

**LUMBUGU** – Kika ky'omuddo ogumera ku bimera ebirala nebinyunyuntamu eiriisa (*striga*).

**LUNNYA** – Empangi oba ekinnya ekyeerambuluddde mu buwanvu ekisimbibwa ku nsalo y'omusiri okulegama oba okuttulula amazzi ga mukoka.

**MAGANA** – Ebisolo n'ebinyonyi abalimi n'abalunzi byebakuumira ku ssamba n'amalundiro.

**MBEERA ETALAGULWA** – Enkyuukakyuuka mu mbeera y'obudde eba tesuubirwa olw'okwawuka ennyo n'eyo amanyiddwa mu kitundu.

**MINERO** – Ebiriisa eiri mu mmere y'ebisolo ne mu bigimusa by'ebirime.

**MMAALI Y'OBUTONDE** – Ebintu byonna ebitakolebwa bantu nga bisobola okuyamba enfuna y'abantu.

**MPANGI (OBA MUKUTU)** – Ekinnya ekigazi ekisimiddwa okulegama amazzi ga mukoka gakozesebwe mu nnimiro mu biseera by'ekeeya.

**MUSAWO W'EBISOLO (AGRO-VET)** – Omukugu w'eby'okulima amanyi okujjanjaba ebisolo byomuddundiro.

**NDWADDE/BULWADDE** – Embeera y'obulamu eyoonese.

**NKYUUKAKYUUKA Y'OBUDDE** – Enkyuukakyuuka mu mbeera z'obudde, okugeza, oluvannyuma lw'emyaaka nga 30 ensi okubuguumirira, enkuba n'ekendeera, ebyeeya nebyeyongera obungi n'okuwanuwa, n'ebirara nga ebyo.

**NNANTAGGWAAWO, BI** – Eby'obugagga ebisobola okuzzibwaawo oba okuddaabirizibwa amangu.

**OBULIMI OBUTABAGANYE N'EBIBIRA** – Okukozesa emiti emisimbe ku ssamba ba ku ddundiro giyambe okukuuma ettaka n'okuligimusa, okuziyiza kibuyaga, okuvaako enku oba ebibala; bino byonna nga okulimi abitwaalira wamu mu bugendere ayongere emiganyulo gy'obulimi.

**TABAGANYA, KU** – Okukola oba okutegeka mu ngeri esobozesa omuntu by'akola obuta genda mu maaso mu ngeri y'embiranyi.

**ZISA, KU** – Okuzzaawo ebimera (nga ensiko n'ebibira) ebyaali bimaliddwaawo abantu oba embeera y'obutonde bw'ensi.

## Ebitabo ebyeyambisiddwa wano

1. Hatibu ne banne 2000
2. Otieno ne banne 2006

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