

REPUBLIKA Y'U RWANDA



MINISITERI Y'UBUHINZI N'UBWOROZI



UBWOROZI BW'AMAFI MU BYUZI MU RWANDA

Igitabo cy'umworozi w'Amafi

Werurwe 2020

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Rwanda Agriculture and Animal Resources
Development Board (RAB)

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MSINGI
BUILDING EAST AFRICA'S INDUSTRIES
OF THE FUTURE

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UMUTWE 1. INTANGIRIRO

1.1 KORORA AMAFI MU BYUZI

Icyuzi cy'amafi ni uburyo bumwe mu buryo bwinshi bukoreshwa mu ubworozi bw'amafi bugamije isoko ni inyungu. Niyo mpamvu rero, umworozi w'amafi ukoreshe ibyuzi agamije kugemurira isoko agomba kuzirikana ibyangombwa byose bikenewe mu cyuzi kugira ngo ifi zikure neza, kugira ngo ifi zibone ibyokurya bihagije bituma zikura mu gihe giteganijwe, akagira na gahunda ihura n'ingamba z'ubworozi bwe zo kugeza amafi kw'isoko

1.2 UBURYO BWO KORORA AMAFI

Amafi ashobora kororwa ku buryo bwinshi bunyuranye. Hari ubworozi gakondo, ubworozi buciriritse n'ubworozi bwa kijyambere. Ubworozi bwa gakondo ni ubworozi bw'amafi bukoresha ibyokurya kamere byo mu mazi, nta kindi umworozi agaburira amafi.

Ubworozi buciriritse bukoresha ibyokurya kamere bwongereyeho igaburo rigizwe n'ibikomoka ku buhinzi bifite intungamubiri ziciriritse, n'aho ubworozi bw'amafi bwa kijyambere bushingiye ku igaburo mvaruganda kandi rigizwe n'intungamubiri zikungahaye. Ubu buryo bwo korora amafi bushobora gukoreshwa ubwoko bumwe bw'ifi cyangwa se amoko menshi y'amafi ateranyirizwa hamwe. Akenshi ubworozi bw'amafi gakondo n'ubuciriritse ubusanga mu byuzi aho ibyokurya karemano byongerwa n'ifumbire y'imborera. Ubworozi bwa kijyambere mu Rwanda bwiganje muri za Kareremba.

1.3 IBYICIRO BY'IBYUZI BY'AMAFI

Hari amoko ane y'ibyuzi by'amafi. Hari ibyuzi by'amafi bicukuwe mu butaka, hari ibyuzi by'amafi byubatse na sima, hari ibyuzi by'amafi byubatswe hifashishijwe shitingi. Uburyo bukoreshwa cyane ni ubworozi bw'amafi mu byuzi bicukuwe mu butaka aho igice kimwe cy'ubutaka gicukurwa hakurijwe ingero runaka z'icyuzi, amazi nayo

akagera mu cyuzi hakoreshwe imiyoboro ivana amazi mu mugezi, ikayohereza mu cyuzi, ndetse n'ivana amazi mu byuzi iyamena mu kabande. Ubu buryo butuma amafi akurira mu cyanya kimeze nko mu kiyaga. Ubworozi bw'amafi mu byuzi bya sima no mu byuzi bya shitingi birahenze cyane kubera igishoro cyo kubyubaka ugereranije n'ibyuzi bicukuwe mu butaka.

AMOKO Y'AMAFI AKORESHWA MU BWOROZI BW'AMAFI MU RWANDA.

Amoko y'ingenzi akoreshwa mu bworozi bw'amafi mu Rwanda ni Ingege/Igihonda ariyo bita Tilapiya (*Oreochromis niloticus*) n'Inkube/Kabambare/Ishonzi (*Clarias gariepinus*). Ubu bwoko bw'amafi bukoreshwa mu bworozi ari bumwe gusa (monoculture) mu cyuzi cyangwa se buvanze (polyculture). Iby'ingenzi biranga aya moko yombi bituma anogera ubworozi bw'amafi mu byuzi biboneka mu mbonerahamwe ikirikirira.

Imbonerahamwe 1 : Ibyingenzi biranga Ingege (*Tilapia niloticus*) n'Inkube (*Clarias gariepinus*).

Ingege	Inkube
Ikura vuba	Zikura vuba, zirya ibyo kurya binyuranye kandi bidahenze
Kubyara no kororokera mu byuzi bitagoye	Zororoka neza iyo abana bamaze gusoreka
Zirya ibyokurya binyuranye	Zirya ibyokurya binyuranye
Zikundwa n'abantu benshi	Zigira inyama nziza ikundwa n'abantu benshi
Zemera kubana n'andi moko y'amafi ahantu hacutse	Zemera kubana na Tilapia
Ntizirwaragurika	Zibaho mu mazi afite umwuka muke

1.3.1 Imibereho y'Ingege n'Inkube.

1.3.1.1 Ingege/Igihonda

Imyororokere: Ingege iri mu bwoko bw'amafi burarira amagi mu kanwa. Kurarira amagi mu kanwa ni uburyo bw'iterambere mu gucunga abana aho ifi y'imbyeyi irinda abana bayo ibyonnyi byo mu mazi kugeza igihe bazakurira. Ingabo itegura icyari cy'uruziga ku ndiba y'icyuzi ikagikorera uburinz. Ubusanzwe, icyari kiba gifite umurambararo wa 30 – 60 cm. Ingano y'icyari ijyana n'ingano y'ifi y'ingabo yacyubatswe. Iyi y'ingore itera amagi mu cyari. Ingabo igahita imenaho intanga, ingore igafata y'amagi ikayararira mu kanwa kayo.

Amagi y'ingege aba afite ibara ry'umuhondo. Amagi aturagwa hashize iminsi 5 – 7. Iyo amagi amaze guturagwa, utwana tumara indi minsi 4 – 7 mu kanwa ka nyina noneho tugatangira kwaga turi kumwe twose kuko twirukira mu kanwa ka nyina iyo hari ikidukanye. Iyi z'ingore ntizirya mu gihe cyo kurarira no kurindira abana mu kanwa. In Gore zitera buri byumweru 4 kugeza kuri 6 ariko ishobora gutera mbere amagi avanyweho.

Umubare w'amagi ifi y'ingore itera utwaga n'uko iyo ngore ingana. In Gore ya 100g ishobora gutera nk'amagi 100, ariko ingore ipima 100 – 600 g ishobora gutera amagi 1000 – 1,500 cyangwa arenze uko iteye(Hepher and Pruginin, 1981).

Imikurire: Ingege mu cyuzi zikura bitewe n'uko zingana (umubare), ibyokurya zibona, n'ubuziranenge bw'amazi zibamo. Iyi z'ingabo zikura vuba kurusha iz'ingore ku kigero cya 10 – 20%. Imikurire y'Ingege igirwaho ingaruka n'abana zibyara iyo badakurikiranwe bitewe n'ibyokurya biba bike, imikurire yazo ikagabanuka cyane.

Imirire: Kugira ngo dushobore kubaho, utwana duto tukimara guturagwa dutungwa na agafuka ka matembabuzi yatwo kugeza irangiye. Noneho tugatangira kurya utwatsi duto turi mu mazi. Uko utwo twana tugenda dukura, dutangira kurya ibyatsi n'ibikoko biba mu

mazi wongeyeho ibyo umworozi azigaburira. Iyo ibyokurya bibaye bikeya ifi nini (Nkuru) zishobora kurya intoya ndetse n'abana bazo. Ingege zirya ibyatsi bito bito biba mu mazi nk'amafunguro yazo y'ibanze. Ingege zigira umuhogo mugufi uganisha ku gafuka gakoze igifu cyayo, ikagira urura rurerure cyane (rungana n'incuro 4 uburebure bwayo). Ingege igira amenyo ari ku ruhembwe rwa mpande eshatu ruba aho bita mu matwi y'ifi. Akamaro k'ayo menyo ni ugucagagura ibyokurya kugira ngo igogora ryabyo rishoboke kandi ryihute bimaze kugera mu gifu.

Imiturire: Ingege ziba mu mazi kandi ni imwe mu moko y'amafi akomera cyane ashobora kwihanganira amazi anyuranye. Ariko kandi, gucunga ubuziranenge bw'amazi ni ingirakamaro ku mikurire y'ifi, ku bwinshi bw'ibyokurya byo mu mazi no ku musaruro mbumbe w'amafi mu cyuzi. Niyo mpamvu ubuziranenge bw'amazi bugomba kugenzurwa ku buryo buhoraho kugira ngo ubuzima bw'ifi bukurikiranwe.

Imbonerahamwe 2: Ubuziranenge bw'amazi bubereye Ingege.

Ikgenderwaho	Ingano	Ikitonderwa
Ubushyuhe	25 – 30 ^{0C}	Ibereye ubwororoke n'imikurire
Umwuka DO (mg/L)	3	Inogeye imikurire myiza
Ubusharire (pH)	6.5 – 9	Ibereye uburumbuke bw'ibiribwa kamere mu mazi
Umwuka CO2 (mg/L)	20	Kuva kuri 2 mg/l ifi zitangira gupfa, byumwihariko ifi ntoya

1.3.1.2 Inkube

Imyororokere: Ubusanzwe, Inkube ntibyarira mu byuzi. Ifi zikuze zishobora gutera amagi no gutanga intanga ngabo habayeho uruhare rw'umworozi mu kuzitera imisemburo. Hashobora kuboneka utwana twinshi hakoreshejwe uburyo bworoheje. Abana b'Inkube babaho nta kibazo iyo bamaze gukura gato bagize nka g 5.

Imirire: Utwana dutangira kurya ibyokurya mvaruganda hakiri kare tukimara agafuka ka matembabuzi, imikurire ikaba myiza ku byiciro byose. Mu biyaga no mu migezi, Inkube irya byose igahitamo bitewe n'ibibonetse. Ifi ntoya zitangira kurya ibyo zivana ku byatsi biborera mu mazi, utwatsi n'udukoko duto two mu mazi. Inkube nkuru zirya udusimba, ibijonjorerwa n'andi mafi.

Imikurire: Inkube ni ubwoko bw'ifi bukura vuba cyane iyo bworowe. Inkube irya rimwe mu masaha 24. Ni ukuvuga ko ishobora guhiga rimwe mu munsu bitewe n'ibyokurya biboneka. Niyo mpamvu inkube ifite igifu kinini gishobora kuzigama ibyokurya bitandukanye. Ntabwo imeze nk'ingege ifite agafu gatoya bituma irya kenshi mu munsu.

Aho ziba: Inkube n'ubwoko bw'ifi bukomeye cyane, bwihanganira ubucucike n'izindi mpinduka z'ibidukikije nk'umwuka n'ubushyuhe. Uzisanga ahantu hanyuranye, mu mazi y'urubogobogo, mu mazi atari meza cyane, mu migezi, mu biyaga no mu byuzi. Zikunda kuba mu mazi hasi aho zibona umusenyi, amabuye cyangwa umusitwe. Ubushyuhe bubereye imikurire y'inkube ni 24° C kugeza kuri 30°, ariko inkube ishobora kubaho guhera hafi 0° C kugera 38° C. Imikurire iragabanuka iyo ubushyuhe buri munsu ya 29° C no kurya birahagarara iyo ubushyuhe buri munsu ya 10° C. Ubushyuhe bwo hejuru inkube itakwihanganira ni 38° C.

Imbonerahamwe 3: Ubuziranenge bw'amazi bubereye Inkube.

Ikigenderwaho	Urwego rw'ibipimo	icyitonderwa
Ubushyuhe	26° - 32° C bibereye amafi.	Munsi ya 15° C. Iki ntizirya neza, zishobora no gupfa.
Umwuka: DO (mg/L)	Kuva 5 mg/l kuzamura ni byiza. Ishonzi zo zigira ubundi buryo bwo guhumeka umwuka wo mu kirere.	0 – 1.5 mg/l iki zishobora gupfa umwuka utiyongereye. 1.4 – 5 mg/l iki zibaho ariko ntizirya neza n'umuvuduko wo gukura ukagabanuka.
Ubusharire (pH)	6.5 kugera 9	Munsi ya 4, iki zirapfa. Kuva 4 – 6.0 iki ntizirya neza, umuvuduko wo gukura ragabanuka.
Umwuka: CO2 (mg/L)	Ibipimo by'ubusharire byo hasi (Ubusharire bwinshi) bwerekana CO2 nyinshi mu mazi.	Iyo CO2 ibaye nyinshi mu mazi iki ntizirya neza, umuvuduko wo gukura ragabanuka. zishobora no gupfa

NFFTC Technology and Information Services



Ishusho1: Ingege/Igihonda



Ishusho2: Inkube/Kabambare/Ishonzi.

UMUTWE 2: GUHITAMO AHAKORERWA UBWOROZI BW'AMAFI NO KUBAKA IBYUZI.

Iterambere ry'umushinga w'ubworozi bw'amafi riterwa ahanini no guhitamo neza aho umushinga uzakorerwa. Ku mushinga w'ubworozi bw'amafi mu byuzi, ibyingingenzi bigomba kwitabwaho ni imiterere y'isambu izubakwaho ibyuzi, ubutaka buzubakwaho ibyuzi n'amazi azakoreshwa mu byuzi.

2.1 GUHITAMO AHUBAKWA IBYUZI.

2.1.1 Imiterere y'isambu

- Ni byiza gushyira ibyuzi ahantu hari ubucurame bworoheje cyangwa se ku gasozi aho bitazagusaba gucukura itaka ryinshi wubaka icyuzi. Icyuzi cyubatse ahacuramye kiroroha kukivanamo amazi.
- Ntiwubake icyuzi ahantu mu kabande hashobora kurengerwa n'imyuzure mu bihe by'imvura. Ntiwubake icyuzi ku musozi uhanamye.

2.1.2 Ubutaka buzubakwaho ibyuzi.

- Ubutaka buzubakwaho ibyuzi bugomba kuba atari umusenyi. Ubutaka burimo umusenyi mwinshi cyangwa urubuyenge rwinshi ntibufata amazi.



Ishusho 3 : Ubutaka burimo umusenyi

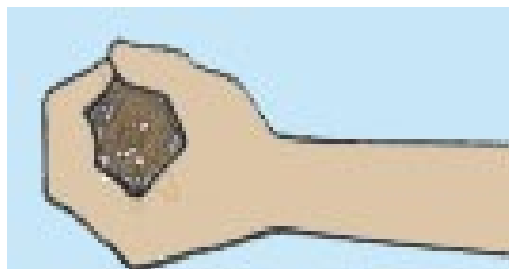
- Ku butaka burimo umusenyi bunyuramo amazi bigatuma aba make mu byuzi byawe.
- Iyo inkombe z'icyuzi zubakishijwe itaka ririmo umusenyi, ntabwo zikomera bihagije ngo zifate amazi yo kwigendera.
- Ubutaka bwubakwaho ibyuzi bugomba kuba bugizwe n'ibumba rihagije. Ubutaka bugizwe n'ibumba bufata amazi neza cyane. Mu butaka bugizwe n'ibumba, amazi make cyane niyo acengera mu butaka.
- Inkombe z'icyuzi zikozwe n'ibumba zirakomera bihagije maze amazi agahama mu cyuzi.



Ishusho 4: Ubutaka bw'ibumba

Gusuzuma ubutaka

- Ugomba gusuzuma ubutaka kugira ngo urebe niba bubereye kwubakwaho ibyuzi. Isuzuma rya mbere rireba uko ibumba ringana mu butaka ukoresheje uburyo bwo "Gukanda". Fata ubutaka mu gipfunsi maze ubutose n'amazi, noneho ubukande usa n'ukora agapira.



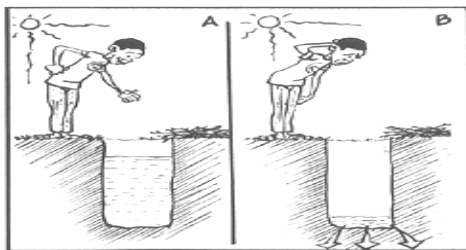
Ishusho 5 a: Gusuzuma ibumba mu butaka

- Terera ka gapira mu kirere maze ugasame. Fungura ikiganza cyawe, niba agapira kagifatanye umaze gufungura ikiganza cyawe, ubutaka ni bwiza kwubakaho ibyuzi.



Ishusho6 b: Gusuzuma ibumba mu butaka

- Ubutaka bubi bufite umusenyi mwinshi cyangwa utubuye twinshi ntabwo buzaguma bufatanye maze ka gapira gashwanyagurike. Niba agapira gakomeje gufatana ubutaka bushobora kuba ari bwiza ariko ntawabyizera. Icyo gihe ukora isuzuma rya kabiri ryerekeye uko ubutaka buhitisha amazi:
- Cukura umwobo uwuzuze amazi kugeza hejuru. Pfundikiza ibyatsi. Umunsi ukurikiyeho amazi azaba yagabanutse kubera kwinjira mu butaka.
- Ongerera wuzuze amazi muri wa mwobo kugeza hejuru. Ongerera upfundikize ibyatsi. Reba uko amazi angana ku munsi ukurikiye ho. Niba amazi acyuzuye, ubutaka ntabwo buhitisha amazi ubwo ni bwiza kubakaho ibyuzi. Niba amazi yongeye kugabanuka, ubwo ubutaka si bwiza kubakwaho ibyuzi by' amafi, keretse indiba yabwo yoroshwe ho pulasitiki cyangwa ubutaka bw'ibumba.



Ishusho 7: Gusuzuma permeability y'ubutaka

A: Ubutaka ntibuhitisha amazi ubwo bubereye kwubakwa ho ibyuzi.

B: Ubutaka buhitisha amazi, ubwo isambu ntabwo ibereye ubworozi bw'amafi.

2.1.3 Amazi yo gushyira mu byuzi.

- Ibyuzi bigomba kuba byegereye aho amazi aturuka nk'isoko, umugezi, ikiyaga cyangwa ikidendezi cy'amazi bifite amazi menshi aboneka igihe cyose cy'umwaka.
- Menya neza ko hari amazi ahagije yo kuzuza ibyuzi byawe igihe cyose bibaye ngombwa kubyuzuzanya cyangwa se kwongeramo mazi.
- Wigendera ku mazi y'imvura mu gushyira amazi mu byuzi. Igihe imvura izaba itaguye ntabwo uzabona amazi ahagije yo gushyira mu byuzi byawe. Iki zishobora gupfa.
- Amazi agomba guturuka ahantu yitaruye hari hejuru y'ibyuzi kugira ngo atembe kubwayo yijyana mu byuzi.

Imbonerahamwe 4: Amasoko y'amazi akoreshwa mu byuzi by'amafi n'imbogamizi zayo.

Amasoko y'amazi	Imbogamizi zayo
Amazi y'imvura.	Amazi ajya mu byuzi aturuka gusa ku mazi y'imvura
Amazi y'amasoko yo mu misozi ikikije ibyuzi	Amazi aturuka mu masoko ashobora kuzana ibyondo biturutse mu masambu anyura mo. Ayo mazi ashobora kujyamo imiti ikoreshe mu buhinzi.
Amazi aturuka mu migezi no mu masoko manini.	Amazi ashobora kwanduzwa n'amatungo, ibihingwa cyangwa se ibindi byaborera mo cyangwa byamenywa mu mazi..
Amazi aturuka mu butaka	Amazi aba akonje kandi ashobora kugira umwuka muke.
Amazi yo mu butaka azamurwa na pompe.	Amazi aba akonje kandi ashobora kugira umwuka muke.

2.1.4 Ibindi bigomba kwitabwaho utoranya ahazubakwa ibyuzi by'amafi.

Isoko ry'umusaruro. Kureba niba ahororerwa hegereye isoko, niba haba hari abaguzi bahagije cyangwa bizaba ngombwa kujyana umusaruro w'amafi mu yandi masoko aho wishyura ubwikorezi; byaba byiza ushobora kugurishiriza ku byuzi byawe cyangwa se ufite umurunguzi utwara umusaruro wawe wose.

Ibikorwaremezo. Ugomba gusuzuma niba ibikorwa remezo bihari kandi bimeze neza, Imihanda izagufasha kugeza umusaruro wawe ku isoko, amashanyarazi yagufasha mu bikorwa bitandukanye bituma ubworozi bugenda neza.

Inyongeramusaruro: Gusuzuma niba inyongeramusaruro zizaboneka hafi. Ifumbire y'imborera n'ishwagara biboneka hafi ku

giciro cyiza? Abana b'amafi baboneka ku buryo bworoshye ku giciro cyiza? Ibyokurya by'amafi cyangwa ibikoreshwa byabyo biraboneka?

Abakeba: Kumenya abandi borozi b'amafi bari mu karere ukoreramo mu rwego rwo gukorana no kwisungana mu gukemura ibibazo muhura nabyo mu kazi ka buri muni.

Ibidukikije: Kureba niba ahantu hagiye gukorerwa ubworozi bw'amafi nta bindi bikorwa bihari bizabubangamira. Urugero: ibihingwa bikenera guterwa imiti, inganda cyangwa ibindi bikorwa byanduza amazi. Suzuma niba ubworozi bwawe nta bindi bikorwa buzabangamira cyane cyane amazi azaturuka mu byuzi wororera mo.

Inzitizi z'amategako: Suzuma niba aho ugiye kororera amafi nta mategeko cyangwa amabwiriza y'ubuyobozi yabangamira ibikorwa byawe. Reba niba nta mategeko cyangwa amabwiriza yihariye ugomba kubahiriza ari ku bijyanye n'ikoreshwa ry'ubutaka, ifatwa n'ikoreshwa ry'amazi n'ibindi.

Umaze kumenya uko bahitamo isambu izororerwa ho amafi:

Kureba isambu ifite ubucurame bworoheje

Ahaboneka amazi ahagije mu mwaka wose.

Ahari amazi meza.

Aho ubutaka bufata amazi.

Ibindi byitabwaho birimo isoko ry'amafi, ibikorwaremezo, inyongeramusaruro, amategako n'amabwiriza, ibidukikije.

Biosecurity:

- Aho kubaka ibyuzi hagomba gutoranywa ku buryo amazi aturuka mu mago yo hafi, amazi yanduye aturuka mu nganda cyangwa amazi aturuka mu mirima ikoreshwa mo imiti irwanya udukoko n'izindi ndwara atembera mu byuzi.
- Ubworozi bwawe ntibwagombye gutambamira abaturage batuye hafi y'ikigo cy'ubworozi
- Hagomba gukorwa ibishoboka byose kugira ngo mafi yo mu mugezi atagera mu byuzi.

2.2 KUBAKA ICYUZI CY'AMAFI.

2.2.1 Ikigo cyawe cy'ubworozi bw'amafi kigomba kungana iki?

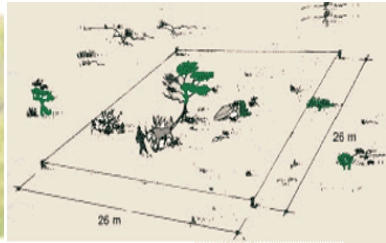
- Ubusanzwe (leta, Ubushakashatsi n'aborozi bifite) ni byiza ko ikigo cy'ubworozi bw'amafi kigira ibyuzi by'ibyiciro bitatu harimo ibyuzi bibyarizwamo abana b'amafi, ibyuzi bakurizamo abana b'amafi n'ibyuzi byo kwororera mo amafi yo gushyira kw'isoko.
- **Ibyuzi babyarizamo:** Ni ibyuzi bito bifite ubuso hagati ya m^2 100 – 500 m^2 . Uburebure bw'amazi mu cyuzi buri hagati ya 1 – 1.5 m. Ibi byuzi ntibyagombye kurenza 5% by'ubuso bw'ikigo cy'ubworozi bw'amafi.
- **Ibyuzi bakurizamo abana:** Ni ibyuzi bifite ubuso buringaniye buri hagati ya m^2 500 na 1000 m^2 uburebure bwabyo buba hagati ya 1.5 – 2.0 m. Ibi byuzi ntibyagombye kurenza 15% by'ubuso bwose bw'ikigo cy'ubworozi bw'amafi.
- **Ibyuzi byo kwororera mo amafi yo gushyira kw'isoko:** Ni ibyuzi bifite ubuso bwisumbuye buri hagati ya m^2 1000- 20000 m^2 . Uburebure bwabyo buri hagati ya 2- 2.5 m. Ibi byuzi bigomba kubakwa ku buso bungana na 60- 70% by'ubuso bwose bw'ikigo cy'ubworozi bw'amafi.

Icyitonderwa: Tugendeye kuri politiki ya MINAGRI y'ubworozi bw'amafi ndetse no kuri Gahunda y'U Rwanda y'Uburobyi n'Ubworozi bw'amafi ni byiza ko umworozi ahitamo igikorwa kimwe cyo kubaza abana b'amafi cyangwa kworora ifi zo gushyira kw'isoko. Ikindi kandi, Abakozi bashinzwe iyamamaza ry'ubworozi bw'amafi bavuga ko ikigo cy'ubworozi bw'amafi gito mu bindi cyagombye kugira byibuze ibyuzi bitatu, ikibyarizwamo abana, igikurizwamo abo bana n'ikindi cyororerwamo ifi zo kurya. Bavuga ko (Abakozi bashinzwe kwamamaza ubworozi bw'amafi) ubuso buto icyuzi cyagombye kugira ari m^2 400 (400 m^2). Bavuga kandi ko icyuzi cya mpande ennye

cyangwa urukiramende ari byo byoroshye kubaka ariko ko umworozi ashobora kugira ibyuzi bifite ishusho iryo ariryo ryose bitewe n'imiterere y'isambu abyubaka ho.

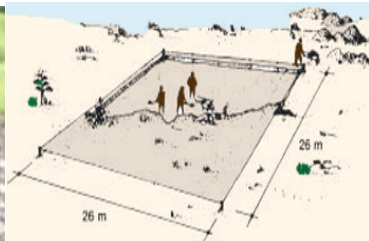
2.2.2 Kubaka ibyuzi bito (Munsi ya m^2 1000)

- Banza utere imambo zerekana impembe za mpande ennye nini, ifite byibuze m26 kuri 26 aho wahisemo kubaka icyuzi.
- Tera imambo mu nguni za mpande ennye noneho ushyireho umugozi werekana aho inkompe z'icyuzi zizagarukira aharekeye inyuma yacyo.



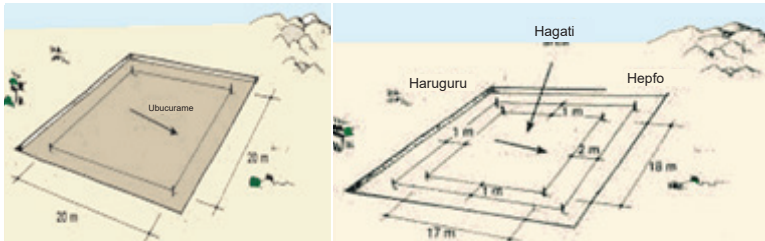
Ishusho 7: Gupima hazubakwa icyuzi

- Harura ku butaka bwa mpande ennye uvaneho ibiti byose, ibisambu n'ibyatsi, uvane ho imizi yose y'ibiti ushobora kubona.
- Kuraho ubutaka bwo hejuru bureshya na 20cm ku buso bwose bwa mpande ennye ubushyire ku ruhande. Uzabukenera hanyuma ubushyira hejuru n'inyuma y'inkombe y'icyuzi.



Ishusho 8: Kuvana ho Ubutaka bwo hejuru

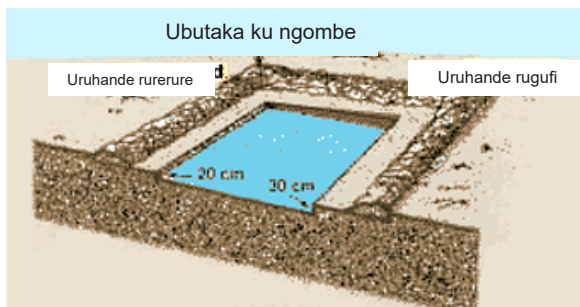
- Noneho tera imambo zerekana indi mpande ennye ntoya iri mo imbere muri mpande ennye nini ifite m 20 kuri 20. Tera imambo mu nguni zayo maze ushyireho umugozi werekana aho inkombe z'icyuzi zizgarukira mu gice cy'imbere (ishusho 8)



Ishusho 9: Gucukura Mpandenye Ntoya Ishusho 10: Gucukura Mpandenye ya gatatu.

- Hasi h'inkombe y'icyuzi ku ruhande rugufi rw'icyuzi no ku burebure bwose bw'urwo ruhande hagomba kugira 1 m ku ruhande rwose rwoharuguru rwa mpande ennye ntoya.
- Naho hasi y'inkombe ku ruhande rurerure rw'icyuzi hagomba kuba hari 2 m kuruhande rwose rwo hepfo ya mpande ennye ntoya.
- Ongerera kandi utere imambo ku bundi buso bwa gatatu hagati mu cyuzi bufite m17 kuri 18. Ubu buso nibwo twita igice cyo hagati.
- Tera imambo zereka inguni z'ubwo buso ushyireho umugozi werekana aho hasi y'inkombe hazaba hagarukiye.(Fig 10).
- Reba neza ko imambo zose n'imigozi zikikije mpande ennye ya m26 kuri 26, m 20 kuri 20 na bwa buso bwo hagati zimeze nkuko bigaragara mumashusho.
- Tangira gucukura uhareye ku buso bwo hagati ukubaka inkombe z'icyuzi cyawe.

- Tangirira kuri mpande ennye yo hagati ku ruhande rwo haruguru. Cukura cm 20. Uko ucukura ugana hepfo, ugende wongera ibujyakuzimu.
- Nugera ku ruhande rurerure, kuri wa mugozi werekana m 2 zigize inkombe y'ubuso bwo hagati, uraba ugejeje kuri cm 30 z'ibujyakuzimu (Ishusho 11).



Ishusho 11: Gucukura Indiba y'Icyuzi



Ishusho 12: Kubaka Inkombe

- Uko ugenda ucukura, shyira itaka hagati mu mirongo yerekana aho inkombe za mpande ennye ya 20 kuri 20 na mpande ennye ya 26 kuri 26 zizaba ziri. Shyira iryo taka hafi y'aho urimo ucukura. Ibi bizatuma inkombe z'icyuzi ziba ndende ziba na ngari uko ugenda wegera aho icyuzi ari kigufi.
- Aho uhuye n'imizi y'ibiti, yivanemo yose uyishyire ku ruhande.
- Igihe cyose ubutaka bworoshye wongereye ku nkombe bugize uburebure bureshya no kugera mu ivi, butsingagire

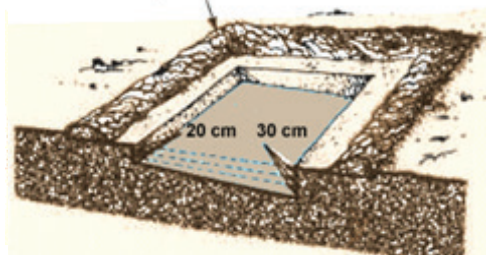
cyane. Ushobora gukoresha umuhini, ubuhiri cyangwa ikindi cyose cyagufasha gutsindira (Ishusho 12 - 13).



Ishusho 13: Gutsindagira Itaka ku Nkombe y'Icyuzi

- Mu gihe ucukura, gerageza kurekera mu ndiba y'icyuzi ubucurame bungana uko bishoboka. Ubucurame bwagombye kuba bworoshye kuva ku ruhande rwo haruguru ugana ku ruhande rurerure rwo hepfo.
- Ongerera utangire ukuraho ubutaka bwo hejuru bwo ku buso bwo hagati. Cukura izindi cm 20 uturutse ku ruhande rwa ruguru na cm 30 ku ruhanderw'icyuzi aharehare. Runda itaka ku nkombe maze utsindagire nkuko wabikoze mbere.
- Ongerera ucukure ku ncuro ya gatanu ari nayo ya nyuma muri bwa buso bwo hagati. Cukura izindi cm 20 uturutse ku ruhande rwa ruguru na cm 30 ku ruhande rurerure rwo hepfo. Runda itaka ku nkombe maze uritsindagire (Fig 13).

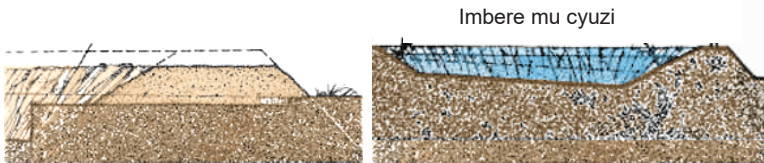
Ubutaka ku ngombe



- Igihe uzaba urangije gucukura ubuso bwo hagati wamaze no kurunda itaka ryose ku nkombe uzaba ufite icyobo gifite m17

kuri m 18 gifite uruhembe ruhanamye. Ubu rero igihe kirageze cyo guconganga inkombe z'icyuzi (Ishusho 14).

- Cukura ubutaka bwashyigaye kuruhande rw'igice kigize ubuso bwo hagati ukora ubucurume bw'inkombe. Shyira ubutaka ucukura ku nkombe maze utsindagire cyane (Ishusho 16).



14: Kunoza Inyuma h'inkombe

Figure 15: Kunoza Imbere h'inkombe

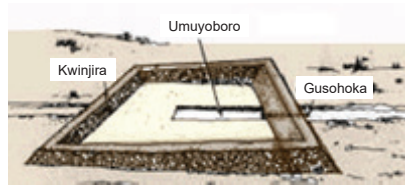
- Ahagana imbere y'inkombe, hagomba kugira ubucurume bwohoheje kurusha ahagana inyuma yayo. Ibishushanyo birakwerekera uko inkombe iba isa iyo imaze kwubakwa (Ishusho 15).
- Ubugari bwo hejuru ku nkombe bugomba kugira m 1.5 kandi bukareshya hose ku cyuzi (Ishusho 16) .



Ishusho 16: Ubugari bwo hejuru y'inkombe

Ishusho 17: Uburebure bw'inkombe

- Fata za cm 20 z'ubutaka wacukuye ugitangira ubushyire hejuru y'inkombe n'inyuma yazo.
- Tera ho ibyatsi kugirango urwanye isuri.
- Indiba y'icyuzi cyawe igomba kuba iri kuri m 1.1 (cm 110) kuva hejuru y'inkombe ahagana ku ruhande rugufi rw'icyuzi (Haruguru) na m 1.4 (cm 140) kuva hejuru y'inkombe ahagana kuruhande rurerure rw'icyuzi (hepfo) (Ishusho 17).
- Cunga neza ku indiba y'icyuzi ifite ubucurume busa kandi hose.



Ishusho 18: Umuferege (Umuyoboro) mu ndiba y'icyuzi

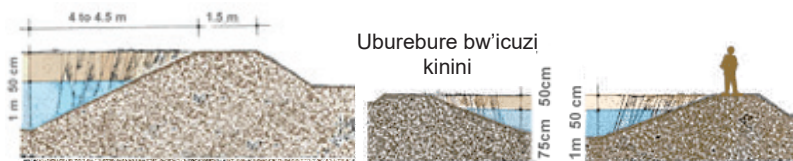


Ishusho 19: Kuvanaho Ubutaka bwacukuwe n'imyanda

- Noneho cukura umuferege mu ndiba y'icyuzi uturutse hagati mu cyuzi ugana hepfo aho indiba y'icyuzi irangirira. Uwo muferege ugomba kugira ubugari bwa cm 50 na cm 20 z'uburebure (amajyakuzimu). Uyu muferege niwo uzafasha kuvana amazi mu cyuzi igihe cyo gusarura cyangwa ushaka kumaramo amazi (Fig 18).
- Urangije gucukura umuferege, vanaho ubutaka wacukuye n'imyanda yose iri mu ndiba y'icyuzi (Ishusho 19).

2.2.3 Kubaka ibyuzi byisumbuyeho (Hejuru ya m² 1000)

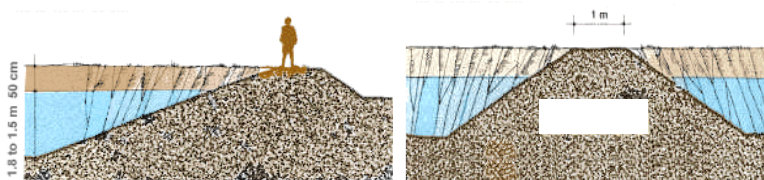
- Niba ushaka kubaka icyuzi kisumbuye ho, tuvuge m20 kuri m50, m 30 kuri m 40, cyangwa kiruseho, ugomba kubihereza uburebure (Ibujyakuzimu) burenzeho.
- Uburebure bw'amazi mu cyuzi bwagombye kugana byibuze na m 0.75 (cm 75) ahaherereye ku mpembe ngufi y'icyuzi na byibuze m 1 kugera kuri m 1.2 ku mpembe ndende ahagana hepfo y'icyuzi (Ishusho 21).



Ishusho 20: Inkombe z'ibyuzi binini

Ishusho 201: Uburebure by'ibyuzi binini

- Niba ibyuzi byawe biri mu karere ubukonje bugera muni ya 20°C, ubaka icyuzi gifite uburebure bwa 1.5 – 1.8 m. Amazi azaba ashushye ahagana ku ruhande rurerure aho ariho ifi zihungira igihe hakonje (Ishusho 22).



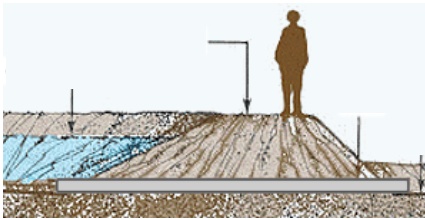
Icyitonderwa: Iyo ibyuzi bikurikiranye, ukenera gusa inkombe imwe hagati yabyo. Iyo wubaka ibyuzi bikurikiranye bifatanye ushobora kubaka inkombe imwe hagati yabyo ifite m 1 y'ubugari hejuru aho kugira m 1.5 (Ishusho 23).

Umaze gusobanukirwa:

Intera zikurikizwa mu gupima no kubaka ibyuzi by'amafi
 Ko icyuzi kigomba kuba kingana byibuze na m² 400
 Ko icyuzi cyaba ari Mpande ennye cyangwa urukiramende
 Ko ibyuzi bito byagombye kugira cm 60 ahagufi na cm 90
 aharehare
 Ko ibyuzi binini byagombye kugira cm 75 ahagufi na cm 150
 aharehare
 Inkombe zigomba kugira cm 50 hejuru y'aho mazi agarukira
 mu cyuzi
 Inkombe zigomba kugira ubucurame bworoheje ku mpande
 zombi
 Icyuzi cya mpande ennye cyangwa urukiramende nibyo
 byorashye kubaka na gucunga.

2.2.4 Kubaka ibikoresho bivana amazi mu cyuzi

- Ukeneye igikoresho gicunga ingano y'amazi ava mu cyuzi kugira ngo uko amazi angana mu cyuzi agume ku rugero rubereye amafi worora kandi ushobore kuyavanamo igihe cyose ubishakiye.
- Igikoresho gicunga amazi mu cyuzi gishobora kuba ari igiti cy'umugano, uruhombo rwa pulasitiki cyangwa rw'icyuma.
- Igikoresho gicunga amazi ava mu cyuzi kigomba kuba gifite umurambararo wa cm 10. Nkuko indiba y'inkombe y'icyuzi ari ndende (nini) kurusha hejuru yayo, igikoresho gicunga amazi ava mu cyuzi kiba kirekire kurusha igikoresho gicunga amazi yinjira mu cyuzi.
- Igikoresho gicunga amazi ava mu cyuzi kigomba kuba kirekire bihagije kugira ngo kinyure mu ndiba y'inkombe gihinguke hakurya. Uzakenera uruhombo rw'uburebure bwa m 6.5 kugira ngo runyure mu nkombe yo hepfo y'icyuzi cyawe (Ishusho 23).



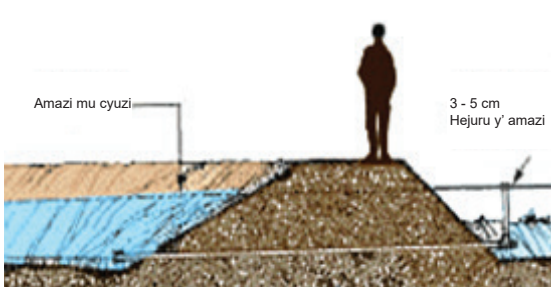
Ishusho22: Uburebure bw'igikoresho gicunga amazi ava mu cyuzi



Ishusho 23: Igikoreho yoroheje

- Kugira ngo ushyire Igikoresho gicunga amazi ava mu cyuzi mu ndiba y'icyuzi, satura inkombe y'icyuzi aho wifuza gushyira icyo gikoresho. Kigomba guhinguranya inkombe kuva imbere mu cyuzi uturutse aharehare kurusha ahandi kikagera inyuma y'icyuzi.

- Niba Igikoresho gicunga amazi ava mu cyuzi kiri muni y'urugero rw'ubutaka inyuma y'icyuzi, icyo gihe uzahacukura kugira ngo amazi azasohoke mu ruhombo(Ishusho 23).
- Rambika Igikoresho gicunga amazi ava mu cyuzi aho wasatuye mu nkombe y'icyuzi wongere uhasubiranye.
- Niba ukoresha igikoresho gifite umurambararo ungana na cm 10, bizagufata amasaha hafi 10 kugira ngo uvidure icyuzi cya m² 400.
- Niba ukoresha uruhombo rwa pulasitiki cyangwa icyuma, byaba byiza wongereye ku mpera yarwo akantu kameze nka L cyangwa T nkuko bigaragara mu mashusho. Pfundikira ako kantu wongeye ho (Ishusho 25. Kandi ugashyire ho gahagaritse (Ishusho 26)
- Aho Igikoresho gicunga amazi ava mu cyuzi kigarukira hagomba kuba hari cm 3 – 5 hejuru y'aho amazi agarukira mu cyuzi. Igihe amazi yuzuye kurenga uru rugero, ahita ameneka anyuze muri icya gikoresho (Ishusho 25).



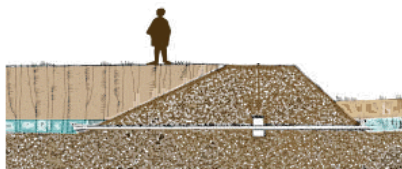
Ishusho24: Igikoresho kivana amazi mu cyuzi



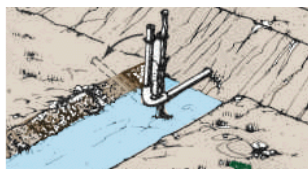
Ishusho25: Igikotesho ku rumambo

- Zirika igice cy'uruhombo ruzamuye ku rumambo washinze mu butaka kugira ngo rutazagwa maze amazi akisohokera utabishaka (Ishusho 26).

- Igihe uzaba ushaka gufungura amazi ngo asohoke mu cyuzi, zitura rwa ruhombo urwerekeze hasi. Amazi azahita atemba asohoka mu cyuzi.



Ishusho26: Itiyo ivana amazi mu cyuzi



Ishusho27: Itiyo Ivuguruye ivana amazi mu cyuzi

2.2.4.1 Ibikoresho bivuguruye bivana amazi mu cyuzi.

- Ushobora kuvugurura Uruhombo ruvana amazi mu cyuzi ukoresheje Urunigi rwa sima ruzengurutse ku ruhombo. Urwo runigi ruzafatira uruhombo ahantu hamwe hagati y'inkombe y'icyuzi kandi rutume amazi adatambukira aho uruhombo ruhurira n'inkombe.

Incamake:

Umaze kumenya uko

Bubaka ibikoresho bicunga amazi asohoka mu byuzi

Gushyira uruhombo ruvana amazi mu cyuzi ku ndiba y'inkombe y'icyuzi

Aho Uruhombo ruvana amazi mu cyuzi rugarukira hagomba kuba ari kuri cm 3 – 5 hejuru y'aho amazi agarukira mu cyuzi

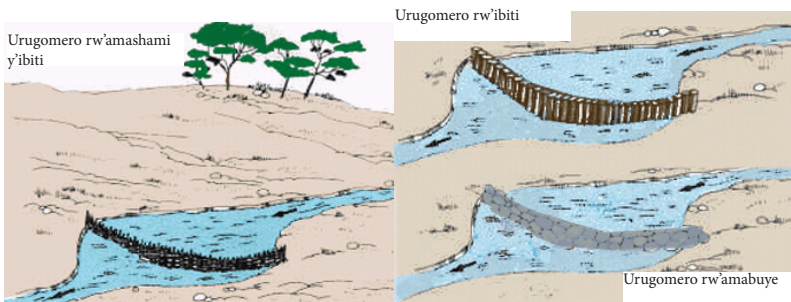
Aho uruhombo ruvana amazi mu cyuzi rutereye imbere mu cyuzi hagomba kuba hari cm 10 munsu y'ahantu harehara kurusha ahandi mu cyuzi

Uko wakoresha umutwe ukoze L cyangwa T ku ruhombo rusohora amazi mu byuzi.

2.2.5 Kohereza amazi mu byuzi by'amafi.

2.2.5.1 Kongera amazi ajya mu byuzi

- Iyo umugezi ufatirwa ho amazi yoherezwa mu byuzi utari hejuru bihagiye gusumba aho ibyuzi biri, ushobora kongera ubutumburuke bwawo wubaka urugomero kugira ngo amazi ashobore kugera ku byuzi nta ngorane.
- Ushobora kubaka urugomero ruciriritse ukoresheje amashami y'ibiti, ibiti cyangwa amabuye ushyira mu mugezi (ishusho 29).



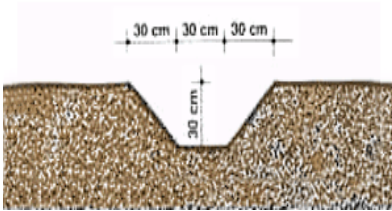
Ishusho 28: Amoko y'ingomero

- Iyo amashami y'ibiti, ibiti cyangwa amabuye yegeranye cyane, urugero rw'amazi inyuma y'urugomero ruzazamuka rube rure.

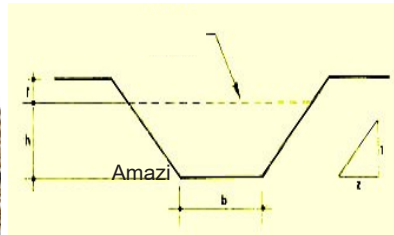
2.2.5.2 Kubaka Imiyoboro Yohereza amazi mu byuzi

- Numara kubaka urugomero ubona amazi inyuma yarwo yageze aho wifuza, uzakenera gucukura umuyoboro ujyana amazi mu byuzi.
- Imiyoboro ikozwe mu buryo bunyuranye ishobora gukoreshwa mu bworozi bw'amafi, ariko ikunzwe kurusha iyindi ni imiyoboro icukuye mu butaka, ifite ishusho rya trapeze irangwa n'ibi bikurikira:

Ubugari ku ndiba yayo (b);
 Ubucurame (z) bwa 1 ku mpande zombi (z: 1)
 Ubujyakuzimu bw'amazi mu muyoboro (h) na
 Umurengerera (f) yo kumena amazi y'umurengerera.

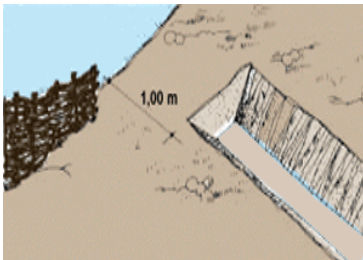


Ishusho29 a: Gucukura umuyoboro wohereza amazi

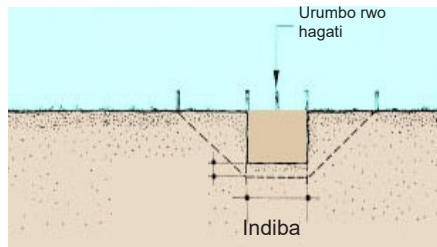


Ishusho30 b: Gucukura umuyoboro wohereza amazi

- Tangira gucukura umuyoboro uhagaze inyuma y'urugomero aho amazi ari maremare. Ariko ubikore ku buryo amazi yo mu rugomero adahita atembera mu muyoboro.
- Ibi ushobora kubigeraho utangira gucukurira nko kuri m 1 uvuye ku rugomero. Igihe uzaba urangije gushyira amazi mu byuzi byawe, nibwo uzavanaho ubutaka butandukaniye umuyoboro n'urugomero maze amazi ahite atembera.

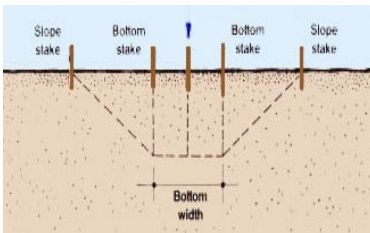


Ishusho 31: Igisigara cya 1 m y'ubutaka

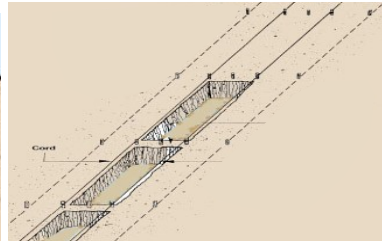


Ishusho 32: Aho Umuyoboro w'amazi Uzubakwa

- Niba imiyoboro yose izacukurwa mu butaka ntakuyishiramo isima. Kuri buri ruhande rw'imambo zerekana mu muyoboro hagati tera ho imambo zerekana ubugari bw'indiba y'umuyoboro, tera imambo zerekana ubucurame bw'umuyoboro ari nazo zerekana aho inkombe z'umuyoboro zihurira n'ubutaka ahagana hejuru. Ringaniza imambo ukurikije uko umuyoboro ungana.

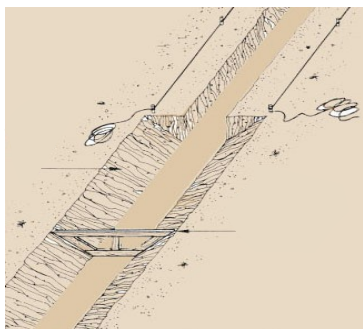


Ishusho 33: Gutera imambo zerekana umuyoboro

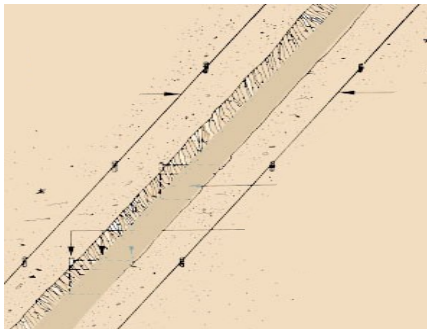


Ishusho 34: Gutera imambo zereka uko umuyoboro ureshya

- Tera imambo zerekana uburebure bw'umuyoboro, hagati, ubucurame n'indiba nkuko byavuzwe haruguru.
- Shyira umugozi ukomeye ku mambo zerekana indiba y'umuyoboro.
- Cukura umwobo ungana n'indiba y'umuyoboro(Ishusho 35):
- Cukura ugeze kuri cm 10 hejuru y'indiba y'umuyoboro urebera kuri rwa rumambo rwo hagati mu muyoboro;
- Siga ubutaka bwo gufata imambo iruhande rwazo kugeza igihe uzarangiriza gucukura ku rumambo rwo hagati (Ishusho 35); Vanamo ubutaka ucukura ubwubakisha inkombe cyangwa se ubuterera ahagana hepfo kugirango butazatera isuri mu muyoboro imvura iramutse iguye.

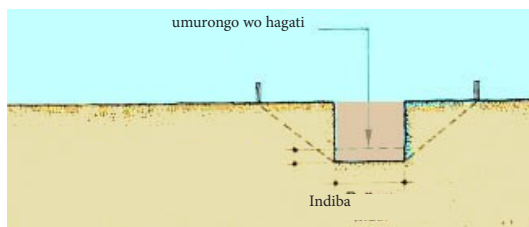


Ishusho 35: Kwimura imambo Ishusho

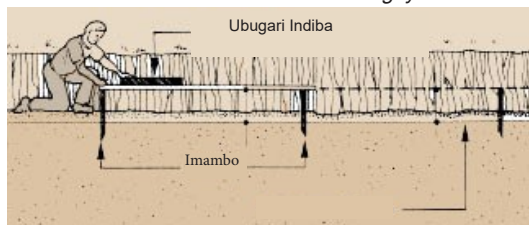


36: Gucong Impembe z'Umuyoboro

Cukura cm 10 z'ubutaka bwashigaye mu ndiba y'umuyoboro maze, niba ari ngombwa



Ishusho 37: Gucukura ahasigaye

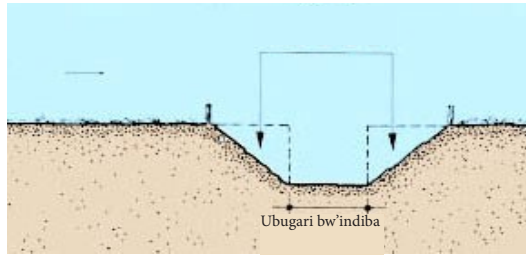


Ishusho 38: Kuringaniza Ubucurame

Ugorore ubucurame bw'umuyoboro (Ishusho 36)

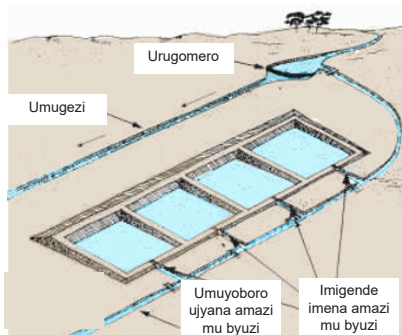
Kata impande z'umuyoboro kuva ku mambo z'ubucurame kugeza mu nguni y'umuyoboro. Bikore ku buryo buhengamye (Obliquely) (Ishusho 36):

Koresha akabaho usuzuma impande z'umuyoboro ugenda ucukura; Vana mo ubutaka ucukura nkuko byavuzwe haruguru.

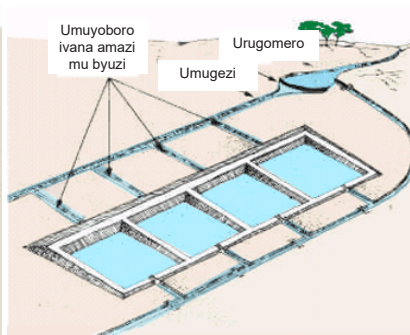


Ishusho 39: GUKata impande z'umuyoboro

- Rangiza wubaka inkombe unaringaniza hejuru y'umuyoboro no kunoza ubucurame bw'inyuma y'umuyoboro.
- Tera ibyatsi byo kurwanya isuri.
- Tunda ubutaka wacukuye ubujyane kubakisha inkombe z'icyuzi cyangwa se ubujugunye ku musozi kurango butazateza isuri imvura iguye bugasubira mu muyoboro.
- Umuyoboro w'amazi ugomba kugira ubucurame bworohewe. Ushobora gukoresha nivo y'abubatsi mu kubaka uyu muyoboro (Ishusho 39).
- Ugeze ku cyuzi cyawe cya mbere (haruguru), umuyoboro uraba wegereye aho amazi yinjirira mu byuzi. Komeza ucukure umuyoboro kugeza uringaniye n'icyuzi cya nyuma.
- Igihe umuyoboro uzaba urenze icyuzi cya nyuma, komeza ucukure urenzeho nka m 10. Noneho utangire kuwegereza imusozi. Ibi bizatuma mu gihe ibyuzi byawe bizaba byuzuye amazi, azarengaho azahita atembera imusozi.
- Ubu noneho, cukura akagende gato gahuza umuyoboro uzana amazi n'icyuzi kimwe kimwe (Ishusho 41).



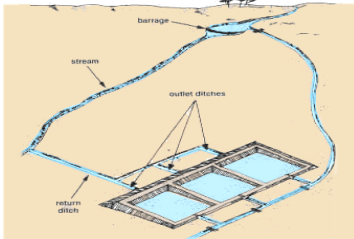
Ishusho 40: Imiyoboro izana amazi mu byuzi



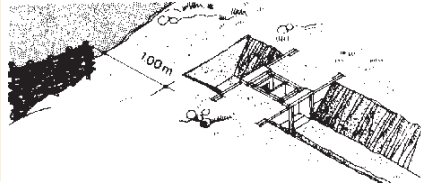
ishusho 41: Imiyoboro ivana amazi mu byuzi

- Uzakenera kandi kubaka umuyoboro umwe cyangwa myinshi isohora amazi mu byuzi iyasubiza mu mugezi igihe uzaba waviduye ibyuzi byawe. Iyo miyoboro bayita iyo kuvidura kandi uko icukurwa biterwa n'uko ibyuzi byawe biteye naho biherereye uturutse ku mugezi.
- Hitamo inzira ngufi kandi yoroshye wanyuzamo amazi asubira mu mugezi.
- Niba ibyuzi byawe biri hafi y'umugezi, inzira yoroshye yo gusubiza amazi mu mugezi ni ugucukura umuferege uhuza igikoresho kivana amazi muri buri cyuzi ukayageza mu mugezi. Ushobora no gukoresha umuferege umwe ku byuzi bibiri cyangwa byinshi (Ishusho 42).
- Niba ibyuzi byawe bitegereye umugezi cyangwa se udashobora gucukura bitaziguye umuferege uhuza icyuzi n'umugezi, wacukura umuferege umwe ku ruhande ruriho ibikoresho bisohora amazi mu byuzi, ukazanyuzwa mo amazi aturuka mu byuzi byose (Ishusho 42).
- Tangirira ku muferege w'icyuzi kiri haruguru. Uyu muferege ugomba kurenga aho igikoresho kivana amazi mu cyuzi cyo hepfo (cya nyuma) kigarukiye maze ugakomeza kugera ku mugezi.

- Noneho cukura utugende duhuza ibikoresho bivana amazi muri buri cyuzi n'umuferege usubiza amazi mu mugezi (Ishusho 43).



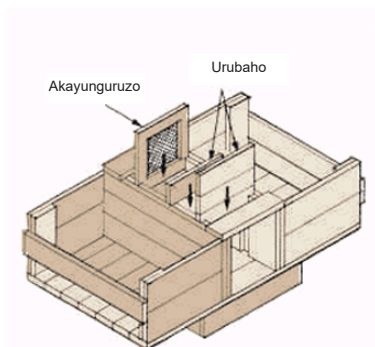
Ishusho 42: Umuyoboro Umwe Uvana amazi mu byuzi



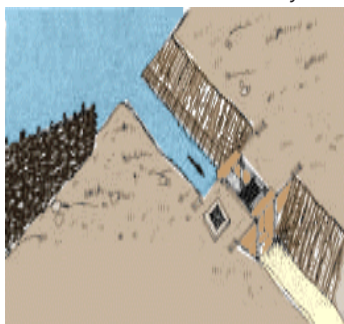
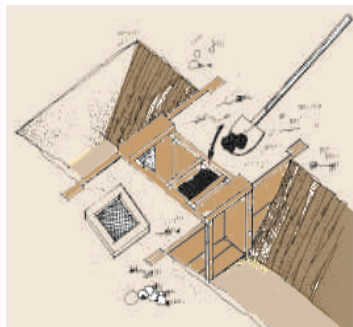
Ishusho 43: Gucunga amazi y'injira mu Muyoboro

2.2.5.3 Gucunga amazi yo mu miyoboro yohereza mu byuzi

- Nurangiza kubaka imiyoboro yohereza amazi mu byuzi, uzakenera gucunga uko amazi atemba kuva mu mugezi atemba mu muyoboro no kuva mu muyoboro yinjira muri buri cyuzi.
- Gucunga uko amazi atemba mu muyoboro ava mu mugezi wubaka akagomero. Ako kagomero ukubaka ku mutwe w'umuyoboro inyuma ya ya metero wasize hagati y'urugomero n'umuyoboro igihe watangiraga kubaka umuyoboro (Ishusho 44).
- Ako kagomero gafite imyanya itatu kuri buri ruhande rwayo. Ibiri muri iyo myanya ijyamo imbaho uwagatatu ukajyamo akayungiro gakumira ifi zo mu mugezi. Ibishushanyo bikurikira birerekana uko akagomero gakoze mu rubaho kubakwa (Ishusho 45 - 47).



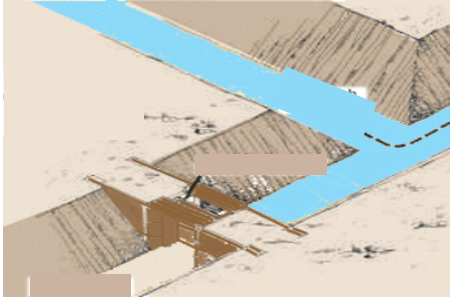
Ishusho 44: Igikoresho gitangira amazi Ishusho 45: Gutsindagira Ibumba hagati y'Imbaho



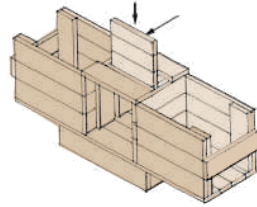
Ishusho 46: Amazi atemba

- Uzuza ibumba hagati y'imbaho washyize mu myanya ibiri kugira ngo amazi atava (Ishusho 46).
- Ube uretse gushyiramo akayungirizo kugeza igihe uzaba ugiye gukoresha ako kagomero. Kabike iruhande kugira ngo katononekara.
- Nurangiza, uvaneho ya metero y'ubutaka bwashyiraye ugitangira gucukura umuyoboro. Amazi azahita yinjira mu muyoboro kugera kuri za mbaho (Ishusho 47).
- Nyuma, igihe cyo gushyira amazi mu byuzi kigeze, uzashobora gucunga amazi yinjira mu Byuzi ukoreshe za mbaho washyizemo uagenda uzigabanya.

- Kugira ngo ushobore gucunga neza amazi yinjira muri buri cyuzi, wakubaka utugomero tundi dutoya ushyira mu muyoboro aho amazi yinjirira mu cyuzi (Ishusho 49).
- Kuri ako kagomero gatoya ukenera umwanya umwe gusa w'imbaho. Igishushanyo gikurikira kirabyerekana.



Ishusho 47: Umuyoboro wohereza mazi mu cyuzi



Ishusho 48: Igikoresho cyohereza amazi mu cyuzi.

- Seseka imbaho mu mwanya wazigenewe kugira ngo wohereze amazi yose mu cyuzi, Cyangwa uvane mo imbaho kugira ngo amazi akomeze urugendo aje mu bindi byuzi. Ushobora no gutondekanya imbaho ku buryo amazi amwe ajya mu cyuzi kimwe andi agakomeza mu bindi.

Incamake

Wasobanukiwe uko:

Bubaka urugomero rwo kwongera amazi

Uko bubaka umuyoboro wohereza amazi mu byuzi

Bubaka utugende tugabura amazi muri buri cyuzi

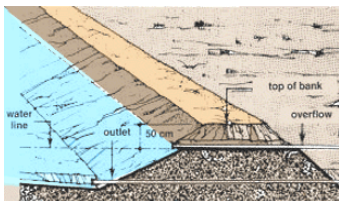
Bubaka imiyoboro ivana amazi mu cyuzi ikayageza mu mugezi

Ibikoresho byo gucunga amazi mu miyoboro yohereza amazi mu byuzi

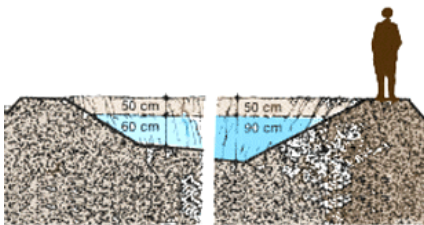
2.2.6. Gucunga amazi ari mu cyuzi

2.2.6.1 Kumena (Kugabanya/Gucunga) amazi y'umurengera

- Mu gihe hari amazi menshi mu cyuzi, ashobora kurenga inkombe maze agatera isuri ku nkombe ndetse n'amafi amwe akagenda.
- Koresha igikoresho gicunga amazi mu cyuzi kugira ngo ukumire amazi y'umurengera yo kurenga inkombe.
- Icyo gikoresho gishobora kuba ari igiti cy'umugano, uruhombo rwa pulasitiki cyangwa rw'icyuma. Icyo gikoresho kigomba kuba gifite byibuze cm 6 z'umurambararo.
- Uruhombo rumena amazi y'umurengera rugomba kuba ari rurerure bihagije ku buryo ruhinguranya inkombe guturuka imbere mu cyuzi kugera inyuma y'acyo aho amazi adatamba ku nkombe. Hazakenerwa uruhombo rufite byibuze m 4.5 z'uburebure.
- Ni byiza ko uruhombo rumena amazi y'umurengera rwashyirwa ku nkombe yo hepfo aho amazi mu cyuzi ari magufi hejuru y'igikoresho kimena amazi yo mu cyuzi kugira ngo amazi asohoka ahite atembera mu muferege ujyana amazi asohoka mu cyuzi.
- Niba uzashyira uruhombo rumena amazi y'umurengera hejuru y'igikoresho gisohora amazi Mu cyuzi, rushyire mu mwanya umwe aho watemye inkombe ushyiramo igikoresho gisohora amazi mu cyuzi. Aho amazi agarukira mu cyuzi hagomba kuba hari cm 50 uturutse hejuru y'inkombe, ba ariho ushyira uruhombo rwawe mu gihe usubiranya inkombe y'icyuzi (Ishusho 50).



Ishusho 49: Igikoresho kimena amazi y'umurengera

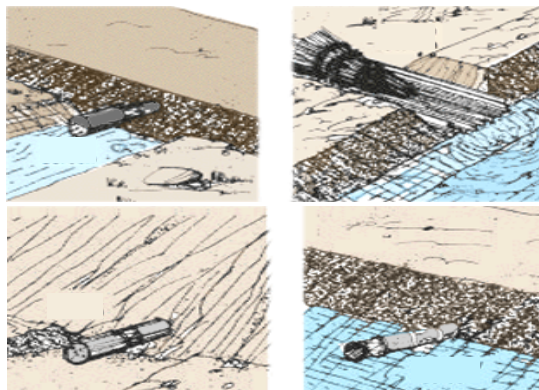


Ishusho 50: Igikoresho kimena amazi y'umurengera

- Niba ushyira uruhombo rumena amazi y'umurengera mu wundi mwanya, icyo gihe uzasatura ahandi mu nkombe y'icyuzi ugeze kuri cm 50 uturutse hejuru y'inkombe(Ishusho 51).
- Iyo icyuzi cyuzuye amazi, uruhombo rumena amazi y'umurengera ruzafatira amazi ku burebure bwa cm 60 mucyuzi ku mpembe ngufi na cm 90 ku mpembe ndendey'icyuzi.

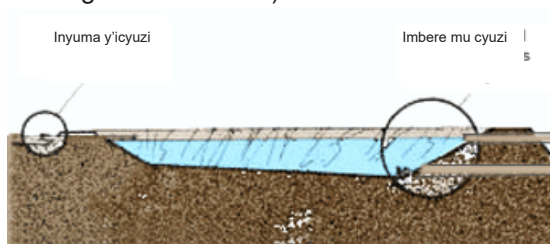
2.2.6.2. Kugenzura imyanda n'amafi yo mu mugezi:

- Igikoresho cyohereza amazi mu cyuzi kigomba kugira akayunguruzo gatuma amafi yo mu mugezi n'imyanda bitinjira mu cyuzi igihe wohereza mo amazi.
- Igikoresho kivana amazi mu cyuzi kigomba kugira akayungiro ko kugira ngo gatangire amafi y'umworozi kugenda mu gihe uvidura icyuzi (Ishusho 52).



Ishusho 51: Utuyungirizo ku gikoresho kizana amazi mu cyuzi.

- Igikoresho cyawe gicunga amazi y'umurengera kigomba nacyo kugira akayungiro kugira ngo amafi tanyuramo igihe amazi yuzuye cyane akanyura mu ruhombo rw'amazi y'umurengera.
- Ushobora kwikorera utuyungiro tw'ibikoresho byinjiza, bivana n'ibicunga amazi y'umurengera mu cyuzi ukoreshaje akayungiro ka pulasitiki cyangwa akicyuma cyangwa se ikibindi gitoboye.
- Utuyungiro tugomba gushyirwa inyuma y'icyuzi ku bikoresho byohereza amazi mu byuzi n'imbere mu cyuzi ku bikoresho bisohora amazi mu cyuzi hamwe n'ibicunga amazi y'umurengera Ishusho 53).



Ishusho 52: Utuyungirizo inyuma n'imbere mu cyuzi.

- Ibi bizatuma impombo zituzura imyanda yatuma ziziba amazi ntabwo zikomeze kunyuramo.
- Zirikirira cyane utuyungiro ku mpombo ukoresheje umugozi ukomeye.
- Mu gihe wuzura amazi mu cyuzi cyangwa uyavanamo sukura utuyungiro kenshi. Kuko utabikoze, imyanda n'amababi bizuzuramo amazi maze ananirwe gutambuka.

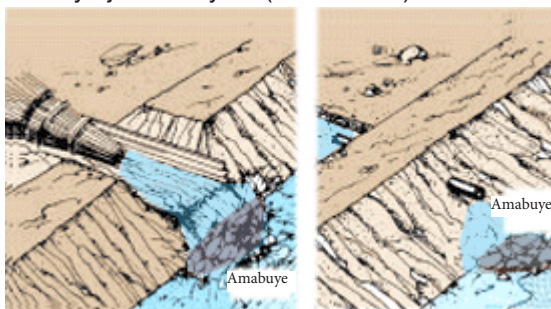
Incamake

Umaze kwiga uko bacunga amazi yo mu cyuzi n'uko bubaka ibikoresho byohereza, bisohora n'ibicunga amazi y'umurengera
Gushyiraho uruhombo rugenzura amazi y'umurengera mu nkombe y'icyuzi kuri cm 50 uturutse hejuru yayo
Gukoresha utuyungiro two gukumira imyanda n'amafi bituruka mu mugezi

UMUTWE WA 3. IMICUNGIRE YAHAKORERWA UBWOROZI BW'AMAFI.

3.1 GUTEGURA ICYUZI CY'AMAFI

- Mbere y'uko wuzuza amazi mu cyuzi cy'amafi, banza wizere ko utuyungiro ku bikoresho byohereza, bisohora, n'ibicunga amazi y'umurengera bihari kandi bikomeye.
- Niba warubatse igikoresho gisohora amazi gifite umutwe wa T cyangwa L, erekeza uwo mutwe hejuru (Ishusho 27).
- Shyira amabuye mu ndiba y'icyuzi aho amazi ava mu ruhombu amenekera yinjira mu cyuzi (Ishusho 53).



Ishusho 53: Amabuye aho amazi y'injirira mu cyuzi.

- Ibi bizatuma amazi adakora isuri mu cyuzi. Bizatuma kandi amazi ataba ibyondo. Bizatuma amazi yinjirana isumo rizana umwuka ifi zihumeka.
- Niba ari icyuzi cyari gisanzwe gikora, kurikiza intera zikurikira kugira ngo utegure neza icyuzi cyawe ugiye guteramo andi mafi:
 - Vidura icyuzi. Vana mo amazi yose maze ureke icyuzi cyumuke mu minsi 14.
 - Indiba y'icyuzi n'iruhande rwacyo inyuma y'inkombe hagomba gusukurwa uvana ho ibyatsi.
 - Sana ibikoresho byohereza n'ibisohora amazi mu cyuzi hamwe n'imiyoboro, hindura utuyungiro ukurikije gahunda runaka.

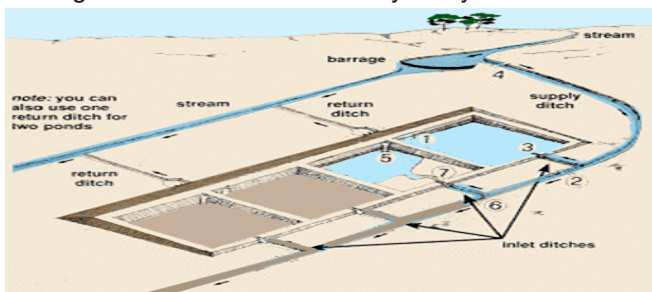
- icyuzi cyose kigomba gusuzumwa ahangiritse hagasuzumwa hakurikijwe gahunda runaka.
- Vugurura kandi usukure inkombe z'icyuzi n' imiyoboro.
- Umisha ibyuzi iminsi 1 – 3, ukurikije uko ibihe bimeze n'uko ubutaka bukoze indiba y'icyuzi buteye.
- Igihe kirageze ngo utangire gushyira amazi mu byuzi kimwe kuri kimwe nkuko byasobanuwe haruguru.

3.2 KWICA UDUKOKO MU NDIBA Y'ICYUZI

- Bica udukoko two mu ndiba y' icyuzi bakoresheje ishwagara.
- Mbere yo gutera ishwagara, ubanza gushyira amazi mu cyuzi kugera kuri cm 6-10 z'amazi.
- Tera ishwagara mu ndiba y'icyuzi ushyiremo 10-15 kg/100 m²
- Nyuma y'icyumweru kimwe, ushobora gushyira amazi mu cyuzi cyawe

3.3 KUZUZA AMAZI MU CYUZI.

- Ugomba kuzuza amazi mu byuzi byawe kimwe kimwe.



- icyuzi cya mbere: Funga igikoresheho gisohora amazi mu cyuzi, Funga akagomero kari mu nguni y'umuyoboro wohereza amazi mu byuzi, fungura akagomero kohereza amazi mu cyuzi, fungura akagomero ko ku mugezi, genda uvanamo urubaho rumwe rumwe, icyuzi cya mbere kizatangira kujya mo amazi.

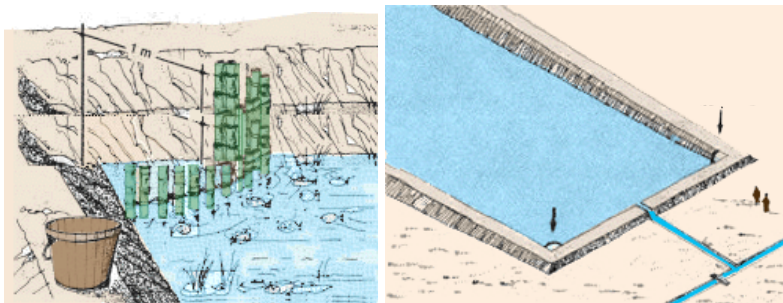
- Tegura icyuzi cya kabiri: Funga igikoresho gisohora amazi mu cyuzi, Funga akagomero ko mu nguni y'umuyoboro wohereza amazi mu byuzi, , fungura akagomero kohereza amazi mu cyuzi.
- Icyuzi cya mbere nikimara kuzura funga akagomero kinjiza mo amazi (3) noneho ufungure akagomero ko mu nguni y'umuyoboro uzana amazi mu byuzi(2), icyuzi cya kabiri kizatangira kuzura amazi
- Komeza ubikore utyo kugeza ibyuzi byose byuzuya amazi.

3.4 GUTERA IFUMBIRE Y'IMBORERA.

- Ushobora gufumbira ibyuzi byawe ukoresheje:
- Ifumbire y'imborera ikozwe n'ibyatsi bikomoka ku bihingwa bivanzwe n'umwanda w'amatungo
 - Umwanda w'amatungo.
 - Ibikomoka ku bihingwa.

3.4.1 Gushyira ifumbire mu kago k'ifumbire.

- Ubaka akago gashyirwamo ifumbire mu nguni cyangwa mu ruhande rw'icyuzi aho umwanda w'amatungo; ibihingwa bibora n'ibyatsi birundwa. Shyiramo ibiro $10/m^2$ 100 mu cyumwerru (Ishusho 54 a).
- Hindura iyo fumbire buri cyumweru kugira ngo Imyunyungugu ikwire mu mazi hose zizamure uburumbuke bw'amazi.
- Teganya gukomeza kwongera ifumbire mu cyuzi cyawe ku ngano runaka buri cyumweru mugihe cyose cy'ubworozi bw'amafi.
- Irinde gushyira mu cyuzi cyawe ifumbire nyinshi, kuko byaba intandaro yo kwanduza ubuziranenge bw'amazi kandi ifumbire iguhenda.



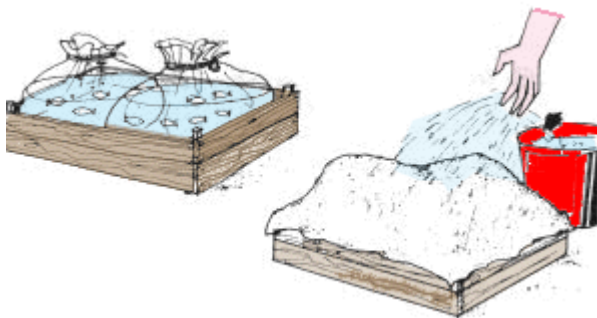
Ishusho 54a: Akago k'ifumbire Ishusho 59 b : Utugo tubiri tw'ifumbire

- Iyo ushyira ifumbire mu kago kabugenewe bwa mbere, yitsindagire neza wuzuze akago kugeza aho amazi agarukira. Aho amazi agarukira haraba hafite uburebure bwa hafi cm 60 ku mpembe ngufi y'icyuzi.
- Iyo ifumbire yawe ikomoka ku mwanda w'amatungo, uzashyiramo ibiro 10 – 15 kuri buri m² 100 z'icyuzi mu kwezi ariko wongera ifumbire mu cyuzi buri cyumweru. Amazi azatangira kuba urucaca mu minsi 2 – 3.
- Niba ifumbire yawe ikomoka ku bihingwa cyangwa ibyatsi, uzakoreshe ibiro 20 – 25 by'ibyatsi kuri m² 100 z'icyuzi buri kwezi ariko wongera ifumbire mu cyuzi buri cyumweru. Amazi azatangira gusa urucaca nyuma y'icyumweru.
- Niba icyuzi cyawe cyuzuye amazi, warashyizemo ifumbire amazi akazana ibara ry'urucaca, ubu igihe kirageze ngo utere amafi mu cyuzi abana b'amafi.

3.5 GUTERA AMAFI MU BYUZI

3.5.1 Gutwara (Kwikorera) Abana b'amafi

- Ugomba kwitonda cyane iyo uteganya ubwikorezi bw'abana b'amafi ubavana aha ubajyana hariya. Abana b'amafi bashobona kwononekara mu buryo bworoshye.
- Niba ufata abana b'amafi ukoresheje umuraga, wirinde kubatwara muri wa muraga. Bashyire mu ndobo, mu base cyangwa mu mufuka wa pulasitiki.
- Iyo utwaye abana b'amafi, ugomba kwitwararika gukoresha amazi y'urubogobogo, Ukarinda amafi ahari izuba cyangwa ugatwikiriza icyo uzitwaye mo ukoresheje igitambaro gitose kugirango zibone ubukonje.
- Niba utwaye abana b'amafi mu mufuka wa pulasitiki, shyira iyo pulasitiki mu ikarito kugira ngo idapfumuka. Twikiriza igitambaro gitose kugira ngo zihamane ubukonje.



Ishusho 55: Abana b'amafi mu mufuka ya pulasitiki

- Uramutse ubona abana b'amafi barimo bayaguzwa umwuka, ongera umwuka mu mazi Vuruga amazi ukoreshe intoki. Simbura amazi make ushyira mucyo utwayemo amafi andi mazi mashya.

3.5.2 Gutera amafi mu cyuzi.

3.5.2.1 Umubare w'amafi uterwa mu cyuzi.

- Iyo icyuzi cyawe kimaze kuzura amazi ukaba wananangije gufumbira amazi nayo akaba yamazze kuba urucaca, biba bigeze igihe cyo gutera amafi.
- Ushobora kuvana abana bo gutera mu kindi kigo cy'ubworozi bw'amafi cyangwa ku wundi mworozi w'amafi .
- Niba ukoresha Tilapia, uzakenera gutera amafi kuva kuri abiri kugeza kuri ane kuri m^2 y'icyuzi.
- Niba icyuzi cyawe gifite m 20 kuri m 20, ni ukuvuga m2 400, ubwo uzakenera gutera abana b'amafi bangana na $400 \times 2 = 800$ kugera kuri $400 \times 4 = 1,600$.
- Tera abana b'amafi bafite g 20-40 mu cyuzi wateguye neza, utere ifi 2 – 4 kuri m^2 y'abana ba Tilapiya b'ingabo gusa niba bishoboka.
- Ni byiza gutera abana b'amafi bakuze. Ariko iyo urebye igiciro cyabo hamwe n'ingorane zo gutwara abana bakuze, aborozi b'amafi bahitamo gutera abana b'amafi bafite byibuze g 5.
- Ni byiza gutera muri buri cyuzi abana b'amafi b'urugero rumwe.
- Niba ushobora kubona gusa abana b'amafi b'ibitsina bivanze, batere nkuko wari gutera abana b'ingabo gusa ariko wibuke kongera mo Inkube uzivanga na Tilapiya.
- Ku bana 1000 ba Tilapiya wateye shyira mu cyuzi abana 50-100 b'inkube(5-10% mu mibare).
- Mu gihe cyo gutera amafi, abana ba tilapiya bagomba kuba baruta ab'inkube inshuro enye mu bunini kugira ngo Inkube itarya tilapiya.
- Iyo urimo ushyira abana b'amafi mu cyuzi, fata umwanya wo kugira ngo uringanize ubushyuhe bw'amazi mu gikoresho uzanyemo amafi n'amazi yo mu cyuzi.
- Hanyuma ureke amafi yijyane buhoro buhoro mu cyuzi.

3.5.2.2 Uko babara ifi batera mu cyuzi.

- Kubara ifi utera mu cyuzi: $N=W/ (G \times a)$

N ni umubare w'ifi uterwa kuri m^2 y'icyuzi

W ni umusaruro w'amafi uteganya kuzabona kuri m^2 cyangwa ha($Kg/m^2/ t/ha$); a niifi zarokotse (%);

G ni impuzandengo y'uburemere bwa buru fi igihe cy'isarura (g cg Kg)

Urugero :

Niba duteganya kuzabona umusaruro wa toni 7 kuri ha, hakaba harokoka 85% y'ifi dutera mu cyuzi, impuzandengo y'uburemere bw'ifi ikaba ari g 200 kw'isarura, ubwo umubare w'amafi tuzatera mu cyuzi ni : $N=W/ (G \times a) = 0.7/ (0.2 \times 0.85) = 4,1$ (amafi $4.1/m^2$)

- Umubare uzaterwa mu cyuzi = Ubuso bw'icyuzi x umubare w'ifi kuri m^2)

Niba icyuzi cyacu gifite m^2 1000, umubare w'ifi tuzatera = $1000 \times 4.1 = 4100$.

Naho icyuzi gifite m^2 500, umubare tuzatera = $500 \times 4.1 = 2050$.

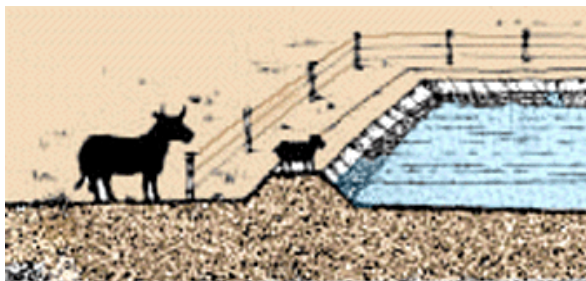
Incamake

- Pakira wigengesereye abana b'amafi utabakomeretsa
- Muri buri cyuzi ushyiremo abana bangana byibuze g 5 kugeza 10
- Ongera 10% ry'umubare nyawo ugomba kujya mu cyuzi yo gusimbura ashobora gupfa.
- Tera amafi mu gitondo
- Ibuka ko uzatera tilapia 2 kuza kuri 4 kuri m^2
- Uzongera mo inkube zingana na 5 – 10 %
- Tilapia zirute inkube incuro 4 mu bunini bwazo

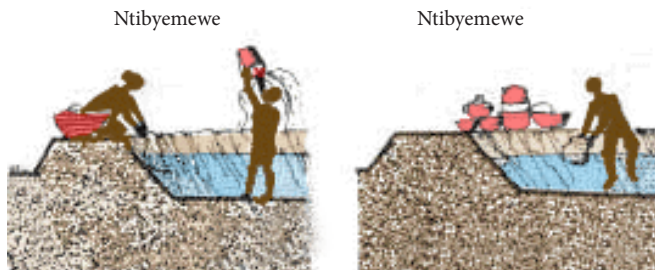
3.6 KUBUNGABUNGA IBYUZI BY'AMAFI.

- Ugomba kwita ku byuzi byawe buri munsu iyo ugiye kugaburira amafi.
- Menya ko ibyuzi byuzuye amazi.
- Urebe neza ko utuyungirizo turi mu myanya yatwo kugira ngo amafi atanyura mo akigendera.
- Ntuzatume ibyatsi bimera aharenze 14% cy'ubuso bw'icyuzi. Niba ubona ibyatsi bitangiye kuba byinshi bikure mu cyuzi.
- Tema ibihuru, ubagare n'ibyatsi ku nkombe z'ibyuzi.
- Menya ko ibyuzi byawe bitava ku nkombe zose. Niba ubonye ahava hita uhasana ako Kanya ukoreshe ibumba ryiza.
- Wirinde inyoni, ibikeri, imbeba n'inzoka. Zishobora kwangiza amafi.
- Ntuzatume amatungo manini nk'inka arisha ku nkombe z'ibyuzi byawe. Ubunini bwazo bwatuma zisenya inkombe z'ibyuzi (Ishusho 56).

Ariko ushobora kureka amatungo mato nk'intama n'ihane zikarisha ku nkombe zigatuma hahora isuku.



Ishusho 56 : Amatungo aragiye ku nkombe z'icyuzi



Ishusho 57 : Abantu biyuhagirira mu byuzi

- Ntugakoreshe ibyuzi byawe, amazi yoherezwa mu byuzi wiyuhagira cyangwa umesa imyambaro, woza ibyombo cyangwa ibindi bikoresho (Ishusho 57).
- Ntugatere ibiti binini ahagereye ibyuzi. Niba hari ibiti binini iruhande rw'ibyuzi tema amashami yaba ari hejuru y'ibyuzi. Amazi yo mu byuzi byawe ntashobor kuzagira ibara ry'urucaca igihe cyose azaba ari mu gicucu cy'ibiti.

3.7 KUGABURIRA AMAFI

- Shyiraho umwete amazi yo mu cyuzi cyawe ahamane ibara ry'urucaca kandi ugaburire amafi yawe buri gihe.
- Igihe ugabura, itegereze amafi yawe urebe niba ameze neza kandi yogana imbaraga.
- Zirikana ko amafi manini yo mu cyuzi cyawe akura byinshi mubyo aya mu twatsi duto n'udusimba dukurira mu mazi y'urucaca.
- Kugira ngo amazi ahore ari urucaca, shyira ifumbire mu cyuzi cyawe buri cyumweru. Niba ukoresha ifumbire y'imborera, uzuza akago kabugenewe buri gihe kugera aho amazi agarukira.
- Niba ukoresha ifumbire ikomoka ku matungo ongera mo kg 10 – 15 by'ifumbire mu kwezi.

- Niba ushaka ko ifi zawe zikura vuba, zigaburire n'ibindi byokurya. Ushobora kuzihereza ibisigazwa biva mu nganda z'ibikomoka ku bihingwa nk'ibisigara mu gutonora umuceri, gusya ibigori, ingano n'ibindi.

3.7.1 Ugabura ibyokurya bingana iki?

- Ntabwo byoroshye kumenya ingano y'ibyokurya umworozu yahereza ifi ze. Ugomba kuzitegereza igihe zirimo zirya kugira ngo umenye ibyokurya zikeneye.
- Uko ifi zigenda zikura ziba nini ni nako zikeneye ibyokurya byinshi.
- Niba ubonye ifi zawe zimara vuba ibyo uzihaye, zongerere ho gatoya ku munsu ukurikiye ho.
- Ni ngombwa kumenya umubare w'amafi ufite mu cyuzi cyawe kugira ngo ushobore kubara ibyokurya uzihereza.
- Igaburo ry'amafi rigomba gutangwa buri munsu mu cyuzi runaka ribarwa mu ijanisha ry'ibiro byose by'amafi (B) ari muri icyo cyuzi. Iryo jyanisha banyita ifunguro rya buri munsu DFR.

Imbonerahamwe 5: Ifunguro rya buri munsu

Impuzandengo y'Ubumere bw'Ifi	Ifunguro ku munsu (% Ijanisha ry'ubumere bw'Ifi)
15 – 20	10 – 7.0
21 – 50	7.0 – 4.0
51 – 100	4.0 – 3.5
101 – 250	3.5 – 1.5
251 – 450	1.5 - 1.0

Aho byavuye: *Producing Tilapia in ponds (World fish centre report)*

3.7.2 Ugaburira amafi ryari?

- Ni ngombwa kugaburira amafi byibuze rimwe mu muni. Ariko iki zawe zizakura neza zigaburiwe kenshi.
- Gerageza kugaburira iki zawe ku gihe kimwe buri muni, kare mu gitondo no ku gicamuni ikihe hari amafu.
- Igihe cyiza cyo kugabura ni hagati ya saa yine mu gitondo na saa kumi ku mugoroba, ikihe ubushyuhe bw'amazi n'umwuka wo mu mazi ari byinshi.
- Ni byiza kugaburira mu mwanya umwe n'ikihe kimwe buri muni ku cyuzi runaka. Amafi azamenyera vuba aho arira n'ikihe bazigaburira.
- Umugabuzi agomba kuba umuntu wizerwa kandi witanga.
- Byaba byiza kurushaho, umuntu umwe ariwe ugaburira amafi buri muni. Umuntu ugaburira amafi buri muni yagombye kuba ari we wuzura ifishi y'igabura ntihagire undi ubikora.
- Ntuzagaburire amafi iyo ubona zititabira kurya, iki zirwaye, zihunga aho zirira, iminsi ibiri mbere y'uko usarura, ku muni wo gupima amafi, iyo hari ibikorera mu cyuzi, iyo amazi mu cyuzi akonje ku muni w'imvura.

3.7.3 Ugaburira amafi ute?

- Ugitangira kugabura jugunya ibyokurya bike mu mazi ku isaha runaka buri muni maze witegereze uko iki zitwara.
- Gaburira ku mpembe ngufi y'icyuzi (aho uburebure bw'amazi mu cyuzi ari bugufi) kugira ngo witegereze amafi yawe uko aya.
- Nusanga iki zawe zitamaze ibyokurya wazihaye, gabanya ho gakeya ku muni ukurikiyeho.
- Nukomeza kugaburira iki zawe ahantu hamwe buri muni, uzamenya uko iki zawe zimara ibyokurya cyangwa zibisigaza.

- Niba ugabura ibiryo byinshi, ibisigar bijya mu ndiba y'icyuzi. Ibyokurya byinshi bijya mu ndiba y'icyuzi byonona ubuziranenge bw'amazi. Irinde kugaburira ifi zawе ibyokurya byinshi.
- Ibi bikurikira biba intandaro yo kutarya neza ku mafi nka Tilapiya: amazi akonje cyane, umwuka muke mu mazi, ifi zirarwaye, ibyokurya biraremereye bigahinda vuba ifi zitarabirya.
- Ubusanzwe bifata iminota 15 kugira ngo ifi zibe zimaze ibyo kurya wazihaye.
- Itegure kugabanya ifunguro ry'amafi yawe mu cyuzi runaka iyo ubona ibi bikurikira: Ifi zitarya ibyokurya byose wagabuye, ubushyuhe bw'amazi buri hejuru gusumba uko bisanzwe muri icyo gihe cy'umwaka, umwuka mu mazi ni mukeya, ibi byose bishobora kuba uruhurirane iyo icyuzi kigereje igihe cy'isarurwa, by'umwihariko iyo cy'isarura gihura n'amezi ashyuha mu mpeshyi.

3.7.4 Igaburo ry'ifi rigizwe n'iki?

- Ni byiza gukoresha ibiryo by'ifi bireremba (pelleted). Ariko kw'isoko byaba ibireremba n'ibitareremba byose biraboneka.

Imbonerahamwe 6 : Umubyimba n'intungamubiri mu Byokurya by'amafi.

Urugero rw'ifi	Uburemere (g)	Umubyimba w'ibyokurya (mm)	Intungamubiri (%)
Utwana tukivuka	-	Powder	45 - 50
Utwana duto cyane	0.02 – 1.0	Powder	40
Utwana duto	1,0 – 10.0	Powder	35 - 40
Amashashi	10.0 – 25.0	1 – 3 mm	32 - 35
	25.0 – 70	1 – 3 mm	30 - 32
	70 – 100	3mm	30 - 32
	100 – 200	3mm	30 - 32
Ifi Nkuru	>200	4 – 5 mm	28 - 30

3.7.4.1 Uko ubara ibyokurya by'amafi.

- Uko ubara ibyokurya by'amafi ugendeye kuri FCR (food conversion rate)
- Food Conversion Rate (FCR) ni umubare w'ibyokurya ifi ziry kugira ngo ziyongere ho ikiro kimwe.
- Igaburo ry'ifi ribarwa hakurikije inyongera y'ibiro by'amafi yose mu cyuzi (B) ukubye na

$FCR = B \times FCR$. FCR ikunze kuba ingana na 2 kugeza ku 8 ku biribwa binyuranye.

FCR yerekana uko ifi zishimira ibyokurya, bijyana n'uko zibiyibuha bikerekana ubwiza bw'ibyokurya. Uko FCR iba ntoya niko ibyokurya aba ari byiza. FCR iri hejuru ya 2 ku byokurya mvaruganda ntabwo ari nziza.

- Uko ubara ibyokurya by'amafi ugendeye ku buremere bw'ifi.

Igaburo ry'ifi ritangwa buri munsu mu cyuzi runaka ribarwa mu ijanisha hagendeye ku biro byose by'amafi (B) ari muri icyocyuzi. Iri janisha baryita Ifunguro rya buri munsu Daily Feeding Rate (DFR).

Ni umubare ngenderwaho ufasha umworozi w'amafi kumenya ikigero cy'ibyokurya agabura. Iyi mibare ngenderwaho itangwa n'inganda zikora ibiryo by'amafi. Igaburo ringana = $B \times DFR$

Igaburo rya buri munsu rigenwa buri kwezi hagendewe n'ibiro byose by'amafi ari mucyuzi.

Hafatwa ifi zokureberaho maze imibare ifashwe igafasha kubara ibijyanye n'umukumbi w'amafi ri mu cyuzi ku mwihariko Impuzandengo y'Uburemere bw'ifi (ABW) n'Uburemere bwose bw'amafi ari mu cyuzi (B) Uburemere bwose bw'amafi ari mu cyuzi = Impuzandengo y'Uburemere bw'ifi (ABW x Umubare w'amafi mu cyuzi).

(C) Ubwiyongere bw'ibiro = (ABW y'ukwezi guherutse - ABW y'ukwezi turimo) x umubare w'ifi mu cyuzi.

(D) Igaburo rya buri munsu (muri uko kwezi) = Uburemere bwose bw'amafi ari mu cyuzi x DFR.

3.7.5 Uko ifi zitabira kurya.

Ibi bikurikira ni ibimenyetso umworozi w'amafi agendera ho iyo yandika mu bitabo uko yabonye ifi ze zitabira kurya. Ibi bikorwa buri munsu n'umugabuzi:

E – Ni byiza cyane: Iyi zirashabutse cyane zitabira vuba kuza kurya. Ibyo kurya byatanzwe birabwira bigashira mu minota 5 kugeza ku minota 10.

G – Ni byiza : Iyi zirashabutse biranganiye kandi zitabira kurya hashize umwanya. Ibyokurya birabwira mu minota nka 15 kugeza kuri 20.

F – Ni byiza buke: Iyi zifite ubute (Ubunabwira) ariko zimara hafi 14 cy'ibyokurya zahwe. Ariko zibikora mu minota irenze 30.

P – Ni bibi: Iyi igaburo ritanzwe, ntabwo ifi zitabira kurya. Ibirenze 14 cy'ibyokurya birasigara.

Ibuka kwandika ibyo wabonye ku ifishi yandikwaho makuru.

Nanone, wandike uko ikirere cyari kimeze mu minsi mike ishize kimwe n'uwo muni. Haguye imvura, hari hakonje cyangwa hashyushye?

3.7.6 Gutwara no Kubika Ibiryo by'amafi.

- Jya ugura gusa ibyokurya bihagije bishobora kumara ibyumweru 4 kugeza kuri 6.
- Bika ibyokurya ahantu hafutse, hari igucucu, humutse kandi mu cyumba kirimo umwuka uhagije.
- Wo kurunda imifuka irimo ibiryo ku rukuta cyangwa ku sima. Shyira imifuka ku dutanda kugira ngo idafatwa n'uruhumbu.
- Ntukigere ukoresha imiti yica udukoko cyangwa indi miti ikarishye hafi y'ibiribwa; kandi
- Ntukigere ukoresha ibiryo byafashe uruhumbu cyangwa byaboze.

3.8 GUKURIKIRANA UBUZIRANENGE BW'AMAZI.

- Ubuziranenge bw'amazi bukurikiranwa cyane mu bwozi bw'amafi harimo ubushyuhe bw'amazi, umwuka wo mu mazi, ubusharire bw'amazi.
- Amoko anyuranye y'ifi gira urwego rwihera rw'ubuziranenge bw'amazi bubereye imibereho, imikurire n'imyororokere yabwo.
- Dore mabwiriza yagufasha kubungabunga ubuziranenge bw'amazi yo mu cyuzi cy'amafi:
 - *Gumana mu cyuzi amazi afite ibara ry'urucaca, wirinde amazi y'urucaca cyane;*
 - *Irinde ikintu cyose cyatuma umwuka uba muke mu mazi nk'ifumbire nyinshi, kugabura byinshi, gutera amafi menshi mu cyuzi;*
 - *Niba ubonye ibimenyetso by'umwuka muke mu cyuzi nk'igihe ifi ziza gushaka umwuka hejuru y'amazi, hita ukora kimwe mu*

bikurikira. Hagarika gufumbira, gabanya ibyokurya utanga ku munsu, hindure amazi mu cyuzi wongera mu amazi mashya.

- *Kumira amazi y'imvura ashobora kuba arimo, ibyondo cyangwa umucanga bishobora kwangiza matwi y'ifi bikazibuka umwuka yo kwinjira mu cyuzi.*
- *Kumira ibintu byose byakwanduzira amazi byo kwinjira mu cyuzi mu gihe uhitamo aho uzororera amafi. Ikigo cy'ubworozi ugishyire ahitaruye inganda, ahitaruye ibikomoka kuri peterori ndetse n'ahitaruye imirima iterwemo imiti yica udukoko;*
- *Shyira amazi mu byuzi afite ibujyakuzimu bwa 1 – 1.5 m;*
- *Gerageza guhamana ubwo bujyakuzimu bw'amazi mu byuzi byawe, byumwihariko mu gihe cy'impeshyi hashyushye. Ongerira amazi mu byuzi kugira ngo ugabanye ubushyuhe buhame hagati ya 20° – 30°.*
- *Niba hari ifi zapfuye zirimo zireremba mu cyuzi, zivanemo ako kanya uhindure amazi yo mu cyuzi.*
- *Kwongera amazi mu cyuzi, fungura agakoresho kohereza amazi mu cyuzi ureke amazi yinjire mu.*
- *Amazi ashaje yari mu cyuzi zasohoka anyuze mu ruhomboruhomora amazi y'umurenge.*
- *Mara amasaha 2 cyangwa 3 buri munsu kugeza igihe uzabona ko ifi zawe zimeze neza.*
- **Uramutse ubonye icyo aricyo cyose utumva mu bworozi bwawe, hagarika kugabura unahagarike gufumbira. Nurangiza uhindure amazi buri munsu mu gihe cy'iminsi itari myinshi.**
- **Iyo munsu irangiye ifi zawe zitaramera neza, zitarya neza, ziza gushaka umwuka hejuru y'amazi, nta ntege zo koga zifite, gishinama umujyanama w'ubworozi bw'amafi cyangwa undi ufite ubunararibonye mu bworozi bw'amafi.**

3.9 GUSARURA AMAFI

- Ntuzigere uvana ifi mu cyuzi cyawe mbere y'amazi atanu ukimara kuzitera. Nyuma y'amezi atanu ushobora kubona ifi zimwe na zimwe nini waroba buri cyumweru ukagurisha.
- Iyo mu cyuzi ifi nyinshi zimaze kuba nini bihagije, igihe cyo kuroba kiba kigeze.
- Ubusanzwe, amafi agera igihe cyo kurobwa hashize amezi umunane kugeza ku icumi.
- Roba amafi mu gitondo hakiri amafu.
- Uburyo bworoshye bwo gusarura amafi ni ukuvidura amazi yose mu cyuzi.
- Hagarika kugaburira ifi iminsi ibiri mbere yo kuyasarura.
- Gabanya amazi mu cyuzi mu gitondo kare ku munsu wo gusarura.
- Akenshi bakoresha umuraga mu gusarura amafi. Tangirira ahagufi mu cyuzi (ahari amazi make) ukomeze ugana ahari amazi menshi ari naho harehare mu cyuzi.
- Kora wigengesereye, ukore ku ndiba y'icyuzi gake cyane.
- Niba bishoboka, urangize gukurura umuraga hafi y'ahari mazi ku mpembe ndende y'icyuzi.
- Oroshya umuraga kugira ngo amazi atitsindagirira mu muraga igihe afatwa.
- Komeza ugabanye amazi uko ugenda urangiza gusarura.
- **Ntuzigere utira umuraga kuko wakwirakwiza indwara mu bworozi bwinshi.**

3.9.1 Gucuruza amafi

3.9.1.1 Kugeza ifi ku isoko.

- Biragoye kugeza ifi ku isoko riri kure kubera ko zipfa vuba. Niyo mpamvu ifi zigomba gupakirwa hamwe na barafu kugira ngo zihamane ubuziranenge kugera k'umuguzi wa nyuma.
- Ikintu cya mbere cyangiza ubuziranenge bw'amafi ni ubushyuhe. Koresha barafu nyinshi ushyire hejuru y'amafi, hagati no hasi yayo mucyo bayatwayemo cyangwa bayabitse ma.
- Rambika ifi uyubitse kugira ngo amazi mabi atinjira mu nda yayo.
- Gupanga neza ifi na barafu bivuga gushyira unyuranya barafu n'ifi mu cyo uzipakira mo kugira ngo ubukonje bugume hasi (5°C) bugerwa ho iyo ushyize kg 1 cya barafu ku biro 2 by'amafi.

3.9.1.2 Ingamba zo gucuruza amafi.

- Uburyo bwiza bwo gucuruza amafi y'ubuziranenge ni ukuyagurisha ari mazima.
- Uburyo bworoshye ni ukugurishiriza ku byuzi (Farm gate).
- Kora amatsinda y'abaguzi bawe ukurikije abagura ifi nzima, ifi zivanywemo ibyo munda, ifi zongerewe agaciro. Aho bishoboka korana kontaro n'abaguzi bawe.
- Tandukanya amafi yawe ukurikije ubunini bwazo kugira ngo ushake igicro cyiza ku mafi manini: Ifi ntoya: 200-350 g; ziringaniye: 350-450 g; Inini: 450-800 g; Inini cyane: zirengeje 800 g.
- Igicro utangira ho ifi zawe kirimo igishoro ukoresha kugira ngo worore izo fi, niyo mpamvu mu kukibara wongeraho inyungu yawe.

- Inyungu ifatika mu bworozi bw'amafi ni ingana na 10%,

3.10 GUKURIKIRANA UMUKUMBI W'AMAFI YATEWE.

• Umubare w'amafi yatewe ugira ingaruka ku musaruro, no mu guteganya ibizasarurwa. Niyo mpamvu ari ngombwa gukurikirana ibi bikurikira:

• Kora ifishi ya buri cyuzi aho wandika amafi uteye n'itariki uyatereye ho, mafi apfa buri muni, amafi warobye. Nusurura wandike umubare w'amafi warobye. Uko Ukwezi kurangiye bara ifi zisigaye mu cyuzi. Gereranya umubare w'izindi fi zabuze utazi aho zagiye cyangwa igihe zapfiriye uwo mubare uwubona ufashe Umubare w'amafi wateye ugakuramo umubare w'ifi zapfuye ugakuramo umubare w'ifi wasaruye.

Gukurikirana uko ifi zikura

• Ni ngombwa gukurikirana uko ifi zikura buri kwezi kuko impinduka mu buremere bw'ifi zose aribwo bugenderwaho mu ku genekereza ifunguro ry'amafi rya buri muni.

• Uroba ifi zireberwaho buri kwezi kugira ngo umenye impuzandengo y'igipimo cya buri fi (ABW).

- Ibipimo bigaragaza uko ifi zikura

Impuzandengo y'igipimo cya buri fi (ABW) = Uburemere bw'ifi zose / Umubare w'ifi mu cyuzi.

Uburemere bw'ifi zose = ABW x umubare w'ifi mu cyuzi.

Ubwiyongere bw'uburemere bw'amafi = (ABW y'ukwezi guherutse – ABW y'ukwezi turimo) x umubare w'ifi mu cyuzi.

3.11 KUGENZURA INDWARA N'IBYONNYI.

- Kugenzura icyuzi cyawe ku buryo buhoraho hamwe n'amafi arimo bituma umworozi ashobora kumenya no gukumira hakiri kare ibibazo byavuka n'indwara zakwaduka cyangwa ibyonnyi.
- Niba ubona ibimenyetso by'indwara ni byiza guhamagara inzobere, veterineri cyangwa ushinzwe iby'amafi akagufasha.
- Ibi bikorwa bikurikira byagufasha gukumira indwara n'ibyonnyi:
 - Vidura, wumisha cyuzi cyawe nyuma ya buri sarura. Kuramo ibyatsi n'ibihuru mu cyuzi n'iruhande rwacyo, uvanemo n'ibyonnyi byose.
 - Tera ishwagara mu cyuzi cyawe niyo ubusharire bwacyo bwaba ari nta mpungenge buguteye.
 - Tema ibyatsi n'ibihuru mu cyuzi n'iruhande rwacyo, urebe neza ko ibikoresho byohereza amazi mu cyuzi bifite utuyungiro two gukumira amafi yo mu mugezi n'imyanda.
 - Tera amafi afite ubuzima bwiza adafite indwara wavanye ahantu hazwi.
 - Tera amafi akomeye afite byibuze g 5 kugira ngo ibikeri bitazirya.
 - Wirinde gutera amafi menshi mu cyuzi.

3.11.1 Gutara no kubika amakuru

- Gutara makuru mu kigo cy'ubworozi bw'amafi ni ingenzi mu micungire y'ibikorwa by'ubworozi. Ayo makuru afasha guteganya umusaruro uzaboneka n'igihe uzabonekera. Afasha kandi no guteganya ibyangombwa bizakenerwa kugira ngo umusaruro uteganijwe uboneke.
- Ifishi cyangwa igitabo cyo kwandikwamo amakuru kigomba kugira umwanya aho umuyobozi w'ikigo yandika buri munsu

ibyakozwe mu kigo n'imari yakoresheye yaba iyinjiye cyangwa se iyasohotse.

- Ifishi yoroheje yakoresheye umunsi ku wundi wandika ho amakuru ajyanye n'ibikorwa byose byo mu kigo, umubare w'amafaranga yakoreshejwe n'umusaruro wabonetse mu kwezi runaka. Ni ukuvuga ko umworozi zakenera umubare w'amafishi angana n'ibyuzi atunze.
- Reba ifishi D1 yo kuzuza buri munsi ku bikorwa byose bikorerwa ku cyuzi.
- Reba n'andi mafishi D2 kugera kuri D6 uko bazuzuka.

D1	Ifishi y'ibikorwa bya buri muni		Uko ifi zitwara zirimo kurya	Bibi	Biringa niye	Byiza
				P	M	G
Izina ry'ikigo:			Uko ikirere kimeze	izub	Umuy	haratuj
Manag				a	aga	e
er						
izina:				X		
Itariki:		DD/ MM / YY	8:00a m			
			12:00 pm			
			4:00p m			

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D2: Ifishi ya stock y'ifi ya buri kwezi

D2 Incamakeya buri kwezi y'imikurire y'ifi												
Ukwezi:												
Izina rya Farm:												
Manager Izina:												
ID y'icyuzi (No)	Itsinda no	Umu bare w'ifi zate we	Ifi zose zimaze gupfa	Ifi zasaru we (No)	Umu bare wose w'ifi ku munsi wo kuroba (No)	Impuz anden go ku muni wo kuroba (kg)	Ibyokurya byagaburirwe (kg)	Umusa ruro mbumbe (kg)	Ibiro byasurirwe kgs	Ubucuri ke bw'ifi No/m ²	FCR	Ibyagurishijwe KGS Rwf
ikitonderwa:												

D3 Ifishi ikurikirana uko amafi akura

D3 Ifishi yo gukurikirana uko amafi akura										
Izina ry'ikigo cy'ubworozi::										
Izina rya Manager:										
Itariki:		Umunsi / Ukwezi / Umwaka								
Ibiranga icyuzi No	Itsinda no	Ibiranga ikigo cy'ubworozi	Itariki ifi zavukiye ho	Ikigereranyo cy'umubare w'ifi no	Ikigereranyo cy'uburemere Bw'ifi g	Itariki uheruka kuruberaho	Uburem ere bwose g			Umubare w'ifi No
Ikitonderwa:										

D4: Ifishi y'Umusaruro n'Ibyacurujwe

[illegible]

D5: Kwimurwa kw'amafi.

[illegible]

D6: Ibyokurya by'amafi

D6	Ibyokurya by'amafi				
Izina ry'ikigo cy'ubworozi:					
Izina rya Manager w'ububiko:					
Umukono wa Manager w'Ububiko					
Itariki	Itsinda Code/itariki ryasohotse ho	Ibisanzwe mu bubiko (Kg)	Iyakiriye (Kg)	Ibyasohowe (Kg)	Ibisigaye muri Stock (Kg)
Ikitoronderwa:					

UMUTWE 4: UBWOROZI BW'AMAFI BW'UMWUGA.

- Ikigamijwe mu bworozi bw'amafi bugamije isoko ni ukweza amafi yo gushyira kw'isoko no kubona inyungu. Niyo mpamvu ugomba guteganya umusaruro uzashyirwa kw'isoko rizwi. Ibi bisobanura ko umworozi agomba gusarura mafi afite ubunini runaka igihe isoko riyakeneye, gusarura umubare w'amafi akenewe no kuyacuruza ku giciro gishobora guhangana kwisoko kandi yunguka.

4.1 ITEGANYA MIGAMBI RY'UMUSARURO W'IKIGO CY'UBWOROZI BW'AMAFI.

- Guteganya umusaruro n'ukugena umusaruro uzaboneka mu gihe runaka cy'ubworozi. Nk'umworozi w'amafi ugitangira, wubakira ku rugero ngenderwaho uagenda unonosora uko ubona amakuru nyayo ashingiye ku bikorwa byawe cyangwa bya bagenzi bawe.

4.1.1 Kubaka urugero ngenderwaho rw'umusaruro wa Tilapia.

- Kora amatsinda y'ibyuzi byawe ukurikije umusaruro uteganya n'isoko/amasoko uteganya kugemurira.
- Mu kigo cyacu dukore amatsinda 5 akozwe n'ibyuzi bibiri buri tsinda bifite m² 1,000 buri cyuzi
- Ukurikije amakuru ufite shyiraho ibyo uzagenda ho mu bworozi bwawe bigizwe na:
 - Imikurire y'ifi uko zigenda ziyongera ibiro kugera ku mezi 12. Hera ku kana ka g 5.

- Umubare w'ifi utangirira ho muri buri cyuzi n' impuzandengo y'uburemere bwa buri fi (ABW) muri buri tsinda.
- Ijanisha ry'umubare w'ifi uteganya ko zizapfa (Ex: 2%).
- Ibyokurya uteganya kugabura kugira ngo ifi zikure uko wifuza.
- FCR z'ibyokurya ugabura kugira ngo ifi zikure uko wifuza (5 g to 500 g fish).
- Igihe ubworozi bumara ngo usarure (amezi 8, 9 cyangwa 10).
- Uru rugero ngenderwaho tururwubakiye ku kigo cyacu gifite:
 - Ibyuzi 10 byo kwororera mo. Ibyo byuzi bifite m2 1,000 buri cyuzi
 - Dutera mu cyuzi ifi 2 kuri m2 z'utwana twa g 5.
 - Igihe ubworozi bumara ngo dusarure ni amezi icumi tugasarur ifi zifite 390 – 500 g
 - FCR duteganya ni 2.50.

Imbonerahamwe 7: Imikurire ya Tilapiya kugera ku mezi 12.

Ukwezi	-	1	2	3	4	5	6	7	8	9	10	11	12
Uburemere bwa tilapiya	2	5	9	17	40	80	140	210	300	390	500	620	770

4.1.2 Iteganyamigambi ry'umusaruro mu kigo cyacu cy'ubworozi bwa tilapiya:

Dufite amatssinda y'ibyuzi atanu (5), dutera itsinda ry'ibyuzi buri mezi abiri tugatera ifi 2 kuri m². Ubwo buri mezi abiri dutera= ifi 2/m² x Ibyuzi 4x 1,000 m²buri cyuzi = Amafi 8,000.

Imbonerahamwe 8: Uko amatsinda y'ibyuzi azaterwa amafi no gusarurwa

Itsinda	Ukwezi ko gutera amafi	Ukwezi ko gusarura	Iburo by'amafi azasururwa
1	Mutarama. Umwaka wa 1	Ukwakira. Umwaka wa Mbere	5730 kg
2	Werurwe. Umwaka wa 1	Ukubozza. Umwaka wa Mbere	2935 kg
3	Gicurasi. Umwaka wa 1	Gashantare. Umwaka wa kabiri.	2935 kg
4	Nyakanga. umwaka wa 1	Mata. Umwaka wa Kabiri	2935 kg
5	Nzeri. Umwaka wa 1	Gicurasi. Umwaka wa kabiri.	2935 kg

Tilapia production model

	Ukwezi	-	1	2	3	4	5	6	7	8	9	10	11
	Uburemere bw'ifi	2	5	9	17	40	80	140	210	300	390	500	620
	Ukwezi 1	Ukwezi 2	Ukwezi 3	Ukwezi 4	Ukwezi 5	Ukwezi 6	Ukwezi 7	Ukwezi 8	Ukwezi 9	Ukwezi 10	Ukwezi 11	Ukwezi 12	
1	No w'ifi zature	8,000	-	8,000	-	8,000	-	8,000	-	8,000	-	-	-
2	No ffi (ntangiriro)	7,840	7,840	15,840	15,840	23,680	23,680	31,520	31,520	39,360	39,360		
3	Uburemere bwose	16	39	143	269	947	1,894	4,413	6,619	11,808	15,350		
4	No ffi (kuroba)	7,840	7,840	23,680	23,680	47,360	71,040	102,560	134,080	173,440	212,800		
5	Uburemere bw'ifi (kuroba)	39	71	403	947	3,789	9,946	21,538	40,224	67,642	106,400		
6	Ibyokurya byagabuwe	35	47	390	1,017	4,262	12,077	25,687	50,407	83,750	136,574		
7	Ibiko byarobwe	-	-	-	-	-	-	-	-	-	5,730		

Gutegany umusaruro w'ibyciro by'ibuzi

Ikiciro N°	Average weight (g)	Harvest number	Harvested biomass (kg)	Feed fed (kg)
1	390	19,131	5,730	14,325
2	390	3334	1301	7631
	500	3268	1634	
3	390	3334	1301	7572
	500	2268	1634	
4	390	3334	1301	7338
	500	2668	1634	
5	390	3334	1301	7924
	500	2268	1634	
Igitaranyo			17,470 kg	44,790 Kg

4.2 INGENDO Y'IMARI Y'IKIGO CY'UBWOROZI BW'AMAFI

- Ingengo y'imari y'ikigo cy'ubworozi bw'amafi ni igikoresho ukoresha mu kugereranya ibyo uzakoresha byose n'ibyo uzinjiza biturutse ku bworozi mu gihe giteganijwe runaka. Ingengo y'imari ikubiyemo ibi bikurikira:
- Ikiguzi cy'ibikoresho biramba. Ushyiramo ikiguzi cy'ibyuzi, amazu, imodoka n'ibindi bikoresho binini n'ibito bimara igihe, imishahra y'abakozi bahoraho
- Ikiguzi cy'ibikoreshwa. Aha ushyiramo ikiguzi cy'ibyo ukoresha kugira ngo umusaruro ugerweho. Harimo abana b'amafi, ibyokurya, abakozi ba nyakabyizi, n'ibindi bihindagurika bitewe n'umubare w'amafi woroye nko gusana ibyuzi, gucuruza amafi, ndetse n'ikiguzi cy'inyungu.
- Umubare w'amafaranga y'injira. Uyu mubare ugizwe n'amafaranga yose aturuka ku bikorwa by'ikigo bigurishwa.
- Ikiguzi cy'ubwisazure. Ikiguzi cy'ubwisazure ni amafaranga umworozi yagombye gushyira uruhande buri mwaka ateganya kuzasimbura ibikoresho. Ubwisazure bukoreshwa ku mwaka. Kubara ubwisazure ku mwaka(D) bw'igikoresho icyo aricyo cyose, gabanya ikiguzi cy'igikoresho (V), ukuyemo agaciro kacyo ubu (R) niba gahari, ugabanye n'imyaka y'uburambe (Y)

Ubwisazure : $D = (V-R) / Y$.

Niba agaciro kigikoresho ubu ari zero ubwo ubwisazure buraba $D = V/Y$.

- Ikiguzi cy'inyungu. Niba amafaranga umworozi azigama ayashora mu bikorwa biramba byo kworora amafi, umworozi yigoma inyugu yakabonye kuvana

kuri ayo mafaranga iyo ayashyira muri banki. Ikindi kandi, iyo ayo mafaranga aba yarayafashe nk'inguzanyo ya banki cyangwa ahandi, umworozi yari kuba yishyura inyungu kuri iyo nguzanyo.

4.2.1 Gusesengura ibikubiye mu ngengo y'imari

Ikiguzi cya byose: Ni igiteranyo cy'ikiguzi cy'ibikoresho biramba uteranije n'ikiguzi cy'ibikoreshwa.

Inyungu Nyayo (Net Returns): Ni ikinyuranyo hagati y'umutungo wose winjiye n'ikiguzi cya byose.

Nta nyungu nta gihombo - Igicro

Nta nyungu nta gihombo - Igicro ni igicro wagurishaho amafi yawe, ibyo washoye bikangana n'ibyo winjiza. Ibarwa mu mafaranga wagurisha ku kg.

Nta nyungu nta gihombo – Igicro = Igicro cy'Ibikoreshwa = rwf/kg

Agaciro k'umusaruro

Nta nyungu nta gihombo – Umusaruro

Nta nyungu nta gihombo – Umusaruro (BEY) isobanurwa nk'umusaruro uboneka aho umutungo wose winjira ungana n'ikiguzi cy'ibikoreshwa byose bihahwa. Ibarwa ku buryo bukurikira: Nta nyungu nta gihombo – Umusaruro (BEY) = Ikiguzi cy'ibikoreshwa byose bihahwa/igicro ku kg

Imbonerahamwe ikurikira irerekana ingengo y'imari y'ikigo cy'ubworozi bw'amafi ya tilapiya.

Imbonerahamwe 8 : Ingengo y'imari y'ikigo cy'ubworozi bw'amafi.

Igikorwa	Uko bingana	Ikiguzi cya kimwe (rwf)	Ikiguzi cya byose (rwf)
Ibikoresho biramba			
Isambu	25,000 m ²	1,000/m ²	25,000,000
Ibyuzi	20,000 m ²	1,000/m ²	20,000,000
Imiyoboro y'amazi			
Umusururo uteganijwe	16,000 kg		
Inyubako			
Umusaruro wagerwaho (Critical Standing Crop)	20,000 kg		
Impuzandengo y'uburemere bw'amafi itenijwe	500 g		
Ifi zirokoka kugeza igihe cy'isarura	85%		
FC R	2.5		
Ikiguzi cy'ibikoreshwa			
Abana b'amafi	40,000	100	4,000,000
Ibyokurya	44,790 kg	900	40,311,000
Imishahara ya banyakabyizi		260,000 rwf/month	3,120,000
Imirimo yo mu byuzi no kubisana (operation cost)			1,000,000
Ibikorwa by'ubucuruzi n'ubwikorezi			3,000,000
Ibikoresho byo mu biro			1,000,000
Amazi n'amashanyarazi			600,000
Igiteranyo			
Umusaruro	17,470 kg		
Amafi apima 390 g	10,934 kg	3,000	32,802,000
Amafi apima 500 g	6536 kg	3,500	22,876,000
Amafi yose yasaruwe	17,470 kg		55,678,000
Ubwisazure (Imyaka)			4,500,000
Inyungu ku nguzanyo			5,900,000

Ugendeye ku mibare y'ingengo y'imari, umworozi abara igishoro:

- Ibikoresho biramba
- Ikiguzi cy'ibikoresheha
- Amafaranga aturuka ku musaruro
- Umusaruro n'igiciro agendera ho nta nyungu nta gihombo
- Inyungu y'ikigo

BIBLIOGRAPHY.

JK Ofori, HR Dankwa, R Brummett and EK Abban. 2009. Producing Tilapia in Small Cage in West Africa. WorldFish Center Technical Manual No. 95. The WorldFish Center, Penang, Malaysia. 16 pp.

Charles C. Ngugi, James R. Bowman, Bethuel O. Omolo. 2007. A New Guide to Fish Farming in Kenya.

Yves FERMON.2008. Subsistence fish farming in Africa: a technical manual.

WRC REPORT NO. TT 463/P/10. 2010. A MANUAL FOR RURAL FRESHWATER AQUACULTURE.

FAO. 2017. Doing aquaculture as a business for small- and medium-scale farmers. Practical training manual by Nathanael Hishamunda, Elisabetta Martone, and Ana Menezes.

Carole Labrousse, Frederic Jozwiak. 2013. Tilapia Farming in Mozambique. Development of a small-scale tilapia farm to improve the livelihoods and nutritional diet of an isolated community in Niassa Province.

FAO. 2003. Fish Pond Construction and management. A field guide and extension manual.

ACMS. 2019. Tilapia Farming Training Workshop.

J.B. Kabagambe. 2014. Ubworozi bw'amafi mu byuzi. A fish farmer booklet.

FAO Training Series. Monitoring, record keeping, accounting and marketing

[ftp://ftp.fao.org/fi/cdrom/fao_training/FAO_Training / General/x6709e/Index.htm](ftp://ftp.fao.org/fi/cdrom/fao_training/FAO_Training/General/x6709e/Index.htm)

