

IMIRIMO YO KUBUNGABUNGA AVOKA NYUMA YO KUZISARURA MU RWANDA



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Ibirebana n'iyi mfashanyigisho

Iyi mfashanyigisho ikubiyemo imirimo yo kubungabunga ndetse n'ingamba zo kugabanya iyangirika rya avoka zo mu bwoko bwa (*Persea americana*) nyuma y'isarurwa, ni ukuvuga haba mu bazihinga n'abazohereza mu mahanga uhereye mu isarura, mu bubiko, kuzitwara ndetse no kuzitunganya. Iyi mfashanyigisho iragaragaza uburyo bushya bworoheje kandi budahenze ndetse n'ibyakubahirizwa n'abahinzi, abohereza mu mahanga n'abapfunyika imbuto za avoka mu ruhererekane nyongeragaciro rujyanye n'ubuhinzi bwa avoka, hagamijwe kuzamura ubumenyi bw'abari muri iki gikorwa kugera ku rwego babasha guhangana ku isoko ryo mu Gihugu ndetse no ku isoko mpuzamahanga.

Avoka yatoranyijwe kubera uburyo ifite amahirwe ari hejuru yo koherezwa mu mahanga. Kuri ubu, avoka yihariye ubwayo 30% y'imboga, imbuto n'indabo byoherezwa mu bihugu bigize Umuryango w'ibihugu by'Uburayi (EU) ndetse no mu bwongereza. Mu rwego rwo gufasha abahinzi n'abohereza mu mahanga bakeneye kwagura ibyerekezo by'isoko, iyi mfashanyigisho ije gutanga imirongo ngenderwaho n'ibisubizo ba rwiyekezamirimo bashobora kwinjiza mu bikorwa byabo kugirango bazamure ubushobozi mu kubungabunga umusaruro nyuma yo gusarura no gushimangira ubwiza kugirango uhuze n'ibyifuzwa n'abaguzi kimwe n'abatumiza avoka mu Rwanda bazohereza ku masoko yo mu bihugu bigize umuryango w'ibihugu by'I Burayi no mu Bwongereza (UK).

Abo iyi mfashanyigisho igenewe: Ba rwiyekezamirimo bato n'abaciritse (SME) bohereza avoka mu bihugu bigize umuryango w'ibihugu by'Uburayi (EU) no mu bwongereza (UK). Iyi mfashanyigisho ikoze kandi yanditse mu magambo yumvikana neza kugirango yumvikanishwe amahame ajyanye no kubungabunga umusaruro wa avoka ndetse no kwita ku bwiza bwawo.

Impugukirwa

Ibiri muri iyi mfashanyigisho cyangwa izindi nyandiko zifashishijwe mu gukora iyi mfashanyigisho ni uruhare rw'impuguke yayikoze, kubw'ibyo ntibigomba gufatwa nk'aho ari murongo bwite wa ITC cyangwa w'Umuryango w'ibihugu by'ubumwe bw'Iburayi.

Uwakoze amafoto: © Benson Shivariro

Gushimira

Ndashimira cyane Umuyobozi Mukuru wa NAEB, Bwana BIZIMANA Claude, Umuyobozi Mukuru Ushinzwe Ibikorwa, Madame URUJENI Sandrine, Umuyobozi Mukuru ushinzwe imali, Bwana NDIKUMANA Andre, ndetse n'ikipe yose ya NAEB ku bufasha bahaye impuguke z'Ishami ry'Umuryango w'Abibumbye ryita ku bucuruzi (ITC) byatumye zikorera mu mwuka mwiza ku buryo byafashije mu gukora isesengura no kwandika iyi mfashanyigisho irebana no kubungabunga umusaruro nyuma yo gusarura. By'umwihariko turashimira Bwana MUNYANEZA Jean Marie Vianney, Umuyobozi w'Ishami rishinzwe ibihingwa bishya ku cyerekezo cyiza afite mu guteza imbere urwego rw'Imboga, Ibuto n'Indabo mu Rwanda, Bwana MUGABUSHAKA Norbert, Madame INGABIRE Gisele, Bwana NSEKANABANGA Fabien ku bumenyi butandukanye badusangije ku birebana na tekiniki zitandukanye zo kongerera agaciro umusaruro ndetse na Eng. RUGANINTWALI Eric, Umuyobozi w'Ishami rishinzwe gukurikirana ubwiza n'ibijyanye n'amabwiriza y'ubuziranenge y'ibyoherezwa mu mahanga bikomoka ku musaruro w'ubuhinzi n'ubworozi muri NAEB kudasangiza ku rugendo rwo gutangiza gushaka icyemezo cy'imikorere myiza (QMS) muri NAEB hamwe n'intumbero ifatanyije n'ishyamba afite ku guteza imbere ubuziranenge mu rwego rw'imboga, imbuto n'indabo. Ubundi bufasha nanone bwatanzwe n'Abikorera bohereza Imboga n'Imbuto mu Mahanga baduhanye amakuru y'ingenzi ku bijyanye n'icyuho kiboneka mu bijyanye no kubungabunga umusaruro wa Avoka ku mirima yabo nk'uko byagiye bigaragazwa ku mirima itandukanye ndetse no ku ma site atandukanye akusanyirizwaho umusaruro.

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Amagambo ahinye yo mu ndimi z'amahanga

BOPP	Biaxially Oriented Polypropylene
BRCGS	Brand recognition through compliance global standard
EAC	East African Community
ETI	Ethical Trade Initiative
EU	European Union
FAO	Food and Agriculture Organization
GAP	Good Agriculture Practices
GHP	Good Hygiene Practices
GLOBAL GAP	Global Good Agriculture Practices
GSFI	Global Food Safety Initiative
HAB	Hass Avocado Board
HACCP	Hazard Analysis Critical Control Points
ITC	International Trade Center
MARKUP	Market Access Upgrade Programme
MRL	Maximum Residue Limit
MSDS	Material Safety Data Sheet
NAEB	National Agricultural Export Development Board
NIR	Near Infra-Red
PPE	Personnel Protective Equipments
PVS	Private Voluntary Standards
RS-HACCP	Rwanda Standard-Hazard Analysis Critical Control Point
SDG	Sustainable Development Goals
SME	Small Medium Enterprises
SNV	Netherlands Development Organization
UAE	United Arab Emirates
UK	United Kingdom
USD	United States Dollar
WHO	World health organization of United Nations

Iriburiro

Ba rwiyemezamirimo bato n'abaciriritse (SMEs) mu buhinzi n'ubucuruzi bw'imboga, imbuto n'Indabo mu Rwanda bahura n'uruhuri rw'ibibazo mu mirimo ijyanye no kubungabunga umusaruro mu gihe cyo gusarura, mu gihe cy'igenamigambi ryo gusarura mu murima, mu kubika umusaruro ndetse no kuwutwara bawerekeza aho utunganyirizwa. Imbogamizi zikomeye zigaragara mu kwita ku musaruro nyuma yo gusarura ahanini niyo soko y'ibihombo biterwa n'umusaruro wangirika mu rwego rwo hejuru bikanagabanya inyungu ibonekamo. Mu gihe ibindi bibazo birebana n'isoko bifite ipfundo mu kutamenya guhangana mu bohereza ibicuruzwa hanze, imbogamizi ba rwiyemezamirimo bato n'abaciriritse bahura nazo ku birebana no kubungabunga umusaruro nyuma yo kuwusarura zishobora gukemurwa n'ubumenyi ku ngamba zo kunoza ukubungabunga avoka ndetse no kugabanya izangirika n'izijugunywa.

Iyi mfashanyigisho iraha ba rwiyemezamirimo bato n'abaciriritse amahirwe yo kunoza uburyo bwo kwita no gucunga umusaruro nyuma yo gusarura hitabwa kuri ibi bikurikira:

1. Impamvu rusange zitera ukwangirika kw'ubwiza bwa avoka
2. Inenge ziza nyuma yo gusarura;
3. Kwita kuri avoka no kumenya ibiyiranga cyangwa ibyo igomba kuba yujuje;
4. Ibisabwa birebana no gusarura avoka, kuzibika neza, no kuzitwara;
5. Amabwiriza akurikizwa n'ibikoresho bikoreshwa mu kwita ku musaruro nyuma yo gusarura.

Urwego rw'ubuhinzi n'ubucuruzi bwa avoka mu Rwanda rufite amahirwe yo ku rwego rwo hejuru yo kongera ingano y'izoherezwa ku masoko yo bihugu byo mu muryango w'ubumwe bw'Ibihugu by'Uburayi (EU) n'Ubwongenerereza (UK) kimwe n'andi masoko mpuzamahanga, kuko agaciro k'ibijyanye n'imboga kuva mu mwaka wa 2014 kugeza muri 2019, byagize izamuka ryo kuva ku madorari ya Amaerika 4,520,000 USD kugeza kuri 39,640,000 USD¹. Mu gihe agace gato muri iri zamuka ariko kavuye kuri avoka, abohereza mu mahanga bakwiye guhera kuri aya mahirwe asanzwe ahari. Kunoza imucungire y'umusaruro ni intambwe imwe mu cyerekezo nyacyo cyatuma ibyoherezwa mu mahanga byiyongera.

¹ FAO STAT. <http://www.fao.org/faostat/en/?#data/TP>. 22 February 2021.

IGICE CYA MBERE

Intangiriro

1.1 Imbibi z'iyi mfashanyigisho n'ibiyikubiyemo

Iyi mfashanyigisho ikubiyemo ibikorwa byo kubungabunga umusaruro nyuma yo gusarura ndetse n'ingamba zo kugabanya umusaruro wangirika ku bahinzi ba avoka hamwe n'abazohereza mu mahanga kuva mu isarurwa, mu kuzibika ndetse no kuzitwara zerekezwa aho zitunganyirizwa mbere yo koherezwa mu mahanga. Iyi mfashanyigisho iragaragaza uburyo bushya bworoheje kandi budahenze ndetse n'ibyabahirizwa n'abahinzi, abohereza mu mahanga n'abapfunyika avoka mu ruhererekane nyongeragaciro rwayo.

Abo igenewe: Ba rwiyemezamirimo bato n'abaciriritse (SME) bohereza avoka mu bihugu bigize umuryango w'ubumwe bw'uburayi n'ubwongereza ndetse no mu bindi bihugu bitandukanye.

Ubwoko bw'imbutu ivugaho: Avoka (*Persea americana*) mu rurimi rwa gihanga, ni igihingwa gitanga imbuto cyo muri Afurika yo hagati ifite amoko menshi harimo "Hass", "Fuerte", "Entttinger" na "Pinkerton" zihingwa mu Rwanda zikoherezwa ku masoko mpuzamahanga atandukanye. Avoka yatoranyijwe kubera ko ikenewe cyane henshi ku isi, bityo ikaba igihingwa cy'ingirakamaro mu kuzamura urwego rw'imbutu, imboga n'indabo mu Rwanda. Muri iki gihe, igize 26% y'ibyoherezwa ku masoko mpuzamahanga atandukanye na ba Rwiyemezamirimo bato n'abaciriritse, aho iza ikurikiye imiteja, hakaba hariho na gahunda yo kuzamura isoko ryo mu bihugu bigize umuryango w'ibihugu by'uburayi n'Uburasirazuba bwo hagati.

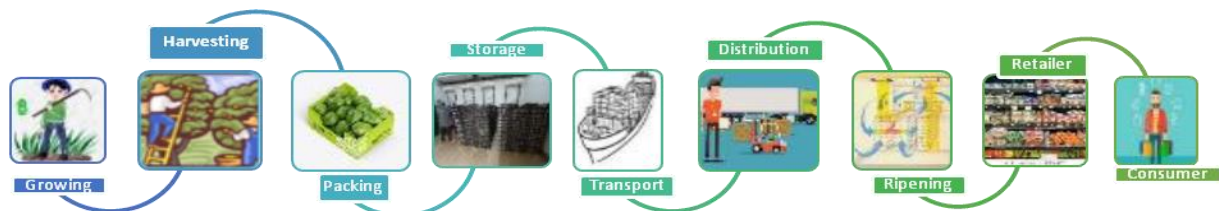
N'ubwo bimeze bityo, abohereza avoka mu mahanga kuri ubu baracyahura no gutakaza umusaruro nyuma yo gusarura byo mu rwego rwo hejuru ku kigereranyo cya 40% by'umusaruro (Raporo ya NAEB YA 2018). Impamvu nyamukuru ni ukutuzuzwa ubwiza busabwa, bituma umusaruro mwinshi wa avoka ugurishwa ku isoko ry'imbere mu gihugu kuko uba washyizwe mu cyiciro cya kabiri utujuje ibisabwa. Kubera kutagira ingamba zihanye zo kuzitunganyamo ibindi bintu nko kuzikuramo amavuta, kutagira inganda zikora ibintu bihita biribwa n'izindi mpamvu zitandukanye, bituma ingano y'ibyoherezwa mu mahanga ikomeza kuba hasi.

Mu rwego rwo kuzamura inyungu yose ku bahinzi, abahoreza avoka mu mahanga n'abazitwarayo bakeneye kugera ku bwiza bukenewe n'abaguzi, haba inyuma ndetse n'imbere, hakurikijwe ibyo igomba kuzuzwa ndetse n'amabwiriza yo kuyitaho kuri buri rwego. Ibi ni ibintu by'ingenzi kugirango ubungabunge urugero rw'ubwiza rwemerwa ruba rwarashyizweho n'abaguzi hamwe n'abaryi.

Kubera ko buri wese mu bagira icyo bakora muri uru rwego afite uruhare ku buryo ibikorwa bye bigira uruhare mu bwiza rusange bw'imbutu, uburyo bwiza n'ibikorwa bikwiye mu kuzitaho nabyo byongera uburambe bw'imbutu, kubw'ibyo bigatera ingaruka nziza ku bukungu burambye bw'uru rwego rw'imbutu.

Ubushyuhe nabwo ni ikintu cyo kwitondera mu ruhererekane rwa avoka, kubw'ibyo, ubwiza bw'imbutu bugenwa n'imikorere y'ibikoresho ukoresha, ibikorwa by'abakozi, uko imbuto zari zimeze mu gihe zisarurwa n'uburyo uzitaho nyuma.

Iyi mfashanyigisho irasobanura ibikorwa, amabwiriza n'uburyo bwo kuzibungabunga bukwiye kuri buri rwego nyongeragaciro rwa nyuma yo gusarura kugirango usigasire ubwiza. Uburyo buboneye bwo kubungabunga avoka mu ruhererekane nyongeragaciro rwayo bukurikiza izi ntambwe zigaragara mu ishusho ya 1 ikurikira.



Ishusho ya 1: Uruhererekane nyongeragaciro rwa avoka zoherezwa hanze/Intabwe zigize uruhererekane rwa avoka zoherezwa mu mahanga

Gahunda yo kubungabunga ubwiza ni ingenzi cyane mu gutanga icyizere cy'ubwiza, hanyuma n'ubuziranenge bw'ikintu ni igice nyamukuru mu bikorwa bya buri muni bwo gucunga ibintu. Ni ngombwa rero ko ibice byose bigize uruherekane (Ishusho ya 1) bica mu cyiciro cy'ubukangurambaga ku bintu by'ingenzi bifite uruhare mu kugabanya ubwiza ku bintu byasaruwe.

Guhahana amakuru ku bwiza mu ruhererekane nyongeragaciro runaka ni ingenzi cyane hamwe no guhanahana amakuru ku byitonderwa nyamukuru kuri buri rwego kugira ngo habeho icyizere cyuzuye ko imbuto zatunganyijwe hakurikijwe amabwiriza n'ibisabwa. Imicungire y'aho imbuto zitunganyirizwa isaba kugira igenamigambi ku birebana no guhangana imikorere idahwitse yo kudakurikiza amabwiriza aba yarashyizweho nko guzitwara, guhisha kwazo, ibyuma bikonjesha zibikwamo, kuzisarura, ndetse n'amabwiriza y'isuku.

Abakozi babikoramo buri gihe bakwiriye guhugurwa ku kamaro k'ibyo bakora n'isano bigira ku kubungabunga ubwiza busabwa n'abaguzi. Imyumvire y'abakozi kuri avoka, cyane cyane ku byiciro bikomeye cyane kandi bigoye nko gupakira, kohereza mu mahanga, gucuruza ku bakiriya batandukanye kandi bakenera ibitandukanye niryo pfundo ryo kugera ku iterambere ry'ubucuruzi rirambye.

1.1.1 Amoko ya avoka n'ibiyaranga

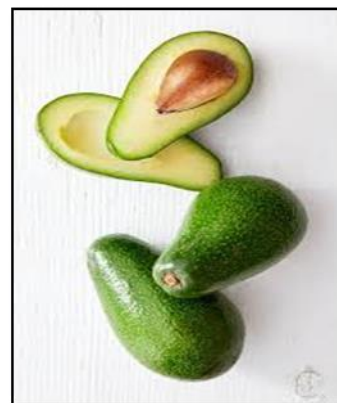
Hariho amoko menshi ya avoka ahingwa akanoherezwa mu mahanga, ariko amasoko y'Umuryango w'ibihugu by'uburayi /Ubwongereza n'Uburasirazuba bwo hagati akunze ubwoko bwa "Fuerte" na "Hass", iyi mfashanyigisho igarukira ku moko ya "Fuerte" na "Hass" kubera ko ariyo asabwa cyane ku isoko ugereranyije n'andi moko ahingwa mu Karere.



Ishusho ya 1: Ubwoko bwa avoka bwa bwa "Hass"²



Ishusho ya 2: Ubwoko bwa Avoka bwa "Fuerte"³



Ishusho ya 3: Ubwoko bwa Avoka bwa "Ettinger"⁴

Imbonerahamwe ya 1 Iby'ingenzi rusange biranga avoka zihingwa mu Rwanda zoherezwa mu mahanga

Izibiranga	Hass	Fuerte	Ettinger
Aho ikomoka	Gwatemala	Imvange ya Megizike-Gwatemala	Kefari Malali-Isiraheri
Ishusho	Ishusho iburungushuye	Ishusho ya Puware ikiri icyatsi	Ishusho ya Puware ndende
Uruhu rwayo iyo yeze	Uruhu ruriho uduhuri duhinduka ikigina cyijimye iyo yeze	Uruhu ruguma ari icyatsi iyo yeze	Uruhu rw'icyatsi runoze
Imiterere	Kunurira nk'ukwa shokola	Yihariye	Imizi mike
Amavuta ayigize	18-23%	16-25%	18-22%
Ibiyigize hatarimo amazi	>21%	>23%	ND*
Intera hagati y'ibiti mu Rwanda	7m x 7m,	7m x 7m	7m x 7m

² Inkomoko: <https://www.indiamart.com/proddetail/organic-hass-avocado-20082838673.html>

³ Inkomoko: <https://www.louiesnursery.com/plants/avocado-trees/fuerte-avocado/>

⁴ Inkomoko: <https://www.goodeggs.com/sfbay/goodeggsproducesfbay/organic-large-ettinger-avocado-trio/5fd7bdeabe6089000e90c420>

Intera hagati y'ibiti ku rwego mpuzamahanga (IR*)	7m x 8m	8m x 10m	7m x 8m
Ibindi	Ifite ubwiza buhebuje	Yihanganira ubukonje	Itwarika neza

Aho byakuwe: Avocado growing in Kenya by Jurgen Griesbach -2005, ND= Bidafite inyandiko byakuwemo, IR*=Ibwiriza mpuzamahanga*

Amenshi mu moko ya avoka y'ibyimanyi aba yarabanguriwe nka "Hass" na "Fuerte" atangira kuzana imbuto nyuma y'imyaka itatu kugera kuri ine nyuma yo guterwa, ariko umusaruro ugaragara wacuruzwa muri rusange utangira kuboneka nyuma y'imyaka itandatu y'ubukure. Avoka zitabanguriye zishobora zo kumara igihe kirekire kugera ku myaka icumi (10) no kurengaho mbere y'uko zitangira kwera.

Imfashanyigisho igaruka kandi ikerekana mu buryo bworoshye kumva mu gice cy'amashusho hagamijwe gufasha abari muri iki gikorwa kumva imirogo ngenderwaho itandukanye ituma umuntu abasha kumva ihame nyamukuru ryo kwita kuri avoka no kubungabunga ubwiza bwayo.

IGICE CYA KABIRI

Ibintu bitera kwangirika k'ubwiza bwa Avoka nyuma yo gusarurwa

Ingingo z'ingenzi zibandwaho: Iki gice giha umusomyi ubukangurambaga bwa tekini ku bintu bitandukanye bitera kwangirika k'ubwiza bwa avoka, aho ibyo bintu bikomoka ndetse inkomoko y'ibyo bibazo n'ingaruka bishobora kugira ku musaruro.

Ibintu bitera kwangirika kw'ubwiza bwa avoka (izituruka ku bidafite ubuzima n'izituruka ku bifite ubuzima): Impamvu zitera kwangirika kw'urubuto muri rusange zirimo izituruka ku bidafite ubuzima n'izituruka ku bifite ubuzima.

2.1 Impamvu zituruka ku bintu bidafite ubuzima

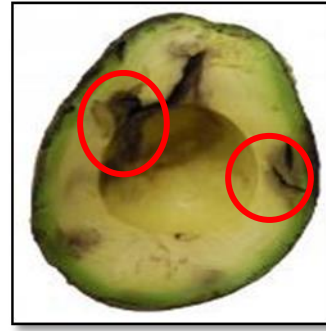
2.1.1 Impamvu zituruka ku bikoreho bikorehwa ku musaruro-Kwangirika guturuka ku bakozi n'ibikoreho bakoresha

Imbutu zangirika bitewe n'ikintu kizikubise biturutse mu buryo bwakoreshejwe mu kuzihanura mu giti, gukubana ubwazo ziri mu mufuka cyangwa kuzikobora ubwawe mu gihe uzitunganya, ukwangirika gutewe n'ibintu gushobora kwigaragaza mu ishusho yo gucika ibikomere cyangwa guhinduka kw'uruho bikazamura imihumekere y'urubuto, gutakaza amazi, gusohora etilene no gutuma hinjira za mikorobe ahakomeretse cyangwa ahakaswe. Uku kwangirika kwangiza intungamubiri, uburambe ndetse n'uburyohe bw'umusaruro. Kuri Avoka, kwangirika guterwa no gukoresha ibikoreho bitujuje ubuziranenge mu gihe cyo gusarura harimo imifuka y'amagunira, kuzirunda nabi, kuzitwara nabi, gushyira umusaruro mwinshi mu kintu kimwe n'ibindi byinshi.

Impamvu zituruka ku bintu zangiza avoka: Muri rusange kwangirika biterwa no gukorwaho, gutsindagirwa, kwikubanaho no kwicugusa.



Ishusho ya 4: Avoka zasaruriwe mu ikureti ariko yujujwe cyane – Kwangirika kw’imbuto guturuka ku kugerekaho indi kureti hejuru. (Ishusho ya © Shivachi)



Ishusho ya 7: Kwangirika kw’imbere mu rubuto kwatewe no gutsindagirwa (Ishusho © Shivachi)



Ishusho ya 6: Avoka zipanze neza mu ikarito-avoka zarinzwe kwangirika (Ishusho © Shivachi)



Ishusho ya 8: Uburyo bubi bwo gutwara avoka mu ikamyoneti idatwikiriye bigatera imbuto kwangirika kuzanwa no kwikanda no kwitsindagirana ho ku ziri mu gice cyo hasi ahapakirwa mu ikamyoneti ©Aden



Ishusho ya 9: Avoka zipakiye neza mu ikureti zitujujwe cyane (Ishusho © Shivachi)



Ishusho ya 10: Ikureti ngari ishobora gukoreshwa ariko ntiyuzuzwe kugeza ku mutwe kugirango wirinde ukwangirika guterwa no kwitsindagirana ho (Ishusho © Shivachi)

Icyitonderwa: Ukwangirika gutewe n’ibintu gushobora guterwa no gukorwaho (uburyo butanoze bwo gusarura nko kuzihanura hasi ziva hejuru cyane mu gihe usarura cyangwa uzipakira), kuzikanda, kuzikuba cyangwa kuzicugusa.

2.1.1.1 Ukwangirika guterwa no kwitsindagira: Ibi bibaho iyo umusaruro uwugeretseho ibintu biremereye, haba harimo cyangwa hatarimo kunyeganyega. Iyo icyo washyizemo umusaruro ugerekeranye ku buhagarike burebure, wapakiye cyangwa wapanze nabi umusaruro bituma uburemere wikoreye butera gutsindagirwa cyane ku byo wabanje hasi (Kuri avoka koresha amakureti y’ubwoko bwa jambo), gupakiramo byinshi, umusaruro washyizwe mu bintu bitujuje ubuziranenge nk’imifuka y’amagunira. Igihita kibaho ni ukumeneka, kwiyasa kw’umusaruro no gusadukamo. Kugirango ugabanye

uku kwangirika wakoresha amakureti manini (Jumbo) kugirango utware umusaruro mu gihe na none kandi upakira ku rugero rudakabije kugirango wirinde gutsindagirwa n’uburemere bw’ikureti iri hejuru.

2.1.1.2 Kwangirika guturuka gukoboka: Ibi bibaho iyo uruhu rw’igisarurwa kimwe rwikubye ku kindi bigatera gukoboka. Bishobora gutera kuvaho kw’uruhu rw’inyuma cyangwa agahu gakurikiyeho. Kuri Avoka, umuyaga wagaragajwe nk’uteza ibi bikomere bigaragara inyuma ku rubuto kubera uko guhuha kw’umuyaga. Gukoresha ibiti bitangira umuyaga ku muzenguruko w’umurima biba bikenenewe kugirango ugabanye ubukana bw’umuyaga.

2.1.1.3 Kwangirika guterwa no gukorakorana: Ubu buryo bwo kwangirika bubaho iyo habayeho kukubitana ku byasaruwe ubwabyo cyangwa kw’ibysaruwe byikubise ku kindi kintu gikomere cyangwa se biri ku muvuduko munini cyangwa byagabanyije, urugero nk’iyo igisarurwa cyituye hasi, gitanga ijwi rikurikirwa no kwangirika kw’igishishwa cyangwa se ntikinangirike. Ubu bwoko bwo kwangirika kuba guturutse ku kutubahiriza ibisabwa mu gusarura no gupakira mu modoka.

Kugirango wirinde ibi, ugomba gusarura avoka ukoresheje ibikoresho byagenewe gusarura nk’ingazi cyanwa urwego. Ntukazunguze igiti cya avoka na rimwe mu gihe ushaka ko zihanuka hejuru. Umusaruro ugomba gushyirwa mu makureti no mu modoka zabugenewe mu gihe cyo gupakira.

2.1.1.4 Kwangirika guturutse ku kwicugusa: Ni buryo bwo kwangirika bufitanye isano no gutwara umusaruro bukaba bubaho iyo utwara umusaruro mu muhanda uwucekagura bya hatu na hatu mu muhanda utameze neza mu gihe kirekire. Gucugusa umusaruro bishobora gutera iyangirika ritewe no kwitsindagira, kwikubana, cyangwa gushishuka. Kubirwanya, ugomba kugerageza kuringaniza neza umuhanda ujya ku murima ukavanamo ibinogo kugirango ugabanye ukwangirika guterwa no kwicugusa kw’imodoka, ugomba na none kureba amarasoro n’uburyo butuma imodoka igenda hasi bumeze neza (Suspension). Gupakira bigomba gukorwa mu buryo bwiza ku buryo amakureti arimo umusaruro aba ateretse neza ku buryo nta kunyeganyega cyangwa kwicugusa biza kubamo mu gihe cyo gutwara umusaruro.

2.2 Impamvu ziterwa n’imiterere y’ikirere

Imiterere y’ikirere nk’umuvuduko w’umuyaga n’ubushyuhwe bigira uruhare ku bwiza bw’umusaruro binyuze mu mihumekere, ikorwa rya etilene no gutakaza amazi mu mikurire y’igihingwa

Ubushyuhwe bwinshi n’ububobere bwo hasi byongera uburyo bwo gukora cyane mu biribwa bigatera ugutakaza amazi kwabyo. Kugirango wirinde ibi, gukonjesha umusaruro ku gihe kigenwe ndetse no kuwugumisha mu bubiko bufite ubuhehere bwinshi nibwo buryo bukoreshwa mu kwitondesha umuvuduko ikiribwa kibisi gikoresha cyane ibikigize bityo kikamara igihe kitari cyangirika bigatuma kiramba.

2.3 Impamvu zituruka ku bifite ubuzima

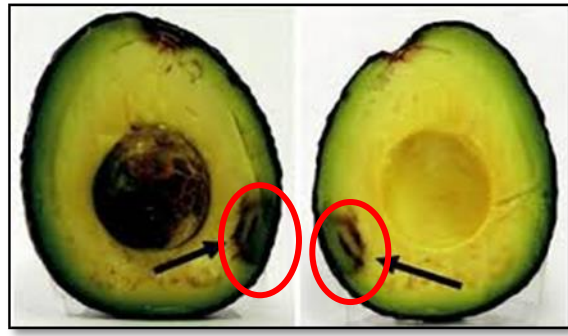
Avoka yangizwa cyane n’utunyabuzima tubaho harimo mikorobe, uduhumyo, bagiteri, udukoko na za virusi ibi byose bikaba bibarwa nk’ibituruka ku binyabuzima.

2.3.1 Ibiterwa n’Utunyabuzima duto (Uduhumyo, Bagiteri, Udukoko na Virusi mu gihingwa)

Utunyabuzima duto nitwo soko ya mbere y’ukwangirika kw’imbuto. Inyinshi mu ndwara zifata umusaruro w’imbuto nyuma yo kuzisarura ziterwa n’uduhumyo. Indwara zigabanya ubwiza bw’umusaruro bigatera igihombo gikomere ku bahinzi. Ugomba kumenya ko indwara nyinshi ziboneka mu musaruro nyuma yo kuwusarura ziba zarawufashe mbere yo gusarurwa. Gufatwa n’indwara kw’umusaruro bishobora kuba mbere yo gusarura cyangwa nyuma yo gusarura iyo amabwiriza y’ubuhinzi adakurikijwe neza. Kwandura mikorobe bishobora kubaho bitewe no gukoresha uburyo budakwiye mu kwita ku igihingwa mu murima, bitewe n’abakozi cyangwa se umusaruro wahuye n’igitaka cyangwa wakoze ku kintu cyose cyanduye. Ibintu bisarurirwamo nabyo bishobora kuba byandujwe n’utuzinga twa mikorobe bikaba byaba isoko yo kwandura indwara ku musaruro kandi wo wari muzima. Kubera iyo mpamvu, kubungabunga ubwiza bw’umusaruro bisaba kwita ku byawanduza mu murima ariko ukanita ku byawanduza nyuma yo kuwusarura.



Ishusho ya 11: Ibibumbe by'ibara ry'umweru n'ikigina (*Sclerotinia sclerotium*) muri avoka⁵



Ishusho ya 12: Indwara y'Akaribata muri avoka⁶

Ni byiza kwita ku isuku ku rwego rw'umurima kugirango ugabanye isoko yo kwangirika itewe na za mikorobe, harimo ugusukura ibikoresho bisarurirwamo no gutera umuti mbere yo gusarura mu rwego rwo gukingira cyane cyane urwanya ko umusaruro ufatwa n'uduhumyo.

Ingamba zo kwirinda

- Kwirinda gutakaza ubwiza guturutse ku kwanduzwa n'utunyabuzima bisaba gukaza isuku n'isukura ku murima.
- Gukoresha ibikoresho bisarurirwamo n'ibyo kubikamo umusaruro bisukuye.
- Abasarura bagomba kwisukura buri kanya bakoresheje umuti usukura ibiganza ukoze muri arukolo.

2.4 Impamvu zituruka ku buzima bw'igihingwa (Guhumeka, Gututubikana, Ibibera mu gihingwa imbere bisohora etilene)

Impamvu zitera kwangirika kwa Avoka zidaterwa n'utunyabuzima zituruka na none ku bidafite ubuzima nazo zirimo izituruka ku mikorere y'igihingwa, guhumeka cyangwa urunyurane rw'ibinyabutabire bibera imbere mu gihingwa nazo zishobora kwangiza umusaruro.

2.4.1 Ibijyanye n'imikorere y'ibigize igisarurwa

Imbuta za avoka zisarurwa zigizwe n'ingirangingo zifite ubuzima. Mu gihe cyo gusarura, igice ukata kiba gitandukanyijwe n'igice cyakigaburiraga. Igice cyasaruwe kiba kigomba gukomeza kubaho kibeshejweho n'ibigitunga kiba cyarabitse bigizwe n'itungagihingwa n'amazi. Ukugabanyuka kw'izo ntungagihingwa kiba cyaribikiye binyuze mu guhumeka no gutakaza amazi binyuze mu gututubikana bituma ubwiza butakara ndetse ikiribwa kigatangira guhangayika. Uko guhangayika bw'ikiribwa butera ikorwa rya Etilene ku rwego rwo hejuru noneho ikiribwa kigatangira guhisha utabishaka nk'ikimenyetso cyo gusaza bihita binatera ukwangirika kw'ubwiza bwacyo mbere y'uko kigera ku isoko.

Ubukangurambaga bw'ibanze ku mibereho y'icyasaruwe nyuma yo gusarurwa ni ingenzi cyane mu rwego rwo kumenya uko usigasira ubwiza bwacyo ukanacyongerera igihe kimara kitarabasha kwangirika.

2.4.2 Uguhumeka

Guhumeka bifatwa nko gucagagurika kw'ibitungagihingwa cyari cyarabitse (Carbohydrates) bikavamo Karubone ivanze n'amazi (Carbone dioxide), amazi n'ubushyuhe bikoze kubera hari umwuka.

⁵ Inkomoko: <https://www.quora.com/Is-it-bad-to-eat-an-overripe-avocado>

⁶ Inkomoko: <https://www.postharvest.biz/en/news/nca-ratios-in-the-skin-of-unripe-avocado-fruit-at-harvest>

Ingaruka z'uku kugabanya umwuka cyangwa kongera urugero rwa gazi karubonike "CO₂" (Urugero nk'iyi ufungira, utwikirira cyangwa ubika ahantu wahinduye ibisanzwe bigize ikirere cyaho) guhumeka biragabanyuka, bigatuma bwa bwiza bw'ikiribwa butinda kwangirika na cya kiribwa kikamara igihe kitarangirika. Mu gihe nyamara, umwuka muke cyane na gazi karubonike iri ku rwego rwo hejuru bitera uguhumeka kudakoresheje umwuka (gutara) bigatera akavuyo mu mikorere y'ubuzima bw'ikiribwa no gukariha (gutakaza uburyohe bwacyo) bigatera kugabanyuka kw'uburambe bwa cya kiribwa.

Ubwikorezi bwo mu Nyanja bw'igihe kirekire muri kontineri bukoresha ubuhanga bwo kugenzura ikirere cy'imbere muri kontineri (controlled atmosphere) nk'uburyo bwizewe bwo kubuza umusaruro guhisha ku rwego rushimishije.

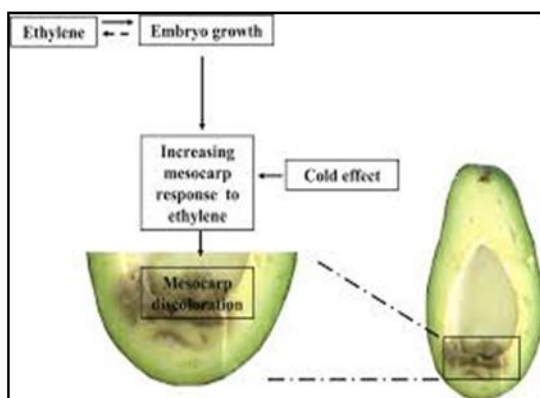
2.4.3 Ingaruka zo kudacunga uguhumeka kwa avoka

- Uguhumeke kwihuse guteza ibihombo by'umusaruro mu buryo bw'ibiro, kwangirika kw'ubwiza, gutakaza imisusire n'uburyohe bwa Avoka.
- Avoka kimwe n'izindi mbuto zirahisha nyuma yo kuzisarura, zigira igihe gisheruka cyo guhumeka byo ku rwego rwo hejuru mbere y'uko zisaza cyangwa mbere ko ubwiza byayo bwangirika burundu, niyo mpamvu guhumeka kwazo kugomba gukurikiranwa nyuma yo kuzisarura.
- Uko ikiribwa gihumeke cyane niko n'ubwiza bwacyo bwangirika ni nako kandi uburambe bwacyo buba bugufi.

2.4.4. Ikorwa rya etilene ritacunzwe neza

Etilene (C₂H₄), ni imvubura yo mu rwego rwa gaze itangiza kandi ikihutisha guhisha kw'ikiribwa binyuze mu guhindura ibara aribyo gutangira gupfa bwacyo. Ingirangingo zose z'ibihingwa zisohora Etilene ku rwego rutandukanye. Imbuto zikora Etilene nyinshi ugereranyije n'imboga, ariko imbuto zihisha zigirwaho imbaraga cyane na Etilene ariyo mpamvu utagomba kuvanga imboga n'ibindi biribwa bigira Etilene nyinshi nk'Imineke, Amatunda, avoka n'izindi mbuto.

Iyo avoka zishyizwe umwanya munini aho ihura na Etilene ihita ihisha, urwanya isohoka rya Etilene n'ingaruka igira mu kwihutisha guhisha bikorwa uzikonjesha by'ibanze ukizivana mu murima hanyuma na nyuma ukayibika mu byumba bikonjesha biri ku bushyuhe bwa dogere 5 kugeza kuri dogere 8.



Ishusho ya 13: Ingaruka za Etilene kuri avoka zabitswe⁷



Ishusho ya 14: Avoka zahishije ziri mu bubiko bitewe no kudacunga isohoka rya etilene bigatera gutangira guhisha zikiri mu bubiko zitarapakirwa © Shivachi

Kuvangura umusaruro ukurikije urwego buri bwoko busohoramo etilene ni ngombwa cyane, ukurikije ibisohora etilene nyinshi, ibisohora iringaniye n'ibisohora nkeya. Mu bubiko buteye imbere, cyangwa mu gutwara umusaruro ku ntera ndende nko mu Nyanja, ugomba gukoresha imiti imira etilene (Potassium permanganat (KMnO₄)) cyangwa ibuza Etilene gukora (Methylcyclopropene cyangwa 1-MCP).

⁷ Inkomoko: https://www.researchgate.net/figure/Working-model-describing-the-interactive-effects-of-ethylene-cold-stress-and-embryo_fig8_23983113

2.4.5 Ugututubikana

Gututubikana, ni uburyo icyasaruwe gitakazamo amazi binyuze mu gukora kw'ingirangingo zikigize bihura na none no gusohora amazi agahinduka umwuka (evapotranspiration), aho amazi ahinduka icyokotsi cy'umwuka bikoze n'ubushyuhe. Ibyasaruwe bitakaza amazi bitewe no kuzamuka kw'isunika ryo mu ngirangingo z'ibyasaruwe mo imbere ugereranyije n'isunika ririri mu kirere. Uko ubuhehere bw'umwuka buri hasi niko n'umwuka urushaho kuma, ni nako kandi gutakaza amazi nabyo bizamuka ku rugero rwo hejuru binyuze mu gututubikana.

Uretse kuba byangiza ubwiza bw'umusaruro kubera ko bigabanya uburambe bwawo, imisusire ndetse n'uburyohe, gutakaza amazi binagabanya uburemere bw'umusaruro wari bugurishe bigatera ibihombo biri hejuru ya 5%, iki kikaba ari igihombo kinini kinatera kunamba kw'ibyasaruwe.

Ibihingwa bifite uburyo bwinshi bwo kwirwanaho ngo bidatakaza amazi, aha harimo agahu kagabanya gututubikana. Ibi nibyo biba ku bwoko bwa avoka bufite ubwo buryo bwo kubuza gutakaza amazi bituma ibasha kumara igihe kirekire ugereranyije n'andi moko afite urugero rwo hasi mu kubuza uku gutakaza amazi.

Kugirango ugabanye gututubikana (gutakaza amazi), ugomba kuzamura ubuherere bwo mu bubiko ubitsemo ibyasaruwe kuri 85-90% ukanagabanya ubushyuhe bubikikije, ibi bihita bikora urukuta rubuza amazi gusohoka bityo ukaba ubujije ibyasaruwe gutakaza amazi.

Imbonerahamwe ya 2 Urugero rw'igipimo cyo kubora ku mbuto zitandukatandukanye

Urwego rwo kubora		
Igihingwa	Igipimo cyo kubora	Igihe icyasaruwe gishobora kumara
Inkeri, Buruberi	Hejuru cyane	Munsi y'ibyumweru 2
Avoka, Sereri, Inanasi, Inyanya	Hejuru	Ibyumweru 2-4
Indimu, Watameloni n'imyembe	Kiringaniye	Ibyumweru 4-8
Pome puware	hasi	Ibyumweru 8-16
Imbutu zumishijwe	Hasi cyane	Ibyumweru 16-36
Imbutu zakonjeshejwe ku bukunje bwo hasi cyane	Hasi by'indengakamere	Hejuru y'ibyumweru 52

2.5 Ibibazo bituruka ku byonnyi-Uruhare rw'udukoko

Impungenge ziri ku isi yose ku bigendaye no kwangiza ubucuruzi bitewe no kwinjiza udukoko tuzanye n'ibiribwa zatumye hashyirwaho ingamba zikaze ku bafatanyabikorwa benshi bo mu bucuruzi. Amabwiriza y'Umuryango w'ibihugu bw'Uburayi asaba igenzura rikaze ku bijyanye n'ubuziranenge bw'ibihingwa kugirango birinde ko hakwinjira udukoko, bakoresheje inzira nyinshi mu gucunga ndetse no kukumira iyinjira ry'udukoko twangiza.

Umubare munini w'ubwandu bw'udukoko ku mboga ubaho byaba mbere na nyuma yo gusarura, bigatera igihombo gikomeye cyo mu rwego rw'ubukungu. Umuryango mpuzamahanga w'Ubucuruzi (WTO) utangaza ko amoko agera kuri 750,000 y'udukoko azwi, muriyo, angana na 450 abarwa nk'ateye ikibazo gikomeye. Ibyonnyi byangiza umusaruro w'imboga ku rwego rwo hejuru iyo bikiri bitoya, ni ukuvuga bigeze ku rwego rw'urunyo (Larva). Muri byo, amasazi yangiza imbutu (*tephritidae*) niyo yangiza ku rwego rukabije, mu kiciro cy'amagi no mu gihe cy'ibinyagu (larvae) muri iki gihe ntubasha kuyabona kandi abasha kwihanganira ubukunje bwo hasi mu gihe imbutu zoherezwa mu mahanga muri rusange buba bwashyize kuri dogere 5-8°C bituma bigorana kuyirandura burundu. Amabwiriza yo gukonjesha yashyizweho kandi agaragara nk'ayabasha kurandura amasazi yangiza imbutu akiri ku cyiciro cy'amagi, urunyo ku cyiciro cya gatatu, ariko na none bigasaba kugumisha ku bukunje bwo hasi kuri 1.5°C cyangwa hasi yaho mu gihe kingana n'iminsi 18 (Were et al, 2020) bikaba bitera kwangirika

kw'imbuto bityo bikaba bitifuzwa. Mu tundi dukoko twangiza harimo utwitwa "spider mites", Tiripusi na "false codding moth" (*Thaumatotibia leucotreta*).

2.5.1 Uburyo bwo kubirinda no kubirwanya

Kugenzura ibyonnyi mu musaruro nyuma yo kuwuvana mu murima bisaba gukoresha imitego ifata ibyonnyi, kuwukonjesha, gukoresha utunyabuzima turya utwo dukoko, kuwuhata karubone irimo amazi ku rwego rwo hejuru cyangwa ugakoresha imirasire aho bishoboka (Irradiation). Uburyo bwo kurwanya ibyonnyi ukoresheje imiti bigomba kwirindwa nyuma yo gusarura, bigakorwa gusa mbere yo gusarura nabwo ukubahiriza igihe gisabwa hagati yo gutera umuti no gusarura nk'uko biba bigaragara ku kirango cya buri muti.

IGICE CYA GATATU

Ubusembwa nyuma y'isarurwa bukunze kuboneka kuri avoka

Ingingo z'ingenzi zibandwaho: Iki gice kiraha abasomyi ubumenyi ku busembwa bukunda kuboneka kuri avoka nyuma yo kuzisarura, ibyangirika ndetse kikanagaragaza uburyo bworoshye bushobora gukoreshwa mu kubirwanya kugirango ubone ubwiza bw'imbutu buhuje n'ibisabwa ku isoko.

3.1 Ubwiza bwa Avoka

3.1.1 Koroha k'urubuto

Gukanda urubuto nibwo buryo bukunze gukoreshwa kugirango umenye uko urugero rw'ubworohe bw'urubuto, gusa ubu buryo bugendera ku byiyumviro (Amarangamutima), uburyo bugerageje kwizerwa kurushaho ni ugukoresha igikoresho cyitwa "penetrometer" nibwo butanga ibisubizo byiza. "Penetrometer" (ishusho ya 15) igenewe kwinjizwa mu rubuto ukurikije imbaraga ziba zakorehejwe mu gutsindagira.

3.1.2 Uburyo bwo gupima ubworohe bw'urubuto ukoresheje "penetrometer"

- Guhitamo ahantu ku murongo uganya urubuto mo kabiri.
- Kuvanaho igishishwa cy'inyuma (exocarp) ukoresheje urwembe cyangwa icyuma.
- Gushyiraho umutwe wa "penetrometer" ha hantu wavanyeho igishishwa ku rubuto, gahoro gahoro sunika ako kuma ufasha wa mutwe kwinjira neza mu rubuto.
- Kugeza aho umurongo wo ku mutwe ugera mu gice cy'urubuto kiribwa wandike imibare y'ubwitsindagire (pressure) igaragara ku kamashini.
- Ku itsinda runaka ry'imbutu hagenda habaho ugutandukana kw'imibare y'ubwitsindagire (pressure) bw'imbutu ziri mu ikarito imwe cyangwa se ku ipareti imwe ariyo mpamvu hagomba gufatwa ibipimo byinshi hanyuma hagakorwa impuzandengo.
- Impuzandengo itanga ishusho y'ubworohe bwa rya tsinda ry'imbutu ryapimwe. Mu rwego rwo gutanga umurongo, imbonerahamwe iri hasi itagaragaza ibyiciro by'ubworohe hakurikijwe ibisabwa ku isoko n'uburyo buhari mu bwikorezi.

Imbonerahamwe ya 3 Ibyiciro by'ubworohe bw'imbutu

ICYICIRO	IMPUZANDENGO YATANZWE NA "PENETROMETER" (PSI)	Icyo isoko ryifuza	Uburyo kutwara byoroshye
Ikomeye cyane	Hejuru ya 25	Abadandaza/Abaranguza	Mu bwato mu Nyanja mu buryo icyo zirimo gicunzwe neza (under CA)
Ikomeye	15-25	Abaranguza/Abadandaza	Mu bwato mu Nyanja mu buryo icyo zirimo gicunzwe neza (under CA)
imenagurika	10-15	Abadandaza	Kuzitwara mu ndege ubushyuhwe bugenzurwa neza
Ikomeye-Ihishije	5-10	Zakonjeshejwe cyane/ubudadandaza ahari izihita ziribwa	Mu bwato mu nyanja
Ihishije byo kuribwa	Munsi ya 5	Zakonjeshejwe cyane	Mu bwato mu nyanja

CA= Mu buryo bubucunzwe neza (Controlled atmosphere)- Umwuka washyizwe kuri ibi bipimo ($O_2=3\%$, $CO_2=6\%$)

(Inkomoko: California avocado association 2005)



Ishusho ya 15: “penetrometer” ikoreshewa mu gupima ubworohe bw’urubuto (ishisho: Shivachi)

3.2. Inenge iturutse ahandi

3.2.1 Kubaburwa n’izuba

Kubaburwa n’izuba bigaragara nko gukoboka, gukomera cyangwa gukubitwa kw’uruho muri rusange ruhinduka ibara ry’umuhondo ku ruhande rumwe kugeza ku gutukura kwijimye cyangwa se umukara bitewe n’ubukana izuba ryari rifite n’igihe avoka zamaze ku zuba. Bikunze kugaragara ku ruhande rumwe werekera ku nkondo bitewe no kuba ku zuba igihe kirekire kwa avoka. Uku kwangirika kw’igishishwa gukomeza n’imbere muri avoka bikaba byagera ku kibuto bigatera kwera nabi. Ubu busebwa bukunze kuboneka ku mbuto zo ku mutwe w’igiti cya avoka aho amababi aba adatwikiriye ari menshi.



Ishusho ya 16: Igice cyabaye umuhondo/ubushye kwatewe n’izuba ©Shivachi



Ishusho ya 17: ubushye bwatewe n’izuba bugaragara nk’ikizinga cy’ikigina: © Shivachi

Uburyo bwo kubyirinda

Gukora ku buryo amababi aba atwikiriye umurima neza kugirango ugabanye ubukana bw’izuba ku mbuto ziri mu giti biterwa no kuba wakase cyane amashami mu murima ukarenza urugero.

3.2.1.2 Kwangirika k’utwenge two ku gishishwa

Ni utwenge tuba turi ku gishishwa cya avoka dufite umumaro wo gutuma imyuka ibasha kwinjira no gusohoka mu rubuto rwa avoka, ni ukuvuga ko dutuma habaho ihererekanya ry’imyuka hagati yo hanze y’urubuto n’igihe cy’imbere mu rubuto. Ukwangirika kw’iyo myenge kugaragararira mu kuba twabaye umukara ndetse twashwanyagutitse. Ukwangirika kw’utu twenge bikunda kuboneka cyane cyane igihe

wabitse imbuto igihe kirekire bitewe no gutakaza amazi ndetse no kubyimba kw'ingirangingo zikikije utwo twenge hanyuma kandi tugapfa iyo ushyize avoka ku zuba igihe kirekire.

Ubu busembwa bukunda kuboneka kuri avoka z'ubwoko bwa "Fuerte" na "Pinkerton" kubera ko aya moko avoka zigumya kuba icyatsi niyo zaba zeze, mu gihe izo mu bwoko bwa "Hass" zo ubu busembwa bugumya bwihishe muri twa todomo tuba ku gishishwa cyazo kereka iyo kwangirika kwakabije cyane. Kwangirika kw'utu twenge akenshi guterwa no gukobagurika gutewe no gufata nabi umusaruro nyuma yo gusarura, mu gihe zipakirwa cyangwa mu kuzitwara zerekezwa mu nzu zitunganyirizwamo cyangwa mu gihe cyo kuzipakira mu kamarito. Mu nzu itunganyirizwamo umusaruro ugiye koherezwa mu mahanga (packhouse), igikorwa cyo koza imbuto cyane cyane iyo zisukuye zumutse hakabaho kuzihanaguza ikindi kintu mu kuzisukura bikunze gutera ukwangirika kw'igishishwa.

Uburyo bwo kubyirinda

Kugabanya ukwangirika kw'utwenge two ku gishishwa cy'imbuto, ugomba kwirinda kuvomerera ibiti mu gihe habura umunsi umwe gusa ngo usarure (kugirango ugabanye ikigero cy'amazi mu rubuto) ndetse ukanirinda gusarura no gutwara imbuto mu gihe cy'ubukonje bwinshi cyangwa ikirere gitose.



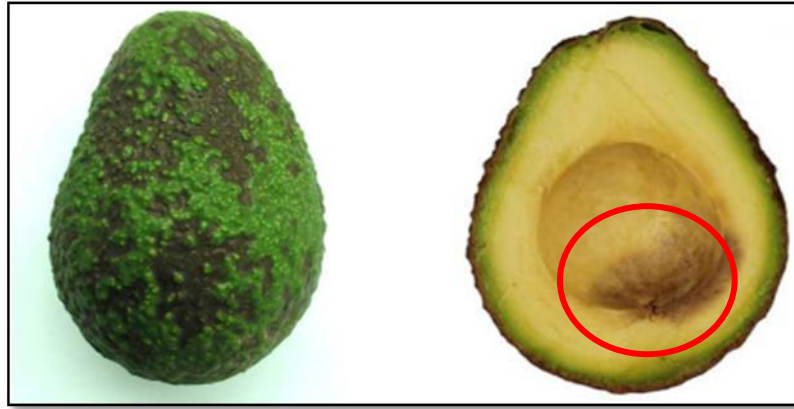
Ishusho ya 18: Ukwangirika kw'utwenge two ku gishishwa kuri avoka y'ubwoko bwa "Hass" © Shivachi



Ishusho ya 19: Utudomo twatwe no kwangirika kw'utwenge two ku gishishwa cya avoka y'ubwoko bwa "Fuerte" © Shivachi

3.2.1.3 Ibikomere biterwa n'ubukonje bwo hasi

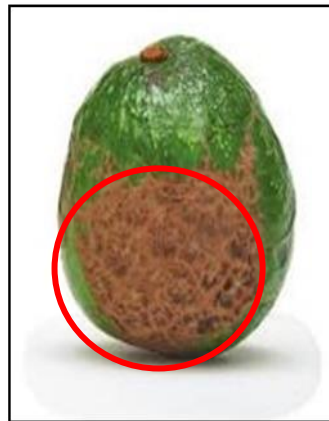
Ibi bikomere biterwa n'ubukonje bigaragazwa ku hantu runaka haba hajeho ibintu by'umukara cyangwa ibikomere bigaragara. Ibikomere cyangwa kwangirika gukomeye bikunda kubaho ku ruhande rumwe rw'urubuto cyane cyane ku ruhande rwo hasi cyangwa ku mpera y'urubuto. Bitewe n'igihe urubuto rwamaze mu bukunje bwo hasi, iyo rwamaze rwamazeho igihe gitoya, uku kwangirika ntabwo kugera ku gice cy'urubuto kiribwa. Ukwangirika kw'inyuma ku gishishwa iyo guhuye n'utunyabuzima dutoya dutera indwara bitera indwara y'uduhumyo iza nyuma yo gusarura. Imbuto ziteze neza, izifite ikigero cya azote kiri hejuru n'icya karisiyumu kiri hasi nizo zikunze guhura n'uku kwangirika gutewe n'ubukonje, uku gukomereka guterwa no gushyirwa mu bukunje ugisarura kimwe no mu gihe zibitswe cyangwa mu gihe ziri mu nzira zoherejwe mu mahanga ku bukunje buri hasi ya 5°C (munsi ya dogere selisiyusi 5). Kugirango ugabanye uku kwangirika guterwa n'ubukonje, haba hakenewe amabwiriza aboneye agenga uburyo bwo gukonjesha gutwara (Amabwiriza ngengamikorere yo gucunga ubushyuhe kuri avoka).



Ishusho ya 20: Kwangirika gutewe n'ubukonje. Inkomoko: © HAB

3.2.1.4 Kwangirika gutewe n'agakoko ka Tiripusi

Tiripusi ni udukoko dukaze cyane tutindiza gukura kw'imbuto iyo zikiri ntoya bituma utwo dukoko tuvanaho agahu k'inyuma k'urubuto bigatera inkovu zikunze kuba zihanda, zityaye kandi zifite ibara ryirabura. Izo nkovu zigumaho na nyuma yo kwera kuko ukwangirika kuba kwarabayeho imbuto zikiri ntoya zigitangira gukura. Ubwo busembwa buba bugaragara butera kugabanyuka kw'imbuto zoherezwa mu mahanga kuko ziba zifite ubusembwa, ingamba nziza zo guhangana nabyo ni ukubahiriza gahunda yo kurwanya ibyonyi no kubikurikirana neza. Imbuto zangiritse muri ubu buryo zakoreshe gusa mu gukora imbuto zitonoye zibikwa mu bukonde bwo hasi zifunze zihita ziribwa kuko ubu busembwa ntabwo buba bugera imbere ku gice kiribwa cya avoka.



Ishusho: 21 Inkovu yatewe na Tiripusi (*Scirtothrips perseae*) (c) HAB

Uburyo bwo kubyirinda no kubirwanya

- Gukoresha utundi dukoko mu murima turya Tiripusi.
- Kurinda umurima utera umuti urwanya gukwirakwira kwa Tiripusi mu murima w'imbuto
- Gukoresha uburyo bukomatanyije bwo kurwanya ibyonyi kugirango ugabanye ubukana bwa Tiripusi mu murima w'imbuto.

3.2.1.5 Ibikomere byatewe n'amababi n'amashami yakoboye (Inkova)

Imbuto zangiritse muri ubu buryo biba byaratewe no gukoboka hakaza ibara ry'ikigina gityaye, imbuto zangiritse muri ubu buryo ntizihinduka niyo zeze. Uko gukoboka kw'igishishwa cy'urubuto gushobora guterwa n'amababi cyangwa amashami yakubye urubuto bikunze guterwa n'umuyaga. Kwifashisha ibigabanyamuyaga bishobora kugabanya ingano y'imbuto zizana izo nkovu, ubu busembwa buba buri inyuma ku gishishwa bikangiza ubwiza bwazo ntinabashe kuba zacuruzwa. Bene izi mbuto zishobora kugurishwa zitonoye zifunze zigakonjeshwa cyane.



Ishusho ya 22: Inkovu zatewe no gukoborwa n'amababi © HAB

3.2.1.6 Ibisigazwa byaturutse ku binyabutabire

Ni gake cyane hakoreshwa imiti mu buhinzi bwa avoka mu Rwanda, ariko kugirango urwanye ikwirakwira ry'uduhumyo mu murima, dushobora gutera indwara za nyuma yo gusarura nko kubora kw'umutwe w'urubuto n'akaribata, imiti ibasha kuboneka ku isoko irakoreshwa. Imiti ishobora gusiga ibisigazwa bigaragara by'ubururu n'icyatsi ku mbuto ariko bitangiza na gato ubwiza bw'igice cy'imbere cy'urubuto cyangwa ngo bitere ibibazo kubijyanye no kurya izo avoka, ariko na none ibi ntibyemewe ku baryi bazo. Imbutu bigaragaraho zakagombye kozwa, zigahanagurwa kugirango ibyo bisigazwa bikurweho. Kugirango ugabanye ingaruka zaterwa n'ibisigazwa by'imiti ku mbuto, ugomba gukoresha imiti irwanya uduhumyo (Fungicides) yemewe n'urwego rubishinzwe mu gihugu, ugakurikiza iminsi isabwa hagati yo gutera umuti no gusarura, ugakoreshwa kandi yoroshye gusukura no kuyikuraho.



Ishusho ya 23: Ukweruruka kwatewe n'ibisigazwa by'umuti ku ndiba y'urubuto © HAB

3.2.1.7 Imihiro

Imihiro cyangwa ibintu byihinnye bigaragara ku mubiri w'urubuto bikaba biterwa no kwangirika kuba kwarabayeho mu gihe ruba rukiri ruto bishobora no kubaho mu gihe cyo kurabya. Imihiro ishobora guterwa n'imihindagurikire y'ikirere cyangwa kurumwa n'agasimba kuba kugaragara n'amaso ukabona hari agace kabyimbye ku gice cy'inyuma ku rubuto. Iyo mirongo ibyimbye ikunda kugaragara iberamye hasi ku rubuto, ikagira umubyimba utandukanye bityo izo mbuto ziba zifite ibyago byinshi byo gukoborwa n'amababi n'amashami kuri ya mihiro ibyimbye. Imbutu zazanye imihiro ziba zidafite isura nziza, zikanangirika mu gihe cyo kuzisarura, kuzipakira no mu kuzitwara zijyanwa aho zitunganyirizwa. Imbutu zifite imihiro zigurishwa gake ariko zishobora kugurishwa zitonoye zanakonjeshejwe cyane.



Ishusho ya 24: Udushyundu ku mubiri w'urubuto © Shivachi



Ishusho ya 25: Udushyundu ku mubiri w'urubuto kandi rwari rweze © Shivachi



Ishusho ya 26: Kwangizwa n'imihoro kugaragara ku gice kiribwa cya avoka yeze © Shivachi

3.2.1.8 Ukudasa kw'imbuto igihe zeze

Ukudasa kw'imbuto kubaho iyo imbuto mu ikarito zifite igihe cyo kwera gitandukanye aho zimwe mu mbuto ziba ari icyatsi mu gihe izindi ziba zifite igicucu cy'amabara atandukanye hakabo gutandukana kw'ubwiganze bw'ibara ry'umuhengeri n'urugero rw'ubworohe bw'urubuto. Iki ni ikibazo cya avoka y'ubwoko bwa "Hass" n'ikibazo cyo kwera gitera akazi kenshi mu kuzitunganya ndetse kigasaba abakozi benshi mu kurobanura izo mbuto nyuma yo kubona komande yo gupakira umuzigo aho akenshi usanga ugomba gupakira imbuto zitari mu rugero rumwe rwo kwera aho imbuto zeze cyane ziba zivanze n'iziteze. Kubohereza mu mahanga, ni ngombwa kutavanga imbuto zo mu duce dutandukanye mu ikarito imwe cyangwa ku ipareti imwe kugirango wirinde kuvanga imbuto zidahuje ukwera kwazo mu kintu kimwe.



Ishusho ya 27: Kureba uko imbuto zisa mbere yo kuzipanga, imbuto zimwe zifite ibara ry'icyatsi cyijimye (Zeze cyane) izindi zirayaga (Iziteze) mu ikarito imwe © Shivachi



Ishusho ya 28: Ukudasa kw'imbuto mu gihe zikiri kwera. Ishusho: ©California avocado commission

3.2.1.9 Kwangizwa n'ibisambeba (Rodent)

Ibisambeba zikunze kwangiza igishishwa cy'urubuto zitobora cyangwa zihekenya kugeza ku gice kiribwa cya avoka bigatuma urwo rubuto rutacuruzwa. Amabwiriza yo kwirinda utwo dusimba mu bubiko, ahapakirirwa no mu murima aba agomba kubahirizwa.

Kubwirinda no kubirwanya

Gushyira mu bikorwa gahunda yo kurwanya ibyonnyi ahashyirwa ibyasaruwe n'aho birobanurirwa. Kwirinda gushyira ibisigazwa by'ibiryo hafi y'umurima, aharobanurirwa umusaruro cyangwa aho ubikwa.



Ishusho ya 29: Avoka zangijwe n'ibisambeba mu gihe zari ziri mu bubiko © Shivachi

3.3 Ubusembwa bwaturutse mu rubuto imbere

Gusuzuma ubusembwa buturuka mu rubuto imbere ushingiyeye ku bintu biri hano hasi ni ikintu cy'agaciro kugirango utange icyizere cy'ubwiza bwa avoka mu baguzi batandukanye uba uzoherezaho. Imbutu zakagombye gusuzumwa mu gihe zikiri aho zitunganyirizwa hakabaho gufataho nkeya zihagarariye izindi (sample) ukareba ubusembwa zifite hanyuma ukabushyira ku ijanisha (%) ry'ubusembwa burimo kuri izi ngingo zikurikira.

3.3.1 Intimatima y'ikigina

Iyi ni isura y'imbere mu rubuto ahagaragara ukudasa bw'igice kiribwa cy'urubuto isa n'ibara ry'ikigina kugera ku mukara. Uruvange rw'amabara y'ikigina rugaragara cyane ku gice cy'impera yo hasi cy'urubuto bikaba byanakomeza bikagera ku gihe cyegereye inkondo hakagenda hazamo hagati urunyurane rw'amabara. Intimatima y'ikigina ikunda kubaho ku mbuto zakuze mu gihe cy'ubushyuhu ndetse cyane cyane mu mbuto zasaruwe zikererewe, intandaro nyamukuru ni ukurenza urugero mu kwera (Imbutu zeze cyane nizo zifatwa cyane), kuzibika igihe kirekire, ububiko bushyushye cyangwa kumara igihe kirekire ku bukonje bwo hasi mu gihe ziri mu nzira zoherezwa mu mahanga kuko zangiza ingirangingo zigize urubuto biturutse ku ikorwa ry'imvubura itera kuba umukara ya "Polyphenol oxidase". Kwegerezwa Etilene ku bushyuhu buri hasi nabyo bituma habaho uguhisha nako gutiza umurindi ukwiyongera mu kajagari kw'ibibara by'ikigina mu gice kiribwa cy'urubuto.



Ishusho ya 30: Intimatima y'ikigina iri mu kajagari © HAB



Ishusho ya 31: Avoka yahishije ifite intimatima y'ikigina iri mu kajagari. © Shivachi

3.3.2 Kubora ku nkondo

Imbutu zafashwe zigira urunyurane rw'amabara y'ikigina cyerurutse mu gice cya avoka kiribwa bigatangirira ku nkondo bigakomeza bimanuka mu rubuto hagati. Kubora ku nkondo ni indwara iterwa n'uduhumyo iyo yakabije cyane urubuto rugaragaza ibyokotsi byeruruka cyangwa by'iroza. Urunyurane

rw'amabara aturutse ku duhumyo rushobora guherekezwa n'ibimenyetso byo kubora. Inyuma ku rubuto hahita hagaragaza ibintu by'umukara bitangira bizengututse ahafata inkondo y'urubuto. Isoko yo gufatwa n'iki kibazo ni itsinda ry'uduhumyo mu murima, iyo ukatira neza, ni ngombwa kavanaho amashami yumye bikaza byiyongera kuri gahunda isanzwe yo gutera umuti urwanya uduhumyo urimo kwivere (Copper). Ikirere gishyushye kandi gihehereye gitiza umurindi kororoka kw'uduhumyo, imbuto zigafatwa ahanini bikaba mu gusarura aho uduhumyo twinjira mu rubuto tunyuze aho inkondo yacikiye niyo mpamvu gukatisha icyuma gifite isuku ari ngombwa kugirango wirinde uko kwandura. Gutera umuti nyuma yo gusarura bishobora gukoreshwa kugirango wirinde ikwirakwira ryo kubora ku gice cyo ku nkondo mu gihe kubika imbuto ku bukonje bwo hasi bigabanya ukororoka kw'uduhumyo.



Ishusho ya 32: Ahafashe inkondo hatangiye kubora⁸



Ishusho ya 33: ishusho igaragaza Kubora kw'ahereye ahafata ku nkondo © Madhupani et al 2017

Ingamba zo kubyirinda n'uburyo bwo kubirwanya

- Kugirira isuku ibikoresha bikoresha mu gusarura
- Mu gihe usarura, buri gihe rekeraho inkondo nibura nka cm 1.27 ifashe ku rubuto
- Irinde gusarura mu gihe cy'imvura.
- Gumisha avoka wasaruye mu ma kureti afite umuyaga uhagije kandi wirinde gukoresha imifuka.

3.3.4 Gufatira ku kibuto kw'igice kiribwa

Ubu busembwa butuma igice kimwe kigomba kuribwa gifatira ku kibuto iyo usatuyemo urubuto mo kabiri ukabitandukanya. Imwe mu mpamvu ibitera ni ukuterera rimwe kw'urubuto iyo igice kimwe cyo hejuru y'ikibuto kitari cyashya, kikaba gikomeye kimeze nk'ikawucu mu gihe ikindi gice cyo kiba cyahishije mu buryo busanzwe. Ubu busembwa bukunda kubaho ku mbuto zeze imburagihe mu gihe ubushyuhe budakwiye mu cyumba cyo guhishirizamo bushobora kongera iki kibazo. Gucuruza bene izi mbuto aho zigomba guhita ziribwa biragabanyuka.

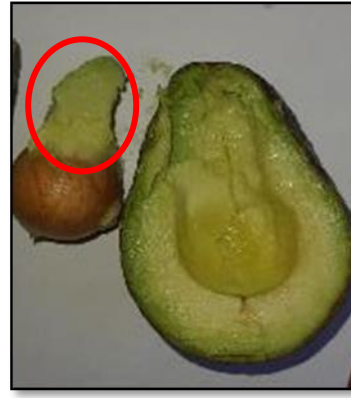
Ingamba zo kubyirinda no kubirwanya

Sarura imbuto zeze neza gusa kugirango wirinde ko zizahisha imbusane. Kurobanura no gutunganya amatsinda y'imbuto (batches) ufata imwe imwe wirinda kuvanga imbuto zidahuje urugero rw'ubukure.

⁸ Inkomoko: [http://Plantvillage.psu.edu Avocado | Diseases and Pests, Description, Uses, Propagation \(psu.edu\)](http://Plantvillage.psu.edu/Avocado%20|%20Diseases%20and%20Pests,%20Description,%20Uses,%20Propagation)



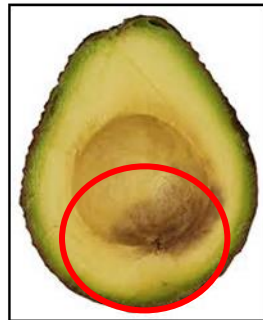
Ishusho 34: Igice kiribwa cyafatiriye ku kibuto cya avoka Ishusho © Shivachi



Ishusho ya 35: Ikibuto cyafatiriyeho igice kiribwa cya avoka shusho: © Shivachi

3.3.5 Ukudasa gukwirakwiye kw'igice kiribwa

Ubu busembwa bugaragara ari ibara riri hagati y'ikijuju n'umukara ndetse rimwe na rimwe hakazamo amabara y'ikigina ku gice kiribwa cy'urubuto biboneka inyuma mu mbuto zibitse cyangwa ziri mu nzira zoherezwa mu mahanga. Urugero rwo kudasa rugenda ruzamuka uko urubuto rugenda ruhisha kandi bikagenda byongera ubukana iyo urubuto rukase. Ubu busembwa bwangiza ubwiza bw'imbere mu rubuto bigahindura uburyohe bw'urubuto bitewe n'igice cy'imbere mu rubuto kiba cyapfuye. Ukudasa gukirakwiye mu rubuto imbere guterwa n'ibikorwa bitandukanye bya nyuma yo gusarura muribyho iby'ingenzi twavugamo gukomereka gutewe n'ubukonje cyane cyane iyo urubuto rutari rweze neza, ikirere cyo mu bubiko kitagenzuwe neza bigatuma urugero rwa gazi karubonike (CO₂) hamwe no kugabanyuka gukabije kw'umwuka (anaerobic condition), kumara igihe kirekire mu rugendo rwo koherezwa mu mahanga. Ikindi kibitera ni imbuto zifite urugero rwa Azote ruri hejuru n'urwa Karisiyumu ruri hasi bitumba mu rubuto hazamo akajagari ko mu rwego rwo hejuru.



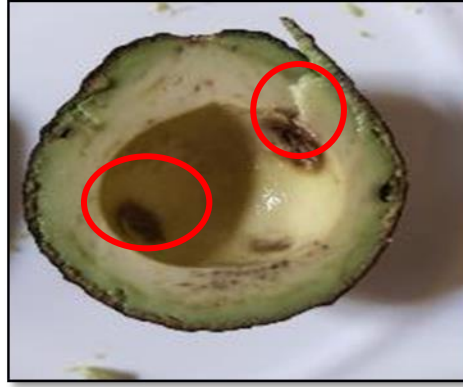
Ishusho ya 36: Ukudasa gukwirakwiye mu gice kiribwa cya avoka Ifoto © Hass avocado board

Ingamba zo kubyirinda no kubirwanya

- Ubahiriza ukwera kw'urubuto guhuye n'icyo isoko risaba.
- Ringaniza ubukonje bwo mu cyumba gikonjesha ubikamo ku buryo buba kuri 6-8°C kugirango wirinde ukwangirika gutewe n'ubukonje.
- Gabanya ubukerewe imbuto zigira mu nziza mu gihe zoherezwa mu mahanga kugirango wirinde igihe kirekire zamara mu bukunje.

3.3.6 Uguhinduka ikujuju kw'imizi yo mugice cy'urubuto kiribwa

Igice kiribwa ku rubuto kigaragaramo amabara y'umukara cyangwa se ay'ikijuju kijimye iyo ugikase. Aya mabara y'umukara n'ikijuju agenda aberamye kuva aho inkondo iba ifashe kugera muni y'ikibuto. Ibintu bizwi bitera guhinduka ikijuju kw'igice cya avoka kiribwa hamwe n'ibimenyetso bigaragara ku gice cyo hasi cy'uruburo harimo ukwangirika imbere guterwa no kubika avoka ziteze neza ku bukunje bwo hasi igihe kirekire.



Ishusho ya 37: Ishusho igaragaza ibidomo by'imbere by'ikijuju ku gice kiribwa
© S.D Mhlophe

Ingamba zo kubyirinda

- Ubahiriza ukwera kw'urubuto guhuye n'icyo isoko risaba.
- Ringanziza ubukonje bwo mu cyumba gikonjesha ubikamo ku buryo buba kuri 6-8°C kugirango wirinde ukwangirika gutewe n'ubukonje.
- Gabanya ubukererwe imbuto zigira mu nziza mu gihe zoherezwa mu mahanga kugirango wirinde igihe kirekire zamara mu bukunje.

3.3.7 Gunduka ikijuju kw'imizi no kubora kw'ahereye inkondo

Iki ni ikibazo cyo kubora ko mu rwego rwo hejuru guturutse ku kwivumbagatanya kuvanze ko kubona kw'ahereye inkondo ndetse n'imizi yabaye ikijuju bigatera uguhindura ibara kw'umuhore wa avoka. Ipfundo nyamukuru ritera ubu busembwa ni itsinda ry'uduhumyo tuba turi mu murima hanyuma amagi y'uruhumbu agakwirakwira aturutse ku mashami y'igiti yashaje bikanduza urubuto mu gihe ikirehe gishyushe kandi kirimo ubuhehere. Kwiyongera kw'uduhumyo bshobora kurwanywa hakoreshejwe uburyo buhamye bwo gucunga ibyumba bikonjesha, ariko kandi ukubahiriza ibikorwa byo kwita ku murima mbere yo gusarura nko gukata amashami yumye, gusukura mu murima w'imbuto no gutera umuti ukoranywe kwivere (Copper) bifasha mu kurwanya ikwirakwira ry'uduhumyo.



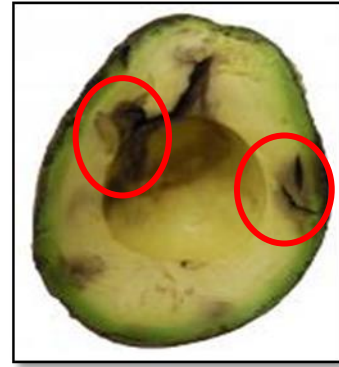
Ishusho ya 38: Kubora kw'ahereye inkondo (ku utwe) no guhinduka ikijuju kw'iminsi yo mu muhore w'urubuto ©HAB

3.3.8 Imfundikirane itera igice cy'urubuto kiribwa (umuhore) kuba umukara

Imfundikirane itera igice cy'urubuto kiribwa (umuhore) kuba umukara ikunda kugaragara ku mbuto zihye, imbuto zigaragaza ibara ry'ikijuju risatira kuba umukara bigaragara muhore ku ruhande rumwe rw'urubuto bikagenda bikura biva ku kibuto biza inyuma ku gishishwa bikangiza igice cyo hagati cyose cy'urubuto. Impamvu nyamukuru itera ubwo busembwa ni ukwitura hasi bw'imbuto mu gihe zisarurwa bikunda kubaho iyo hakoreshejwe uburyo gakondo bwo gucugusa igiti imbuto zigahanuka hejuru mu giti zitura hazi ku butaka.



Ishusho ya 39: Ukwangirika kw'inyuma ku rubuto kwaturtse ku buryo bubi bwo gusarura (Kwitura hasi kw'urubuto)
© Shivachi



Ishusho ya 40: Igikomere cy'imbere mu rubuto cyatewe no gukoresha uburyo budakwiye mu gusarura © Shivachi

Ingamba zo kubyirinda

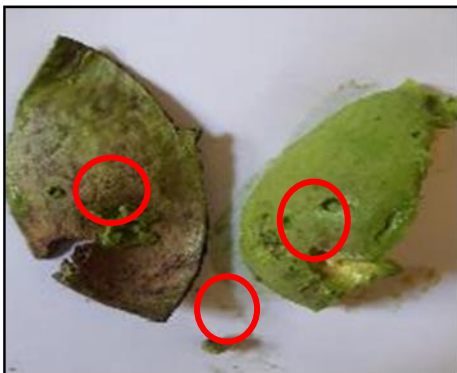
- Gukoresha uburyo bwiza bwo gusarura ukoresheje imifuka yabugenewe ifite uburyo isama imbuto igihe ziva ku giti kugirango zitagwa hazi zigakoboka.
- Kuzaza ikureti mu buryo budakabije butuma ikureti yo hejuru idakomeretsa imbuto zo mu ikureti yo hasi.
- Kwirinda gukoresha imifuka mu gihe utwara imbuto zasaruwe.

3.3.9 Intirima (Ikibuye) mu mu gice cy'urubuto kiribwa (Umuhoze)

Avoka ihiye ishobora kuzamo ikintu cy'igishyundu gikomereye gifashe ku gishishwa cya avoka ihiye kimeze nk'ibuye gikunze kugira nka 5mm gifashe ku gishishwa. Hanze y'urubuto biba bigaragara nk'ibinogo cyangwa ibidomo byijimye kandi nta kibazo byatera ubiriye n'ubwo bigabanya ubwiza bw'urubuto. Izo ntirima (ibibuye) ziterwa no kurumwa n'udukoko (inigwahabiri) cyane cyane utwotwa "fruit spotting bug", mu buryo kamere bwo kwirwanaho urubuto ruhita rushyira mu kato igice cyarumwe n'ako gakoko bigatera kwiremamo ikibuye gihita cyumvikana iyo ururiye.

Uburyo bwo kubyirinda

- Kurwanya ibyonnyi hakiri kare utera umuti ubirwanya, ukoresha imitego cyangwa ugakoresha uburyo bukomatanyije bwo kurwanya ibyonnyi.



Ishusho ya 41: Ibuye rifashe ku gishishwa no ku muhoze waavoka
© Shivachi



Ishusho ya 42: Ikimenyetso cy'aho ibuye ryari ryinjiye mu muhoze © Shivachi

IGICE CYA KANE

Kwita kuri Avoka no kumenya ibyo igomba kuba yujuje

Ingingo z’ingenzi zibandwaho muri iki gice: Iki gice gifasha umusomyi kumenya tekinike zo kumenya imbuto zeze neza igihe zikiri ku giti hakoreshejwe ubumenyi bukwiye bwo kumenya ibiranga kwera. Abasomyi barahabwa ubumenyi ku buryo bwo gukora amabwiriza yo gusarura ndetse n’ibigomba kubahirizwa mu gihe cyo gusarura na nyuma yo gusarura.

Urugero rw’inyubako itunganyirizwamo avoka hakoreshejwe imashini



Ishusho ya 43: Imashini ishyira mu byiciro avoka ikanazitoranya⁹

4.1 Uko wita ku musaruro ndetse no kumenya ko wubahirije ibisabwa

Abahinzi ba Avoka bahura n’imbogamizi zo kwemeza niba imbuto zaba zigejeje igihe cyo gusarurwa. Ni umwitozo rusange mu buhinzi bw’ibintu bicuruzwa ari bibisi kuko igihe nyacyo cyo gusarura amoko atandukanye ya avoka gikenera igihe cy’umwitangirizwa (gusarurwa mbere gato) gikwiriye kugirango umusaruro uzagere ku isoko ugejeje igihe nyacyo cyo kwera.

4.1.1 Inzego zo kwera

- Igihe cyo kwera ukurikije imikurire y’igihingwa.
- Igihe cyo kwera ukurikije ibyo abaguzi bashaka cyangwa isoko ry’imbuto rikeneye.

4.1.2 Igihe cyo kwera ukurikije imikurire

Muri rusange, ni igihe gukura k’urubuto kwageze ku ndunduro rwegereje kuba rwashya cyangwa imbuto zikaba zajeje ku ndunduro y’ubukure ku mbuto zidahisha nyuma yo gusarurwa.

4.1.3 Igihe cyo kwera ukurikije ibyo abaguzi bakeneye:

Ni igihe cyo kwera aho ubukure nyabwo buterwa n’icyo uzakoresha igisarurwa. Kwera gushingiye kucyo isoko rikeneye kugabanyijemo ibice 3 bitandukanye aribyo: ibiteze ukurikije imikurire y’igihingwa, ibisarurwa bihishije n’ibisarurwa bikomeye kandi byeze neza.

⁹ Inkomoko: https://reports.weforum.org/enabling-trade-from-valuation-to-action/enabling-trade-from-farm-to-fork/a6-case-studies-f2f/kenyan-avocados-connecting-to-high-value-export-markets/?doing_wp_cron=1613505710.1677761077880859375000

Avoka zisarurwa zikomeye kandi zeze (Icyiciro cya 1 ishusho ya 44) ahagaragara igihe imbuto zisarurwa zujuje ibintu runaka nk'ishusho, ingano, izindi ngero zirimo amapapayi, amacunga, imyembe n'imineke.



Ishusho ya 44: Uko Avoka y'ubwoko bwa "Hass" igenda ihindagurika iyo iri guhisha (Inkomoko: mission produce, Inc),

Icyitonderwa: Avoka y'ubwoko bwa "Fuerte" n'izindi mbuto zifite uruhu rw'icyatsi ntabwo zihindura ibara iyo zihishije ariko muri rusange zose zitakaza ukurabagirana kw'uruhu rwazo rukagenda rwenda kuba umuhondo.

4.2 Uburyo bwo kumenya ko Avoka yeze (Iqipimo cyo kwera)

Ukwera kwa avoka gupimwa hakurikijwe uko umuntu ayibona. Abahinzi bamwe bahitamo igihe cyo gusarura bakoresheje gusa kurebesha amaso no gufata imbuto nkeya mu murima iminsi mike mbere y'igikorwa cyo gusarura. Ni uburyo bushingiye ku kurebesha amaso no gukorakora, binagenda ku bushobozi bw'umusaruruzi mu gufata icyemezo.

Uburyo bwo gupima ko avoka yeze ukoresheje uko uyirebesha amaso:

- Ushobora gupima ko avoka yeze ukurikije uko urubuto rusa inyuma. Imbuto ziteze ziba zisa n'icyatsi kibengera, zifite uruhu rushashagirana mu gihe imbuto zeze ziba ari icyatsi cyijimye hanyuma izarengeranye ku ruhu ziba zifite ibice byenda kuba igihogo.
- Ushobora kandi gupima ukwera urebeye ku gihu kiba gitwikiriye ikibuto. Bikorwa ukasemo kabiri urubuto rudahiye ukoresheje icyuma gityaye. Iyo icyo gihu gitwikiriye ikibuto gifite ibara ry'ikigina cyijimye ndetse umubyimba wacyo ukaba ari muto, urwo rubuto ruba rushobora kuba rweze.
- Imbuto ziteze zishobora kutakirwa ku isoko kuko zitari zashya neza. Kumenya ko imbuto zeze ni ingenzi cyane mbere y'isarura.

4.2.1. Gukoresha tekinike zishingiye ku ntego n'ishingiye ku kuntu umuntu abibona

- Impumuro cyagwa uburyohe ukoresheje kwihumuriza;
- Ubunini, ishusho n'ibara ukoresheje kureba;
- Imisusire, gukomera cyangwa korohera ukoresheje gukorakora;
- Gukubita imbuto ukumva ijwi bitanga ukoresheje ukwirangira;
- Kuryaho kugirango wumve uko ziryohereye, uko zikereta cyangwa zirura.

Uburambe bukwiye nibwo muyobora wa mbere mu gusesengura ukoresheje amaso. Igihe nyacyo cyo gusarura kurebeshwa amaso ku bihingwa bimwe na bimwe: Ku bitunguru by'amateke ni igihe amababi yabyo n'igice cyo hejuru y'ubutaka cyamaze guhisha kikuma, ku birayi ni igihe igice cyo hejuru y'ubutaka

cyamaze kuma/gupfa. Ibindi bihingwa bishobora kugorana, ibiranga avoka yeze ahanini byo biba bigaragara urebesheje amaso.

4.2.2 Ibibi byo gukoresha tekinike zishingiye kubyo ubona mu buhinzi n'ubucuruzi bwa avoka

- a. Imihindagurikire y'ikirere ishobora kuvangira abasaruzi;
- b. Guhindagurika kw'ibintu bimwe bituruka ku bifite ubuzima (biotic) cyangwa ibidafite ubuzima (abiotic) cyangwa agace ibihingwa birimo bishobora kukuyobya mu gufata ibyemezo ku gihingwa (ibihingwa biri hafi y'icyobo cy'amazi cyangwa hafi y'ibyobo cy'ifumbire bikura vuba vuba);
- c. Mu buhinzi bugamije ubucuruzi (imirima minini), gushyiraho agace gato uzagenzuriramo ko ibihingwa bigeze igihe cyo gusarurwa kikunze kugorana, bityo rero, zimwe mu mbuto ziba zishobora gusigara mu murima bikaba igihombo mu isarura rikurikiraho kuko hari igihe usanga zararengeranye.

4.2.3 Uburyo bukoresha ibintu bifatika

Hariho uburyo bwinshi bukoresha ibigaragara mu kugenzura ukwera ku moko atandukanye y'imbutu. Muri ubwo buryo harimo: Kureba imbaraga zifatisha urubuto ku nkondo yarwo, gusuzuma ijwi ryazo, Guhindura ibara ku ruhu, uburyohe, kwifungura/kwiyasa kw'urubuto, guhunguka, ireme cyangwa isura ry'imbutu. Kuri avoka, uburyo bwo kureba ibigaragara harimo kureba uko ibara rihindagurika kuva ku mubiri ubengerana kugera ku rubuto rufite umubiri wijimye (dull skinned) aribyo bikunda gukoreshwa kuri avoka y'ubwoko bwa "Fuerte".

4.3 Ibishingirwaho mu gushima ukurikije ibigaragara

Ibisabwa n'isoko kuri buri cyiciro cya avoka bigengwa n'ibyo abaguzi cyangwa abazirya baba bakunda. Hari inyigo iri gukorwa ku bintu bigenga ibyo abaguzi bifuzaga, ariho hazamo ibintu bitandukanye byo kurebaho kuri buri cyiciro nk'uko bisobanuye hano hasi. Gupima igice cya avoka kiribwa (Umubiri) nibwo buryo bukoreshwa mu kureba ubushyashya bwa avoka ku isoko.

4.3.1 Ibiranga avoka urebesheje amaso

4.3.1.1 Imiterere: Imiterere ni ikintu cy'ingenzi ku baguzi b'ibiribwa. Ni igipimo cy'ubunararibonye mu bijyanye n'ibiribwa kigasobanurwa nk'ikintu nyamukuru kibumbatiye uburyo bwo kumenya uburyohe ikiribwa cyagira mu kanwa umaze kukirya, gifite ibikiranga bisuzumwa ukoresheje gukorakora. Kuri avoka, imisusire igenwa n'utugirangingo duto tuyigize, ibifite ubuzima n'ibinyabutabire biyirimo, amazi yifitemo n'ibigize igishishwa cy'ingirangingo ziyigize. Imiterere iteye imbere kuri avoka ni umusaruro w'ibikorwa bigenda byisubiramo byo guhindura imiterere yayo mo imbere ukoresheje kuyibangurira ugamije kuyiha ubushobozi bwo guhangana n'indwara mu gihe uri no kuyongerera imiterere yayo yose mu gihe ihishije.

4.3.1.2 Uko igaragara/ibara: Amoko yose ya avoka aba ari icyatsi iyo zitari zera. Gusa, kuba icyatsi n'ubukana bw'ibara ry'icyatsi bugenda bugabanyuka uko igenda yegera kwera. Icyakora hari ibindi bintu bishobora guhindura iryo bara ry'icyatsi n'ubwo avoka zaba zitari zera, muri byo twavugaga gazi ya etilene, kugabanyuka kw'intungagihingwa, indwara ndetse no kuribwa n'udukoko. Avoka zikiri nshya iyo zishyize hamwe na gaze ya Etilene zitangira gushya zigahindura ibara, rikaba igihogo kuri avoka z'ubwoko bwa "Hass" mu gihe iz'ubwoko bwa "Fuerte" zo zitangira koroha.

4.3.1.4 Imizi iri mu gice kiribwa cya Avoka (Umubiri): Ni ukuvuga umubare w'imizi iba iri mu rubuto. Ingano y'imizi kandi ifitanye isano ya hafi n'ubwoko bwa avoka. Abahinzi ba avoka bakagombye kumenya gutandukanya itandukaniro riri hagati y'imiterere ya avoka yoroshye, inurira cyangwa irimo imizi mu mirimo isanzwe yo gusarura. Ni icy'agaciro kumenya ko ubwoko bumwe bwa avoka bugira imizi myinshi kurenza ubundi kandi bufite igihe cy'ubukure kungana. Iyi niyo mpamvu nyamukuru yo kwitaho mu guhitamo ubwoko bukunzwe ku isoko aribwo "Hass" na "Fuerte" kuko bufatwa nk'ubutagira imizi mu rubuto.

4.3.1.5 Impumuro n’uburyohe: Hass avocado Avoka y’ubwoko bwa “Hass” isaruwe ku gihe nyacyo cyo kwera izwiho kugira uburyohe bw’ibinure bukeya cyangwa ntibugire namba, iba umutsima muri kamere yayo, ikagira n’uburyohe bukomeye kandi bunurira, mu gihe imbuto ziteze wumva mu kanwa zifite ibinure byinshi kandi zenda kuba nk’amazi.

4.4 Ibikoresho byifashishwa mu kumenya ubwiza bukwiriye

- a) Ifuru ntoya
- b) Umunzani
- c) Igikombe
- d) Agasahani ko kurambikaho ibyo upima
- e) Agapima imbaraga/ubukana
- f) Agapimabuhehere
- g) Akabaho ko gukatiraho
- h) Icyuma gityaye
- i) Imakasi (Sekateri)
- j) Igipimo ibigize avoka hatarimo amazi

Ibyuma bikunze gukoreshwa mu gupima ubwiza bwa Avoka

 <p>Ishusho ya 45: Ifuru ntoya (Microwave) yo gupima ibigize avoka hatarimo amazi¹⁰</p>	 <p>Ishusho ya 46: Umunzani wo gupima izihagarariye izindi¹¹</p>	 <p>Ishusho ya 47: Ikirahure ¹²</p>
 <p>Ishusho ya 48: Agasahani ko kurambikaho ibyo upima ukabishyira mu ifuru ntoya¹³</p>	 <p>Ishusho ya 49: Agapima ubukomere bw'urubuto gacengeyemo¹⁴</p>	 <p>Ishusho ya 50: Urubaho rwo gukatiraho n'icyuma byo gukoresha utegura ibyo ugiye gupima¹⁵</p>
 <p>Ishusho ya 51: Imakasi (sekateri) yo gukata inkondo y'urubuto¹⁶</p>	 <p>Ishusho ya 52: NIR (Igipima ibigize avoka hatarimo amazi)¹⁷</p>	 <p>Ishusho ya 53: Agapima ingano y'amazi ari mu rubuto © Shivachi</p>

Mu gihe udafite ibikoresho, uburyo bworoheje bukoreshwa mu gupima ubushyashya bw'umusaruro harimo kureba ibara ry'uruho rw'urubuto. Imbutu zeze ziba zifite ibara ridakeye n'igice cyo hasi cyijimye mu gihe iziteze ziba zibengerana zifite ukuntu zifukuye ahagana hasi ku mbuto. Ibikorsho bimwe bikoreshwa mu gufata ibipimo by'uko avoka zeze harimo agapima ubuhehere mu rubuto (Moiture meter, pressure gauge) ndetse vuba aha ikoreshwa ry'imirasire itangiza "infra-red (NIR) technology" yemejwe n'ubwo igihenze ku bahinzi bato bafite imirima mito.

¹⁰ Inkomoko: https://en.wikipedia.org/wiki/Microwave_oven

¹¹ Inkomoko: <https://www.amazon.com/Precision-Analytical-Electronic-Industry-Agriculture/dp/B07X9YHN1W>

¹² Inkomoko: <https://www.indiamart.com/proddetail/glass-beaker-21661504362.html>

¹³ Inkomoko: <https://www.amazon.com/Polystyrene-Petri-Dish-60mm-Sterile/dp/B07DX9R8L3>

¹⁴ Inkomoko: <https://www.indiamart.com/proddetail/standard-penetrometer-1195086497.html>

¹⁵ Inkomoko: <https://www.amazon.in/Chefstar-Plastic-Chopping-Board-2-Piece/dp/B07SL5FLZM>

¹⁶ Inkomoko: <https://www.amazon.co.uk/Shear-Joy-Secateurs-Comfortable-Precision/dp/B06XSX4HLR>

¹⁷ Inkomoko: <https://felixinstruments.com/food-science-instruments/portable-nir-analyzers/f-751-avocado-quality-meter/>

IGICE CYA GATANU

Gusarura Avoka

Ingingo z'ingenzi zibandwaho muri iki gice: Iki gice giha umusomyi Tekinike nziza zo gusarura ku buryo ziramutse zikoreshejwe zagabanya ubusembwa buboneka nyuma yo gusarura bugatera gutakaza umusaruro, umusaruro ukajugunywa bityo bikanagira ingaruka mbi ku burambe bw'imbuto ziba zasaruwe.

Abasomyi barahabwa ubumenyi ku buryo bwo gukora amabwiriza ngenderwaho n'ibitonderwa mu gihe usarura ndetse na nyuma yo gusarura.

Gusarura ni igikorwa cyo kuvana urubuto ku giti rwezeho cyangwa ikindi kintu rwakuriyeho mu gihe ukeka ko rwaba rugeze igihe cyo kuba rwaribwa, rwatunganywa cyangwa rwujuje ibisabwa n'abaguzi. Intabwe n'uburyo bwo gusarura ni ipfundo ry'imimerere y'umusaruro nyuma yo kuwusarura, ni ukuvuga ubwiza, imiterere, uburambe, ubuziranenge bunasaba kwitonderwa cyane. Abahinzi bakagombye gukurikiza amabwiriza yo gusarura (Amabwiriza agenga isarura) bakanaha amahugurwa itsinda risarura ku buryo buboneye bukoreshwa, ibikoresho byifashishwa, bakanafata umwanya wo gukurikirana uko isarura rikorwa.

5.1 Igikorwa cyo gusarura

Gusarura bigenwa no kwera kw'imbuto. Uburyo nyamukuru bushingirwaho kandi bwizewe mu kumenya ko avoka yeze ni ugupima ingano y'amavuta cyangwa ibigize avoka hatarimo amazi (rebera ku mugereka wa 1 n'uwa 2-Amabwiriza akurikizwa mu gupima ingano y'amavuta) kandi bikorerwa muri laboratwari ufashe imbuto mu murima zihagarariye izindi (samples), ubu nibwo buryo bwizewe bwo gupima ko imbuto zeze.

- Gupima ibigize urubuto hatarimo amazi (Dry matter test) bigomba gukorwa mbere yo gusarura. Uwohereza mu mahanga agomba kwikurikiranira iki gikorwa kandi agasangira amakuru n'umugemurira cyangwa abamugemurira kugirango hagenwe igihe nyacyo cyo gusarura. Gupima ibigize urubuto hatarimo amazi (byumishisjwe) ni ibintu byoroshye, ntibihenze ndetse byakagombye kuba ibintu bisanzwe.
- Mbere yo gusarura, imbuto nkeya zihagarariye izindi (zifite urugero rwo kuba zacuruzwa) zigomba gufatwa zigashyirwa ahantu hasukuye mu cyumba kugirango ukurikirane uko zizashya ku bushyurwa bwo mu cyumba, ikirere cyaba ari cyiza cyangwa atari cyiza, ukanareba n'iminsi batwara.
- Ku mirima, abahinzi bashobora gukoresha ibipimo byo kureba ko imbuto zeze nko kureba ingano y'urubuto n'isura y'agashishwa k'inyuma y'ikibuto kugirango umenye igihe urubuto ruzapimirwa.
- Kugira umubyima muto no kwirabura kw'ako gahu k'inyuma y'ikibuto ni ikimenyetso ko urubuto rweze.

5.2 Gusarura imbuto zigeze ku rugero rukwiye rwo kwera biffite uruhare runini ku bwiza bwazo.

- Pima ukwera kw'imbuto zo muri buri murima w'imbuto zigomba gusarurwa buri cyumweru, bikorwe mu kwezi kubanziriza igihe gisanzwe cyo gusaruraho uwo murima.
- Ntugomba gusarura imbuto mbere y'uko zigeze ku rugero rukwiye rwo kwera.
- Pima urugero rwo kwera kuri bui murima w'imbuto, buri cyumweru, mu gihe cyo gusarura. Hagarika gusarura imbuto zigenewe koherezwa hanze mu gihe zitangiye kurenza igihe cyo kwera (zarengeranye).
- Sarura utoranya (Imbuto zihuje urugero zigezeho rwo gukura). Itsinda risarura rifite ubunararibonye, ryahuguwe neza ritoranya neza imbuto mu gusarura.

5.3 Gusarura avoka ukoresheje uburyo buboneye bwo kwita ku murima usarurwa

- Imbutu zisarurwa mu murima zakabaye zisaruranwa ubwitonzi zigashyirwa mu makureti kugirango uzirinde kwangirika, kubika amazi, gufatwa na miliyuni, ibyondo no kuzibuza gukuboka kwa hato nahato.
- Mu gusarura neza, umuntu abasha kubona inyungu ku mbuto ze. Wibuke ko avoka zikoborwa ndetse zikanakomeretswa n'ubusa, hanyuma izo ntizakirwe ku isoko.
- Soroma avoka mu gihe imvura itari kugwa kugirango ugabanye ukujundika amazi kw'imbutu bishobora gutera kwangirika kw'utwenge twazo, kandi ikirere gitose gitiza umurindi kubora ndetse no gukwirakwira kw'indwara. Ubwitonzi mu gihe cyo gusoroma bisaba ko abasoromyi kwita kuri ibi bikurikira:
 - Kwamabara uturindantoki.
 - Kudakuraho inkondo ku rubuto.
 - Katira uruti rw'inko hafi hashoboka ariko udakomereke urubuto.
 - Tondeka himbuto hasi ku kintu kirambuye ahatwikiriye cyangwa ukoreshe amakureti igihe abasha kuboneka.
 - Koresha ibikoresho byabugenewe mu gusoroma nk'ingazi, agahabuzo n'agafuka usaruriramo ukambaye.
 - Wijugunya hasi imbutu kuko bizitera gukomereka.
 - Ntukuzuze cyane icyo usaruriramo cyangwa amakureti kuko imbutu ziri hejuru zikobagurika.
 - Bika imbutu zazoromwe ahantu hatwikiriye hatari izuba cyangwa amakarito yo hejuru uyatwikirize amababi.
 - Jyana imbutu mu nzu zitunganyirizwamo zigiye koherezwa mu mahanga vuba cyane hashoboka.



Ishusho ya 54: Uburyo bwiza bwo gukusanya avoka zasarurwa mu murima ukoresheje amakurete, ikurete yo hasi ukayirinda ko ikora ku butaka @Shivachi

5.4 Ingano y'imbutu

- Imbutu zipakirwa hakurikijwe uko zigiye zingana
- Gutoranya imbutu zinganya ubunini bikorwa n'imashini igashyira hamwe imbutu zinganya uburemere.
- Ubunini bw'imbutu washyizemo butangwa n'umubare w'imbutu zifite uburemere bujya kungana ku buryo bwazo ziri hamwe mu ikarito buba ibiro 4 mu ikarito.

5.5 Ibikoresho bikoreshwa mu gusarura: Amakurete/Imifuka yemewe/Tabs/ibyuma, uduhabuzo n'ingazi (Ibyo usaruriramo n'ibikoresho ukoreha)

Mbere yo gukoresha ibyo usaruriramo n'amakurete (Tubs & Crates) bigomba kuba bisukuye, bigomba kwinkwa, gusukurwa hakoreshwe imiti isukura yabugenewe hanyuma bikunyuguzwa n'amazi meza. Ntibigomba guterekwa ku butaka ahubwo bigomba kurambikwa ku maparete cyangwa utundi tuntu twagenewe guterekwaho amaparete.



Ishusho ya 55: Avoka zitwaweneza ziva mu murima ziri mu makureti. ¹⁸



Ishusho ya 56: Kurundanya avoka hasi zitari mu makureti ni bibi cyane. ©Aden



Ishusho ya 57: Kurundanya avoka hasi zitari mu makureti ni bibi cyane. © Aden



Ishusho ya 58: Kubika no gutwara avoka mu mifuka ntabwo byemewe ©Aden.



Ishusho ya 59: Imbuto za avoka zipakiye neza ¹⁹

5.6 Uburyo bwo gusarura ndete n'uko ibintu bigenda bikurikirana

- Abasaruzi bagomba bagomba guca inzara zabo kugirango bagabanye ibyago byo kuba bakomeretsa avoka mu gihe basarura
- Uruhabuzo ruriho akuma gakata (ishusho ya 61) ku mpera rushobora gukoreshwa iyo udashyikira neza imbuto.
- Ku mpera kandi y'urwo ruhabuzo hagomba kuba hariho agafuka gasama avoka. Ako gafuka kagomba kuba gakoze mu ruhu rworohereye kugirango wirinde gukomeretsa imbuto.
- Utwuma dukata tugomba kuba dufite isuku kugirango wirinde ikwirakwira ry'indwara.
- **Icyitonderwa:** Utwuma dukata dutwawe nitwo tugomba gukoreshwa kugirango dukate neza inkondo y'urubuto hejuru y'aho iba ifashe ku rubuto. Uburebure bw'inkondo busigara ku rubuto bugomba kuba cm 1 (0.4 inc) cyangwa muni gato kugirango wirinde ko iyo nkondo yaza gukomeretsa urundi rubuto rwegeranye nayo.

¹⁸ Inkomoko: <https://www.kenyanews.go.ke/mathioya-avocado-farmers-to-enjoy-better-prices-after-striking-a-new-deal/>

¹⁹ Inkomoko: <https://www.latimes.com/world-nation/story/2019-11-20/mexico-cartel-violence-avocados>



Ishusho ya 60: Gusoroma urubuto n'intoki (ibi bikorwa gusa ku mbuto zegereye hasi)²⁰



Ishusho ya 61: Gusarura ukoresheje uruhabuzo ruriho agafuka gasama imbuto kabuza imbuto guhanuka hasi²¹



Ishusho ya 62: Imakasi isarura avoka²²

Imbonerahamwe ya 4: Isano riri hagati y'ubunini bw'imbuto n'uburemere bwazo

Ubunini bw'imbuto	Ikigereranyo cy'uburemere mu Magarama
12	300-371
14	258-313
16	227-274
18	203-243
20	184-217
22	165-196
24	151-175
26	<175 – Uburemere bw'aikarito -10 kg ku ikarito

Gusarura avoka mu Rwanda bikoreshwa intoki. N'ubwo gukoresha imashini biba bishoboka ku bateye imbere, igiciro cy'ibikoresho kiba kirenze ubushobozi bw'abahinzi bato ari nabo ahanini beza umubare munini mu Rwanda wa avoka zoherezwa mu mahanga. Abasaruzi bagomba kuhabwa inama ku buryo bwiza n'ibikoresho bikwiye bikoreshwa mu gusarura, harimo na tekinike zigabanya ibyakwangizwa no gukomeretsa imbuto. Amakurete ntagomba gupakirwa ngo yuzure no hejuru kugirango wirinde ko wakomeretsa imbuto bityo ugatanga icyuho cyo gutambutsa umwuka. Kurobanura bwa mbere bigomba gukorerwa ku murima kugirango uvanemo imbuto zakomeretse. Imakasi zigomba kuba zityaye kugirango zitangiza igiti mu gukata kandi nijoro zigomba kubikwa mu muti cyangwa icyuma cyica mikorobe kugirango wirinde kwanduzwa kwa hato na hato.



Ishusho ya 63: Amakureti yangiritse ntagomba gukoreshwa. Ishusho: © Shivachi



Ishusho ya 64: Amakurete yanduye ntagomba gukoreshwa

© Shivachi

²⁰Inkomoko: <https://gregalder.com/yardposts/how-to-harvest-avocados/>

²¹Inkomoko: <https://videohive.net/item/harvest-of-hass-avocados-with-pole/23346920>

²² Inkomoko: <https://www.amazon.co.uk/Shear-Joy-Secateurs-Comfortable-Precision/dp/B06XSX4HLR>



Ishusho ya 65: Ikurete isukuye yujuje ibisabwa kugirango itwarwemo avoka (kuyipakira neza ni ukugeza aho ikiganza gifata) Ishusho © Shivachi

Ibikoresho byo gusarura byasukuwe iyo bitari gukoreshwa bigomba kubikwa ahantu hafunze kure y'inyoni n'imbeba by'umwihariko nijoro no mu minsi y'impera z'icyumweru. Ibi birinda ko byakwangizwa n'amahurunguru y'imbeba cyangwa y'inyoni mbere ko byongera gukoreshwa.

5.7 Ibikorwaremezo bisabwa mu gihe cyo gusarura.

Imbutu zasaruwe zigomba guhita zibikwa ahantu hari amafu. Ku murima, abahinzi bagomba kubaka ahantu ho gutoranyiriza hatwikiriye bakoresheje ibikoresho bidahenze ndetse n'ububiko bw'agateganyo bw'umugaruro utegereje kujyanwa mu nzu umugaruro ushyirirwamo mu byiciro ukanatunganywa mbere yo kujyanwa hanze.

Mu bikorwaremezo ba ngombwa, harimo:

- Ibyumba bikonjesha bidakoresha imbaraga z'amashyamba;
- Ibisharagati cyangwa hangari bishyirwamo umugaruro uwurinda izuba;
- Aho gukarabira ibiganza.

Mu gihe utwara umugaruro uwuvana mu gapande uri gusaruramo uwujyana mu gisharagati cyangwa muri hangari ahatwikiriye, ni byiza gucunga neza utuyira unyuramo cyangwa uduhanda tuyayo kugirango ugabanye iyangirika ryaterwa no kubimena hasi, gukomereka inyuma ku bishishwa bitewe no kwicugusa.



Ishusho ya 66: Icyuma gikonjesha gikoresha amakara @Shivachi



Ishusho ya 67 : Uburyo budakwiriye bwo kurobanura avoka ku murima: umusaruro ushobora kwanduzwa n'ibitaka cyangwa utundi dukoko dutera indwara ndetse n'umuyaga ntutemberamo neza mu mbuto zirundanyije .(c)Aden

5.8 Imicungire y'inzu zikonjesha umusaruro nyuma yo gusarurwa.

Gukonjesha ni intambwe y'ingenzi yo kwita ku musaruro nyuma y'isarura aho ugabanya ubushyuhe bw'umusaruro wasarurwe ugamije kugabanya imikorere y'ibigize ubuzima bw'uwo musaruro nko guhumeka, kongera uburambe bwawo, bikabungabunga ubwiza bw'umusaruro, mu gihe kandi unabuza gutakaza uburemere butakara binyuze mu gutakaza amazi no kunamba.

Ibigize ugukonjesha bwa mbere cyangwa guhoza (Pre-cooling system) harimo icyuma gikonjesha gake gake, umwuka ukonje uzana imbaraga, gukonjesha gukoresha amazi, Gukonjesha ukoresheje umwuka wakuruye ndetse no guhuza umusaruro n'ibintu bikonje cyane nka balafu.

Gucunga ubushyuhe ni ikintu cy'ingenzi cyane mu kurinda ubwiza bwa avoka nyuma yo kuyisarura. Ubushyuhe bw'umusaruro buba buri hejuru y'ubushyuhe buri mu kirere urimo, buba buzamutseho dogere selisiyusi 3 kandi bugumya buzamuka iyo nta gikozwe. Ibi rero bitera kwangirika kw'ubwiza bwa cya kiribwa, kugabanyuka kw'igihe cy'uburambe, kwiyongera kwa za mikorobe no gutakaza uburemere.

5.9 Koza avoka

- Amazi meza niyo agomba gukoreshwa mu gihe woza avoka uvanaho igitaka.
- Imiti yica mikorobe ikoze mu bitunga igihingwa niyo igomba gukoreshwa wubahirije urugero rusabwa kugirango ugabanye ubwandu bwaterwa na mikorobe.
- Igishashara gishobora gukoreshwa iyo byasabwe n'umukiriya, icyo gishasha kigomba kuba cyujuje ubuziranenge bwo kuba cyaribwa.

5.10 Ingamba na Tekinike zo kugabanya iyangirika ry'umusaruro wa Avoka.

5.10.1 Kwimenyereza gusarura imbuto zeze kugirango ugabanye umubare w'imbutu izirengerana zikiri ku giti: Amoko ya avoka ashya vuba iyo yeze. Kubera uko kuntu zishya byihuse, gusarura kenshi biba bikenewe kugirango avoka zisarurwa zibe zijyanye n'ibisabwa n'abakiriya. Ibi bizagabanya izijugunywa bitewe n'uko zize cyane zikarengerana. Igenzura ryimbitse mu gihe cyo gusarura riba rikenewe kugirango urebe ko nta mbuto zeze zaba zisigaye ku biti mu murima.

5.10.2 Gukoresha isuku (Gusukura no gukoreha umuti wica mikorobe) ibikoresho bikoreshwa mu gusarura kugirango wirinde ikwirakwira: Ibikoresho bikoreshwa mu gusarura bishobora kuba inzira yo kwandura indwara mu muzigo woherejwe mu mahanga. Abahinzi bagomba gukora ku buryo ibikoresho bakoreshe nk'imakasi (sekateri) cyangwa ibyuma bisukurwa ndetse bikanyuzwaho umuti wica mikorobe. Mu ijoro, Ibikoresho byo gusarura bigomba kubikwa ahantu hafunze kandi hari umutekano kure y'inanyi n'imbeba kugirango wirinde ko byakwangizwa n'amahurunguru y'imbeba cyangwa y'inanyi.

5.10.3 Kwirinda gukomeza gukorakora cyangwa gukuba imbuto zasaruwe: Avoka muri miterere yazo zangirika ubusa (zirorohereye), bityo kugabanya inshuro zikorakoraho ni ikintu cy’ingenzi gituma ziramba, bikagabanya umubare w’izijugunywa ndetse bikanazamura umusaruro ugurishwa. Intambwe za ngomgwa umusaruro uba ugomba gucamo nizo zigomba gukorwa. Avoka zigombagutunganywa mu bwitonzi bwinshi. Nyr’umusaruro agomba guteganya ibikoresho byoroshya akazi ko kuwutwara haba ku murima ndetse n’aharobanurirwa umusaruro. Muri ibyo bikoresho harimo amakurete, ingorofani cyangwa ishareti, amakarito n’ibindi.

5.10.4 Amakureti yashyizwemo umusaruro ntagomba kuba yegeranye cyane ku buryo bibuza umwuka gutemberemo: Kwangirika guturutse mu kwitsindagiranaho ntigikunze kugaragara n’amaso iyo zikiri mbisi ahubwozigaragaza ibyasha mu gice cyimbere kiribwa (umubiri) iyo zigejejwe ku isoko bigatuma iyo loti icuruzwa nabi ndetse n’izina ry’uwazohereje mu gihugu zaturutsemo rikagira isura mbi ku isoko. Gupakira wegeranyije cyane, kuzuza amakureti ukarenza urugero bituma umwuka udatambuka neza hagati muri izo avoka bigatera ikirere kigwa neza za bagiteri zororokera ahatari umwuka (anaerobic bacteria) bigatera kubora cyangwa ukundi kwangirika kw’imbuto.

5.10.5 Guhitamo gusarura imbuto zigejeje ku gihe nyacyo cyo kwera, iziteze zigategereza isarura rikurikiyeho: Imbuto ziteze zigira ikibazo cyo kudahira rimwe ugereranyije n’imbuto ziri hafi kwera cyangwa izeze neza. Inyinshi mu mbuto ziteze zikurwamo zikajugunywa kuko ziba zitujuje ibyo abakiriya batifuza. Ibyo rero bituma uburemere bukeya bityo bikagabanya umusaruro wari uteganyijwe mu murima w’imbuto. Amahugurwa ahagije ku byo abakiriya baba bifuzwa ni ngomwa bu bagize itsinda risarura.

5.10.6 Ibyasaruwe biba bigomba huhita bikurwa ku zuba bikimara gusarurwa: Avoka zasaruwe zitangira gutakaza amazi ako kanya bitewe n’ibiba biziberamo imbere twasobanuye mu gice cya gatatu. Kugirango ukerereze igikorwa cyo guhumeka no gututubikana, avoka ziba zigomba gushyirwa ahantu hari amafu zikimara gusarurwa ku bukonge bwa Dogere 5 ku bwoko bwa “Hass” na Dogere 7 kuri avoka z’uruhu runyerera nk’ubwoko bwa “Fuerte”. Kubaka igisharagati cyo gushyiramo umusaruro ni ngombwa cyane hafi hashoboka ku murima w’imbuto ariko kigeraho umuhanda kugirango bifashe kuzegeranya no kuzitwara zijyanwa mu cyumba gikonjesha kidakoresha izindi ngufu cyangwa mu nzu yabugenewe ipakirirwamo umusaruro.

5.10.7 Kurobanura bigomba gukorwa kugirango uvanemo avoka zarwaye, izangiritse n’izakomeretse cyangwa izifite ubusembwa: Imwe mu mpamvu nyamukuru itera guhomba umusaruro nyuma yo gusarura ni ukuba muri avoka zasaruwe harimo uburwayi. Inyinshi muri Bagiteri, uduhumyo cyangwa utundi tunyabuzima dutera uburwayi byifitemo ubushoboozi bwo guhangana n’ubukonge bwo hasi cyane cyane iyo zikiri mu bikonoshwa byazo (spore form). Mu kwirinda gukura kw’indwara aho zamaze kwinjira, imbuto zangiritse n’izifite inenge ziba zigomba gukurwa mu zindi vuba hashoboka.

IGICE CYA GATANDATU

Kubika Avoka

Ingingo z’ingenzi zibandwaho muri iki gice: Abasomyi barahabwa ubumenyi bwa tekhnike ku bintu bitandukanye bisabwa kugirango ugumane ubwiza bwa avoka mu rugendo rwayo kugeza igihe igereye ku soko. Ikiguzi ndetse n’inyungu ziri mu gukoresha ububiko buteye imbere kugirango ubungabune ubwiza bwa avoka.

6.1 Kubika umusaruro

Ububiko bwiza bwa avoka zasaruwe ni ikintu cy’ingenzi kigufasha kugeza ku isoko ibintu byujuje icyo isoko risaba. Mu rusange, **Ubushyuhe, Etilene n’ubuhere bw’umwuka ukikije ibyasaruwe** nibyo bintu by’ingenzi bifite uruhare mu kubungabunga ubwiza bw’umusaruro mu gihe cyose bw’uburambe bwawo.

Impamvu ari ngombwa kubika umusaruro ahantu hakonje:

- Kugirango umusaruro ubashe kuramba
- Kugirango ubungabunge ubwiza bw’itungamubiri zirimo ndetse n’ibyo abakiriya basaba;
- Kugirango ugabanye ibihombo biterwa n’umusaruro ujugunywa kuko wangiritse.
- Kugirango haboneke umusaruro wo kurya ndetse no gutunganya wujuje ibyo isoko rikeneye.
- Kugirango wongere igihe umusaruro umara utari wangirika (Hejuru y’iminsi 21).

Avoka zibitse ku bukonje nyabwo busabwa bwa Dogere 5-7°C ndetse n’ubuhere bw’umwuka bwa (85%-90%) zizakomeza kugumana ubwiza busabwa n’abaguzi nibura igihe kirenga iminsi 30. Uwo musaruro uba ugomba kwitabwaho ku rwego rwo hejuru kugirango ucunge ko za gazi nk’umwuka, gazi karubonike na Etilene biri ahabitse umusaruro ziri mu rugero rwa 2-3% na 5-6% mu gihe umusaruro ubitse. Kugirango uburambe bw’umusaruro bubungabungwe, ni byiza kwirinda kuvanga avoka n’ibindi bisarurwa bisohora etilene nyinshi nk’imineke, amatunda, urusenda, inyanya mu gihe bibitse bigomba gutwarwa binyujijwe mu Nyanja.

Kuvanga avoka na bimwe mu bisarurwa by’amoko atandukanye mu bubiko bishobora gutiza umurindi ihinduka ry’ibara rya avoka ndetse bigatera guhisha vuba.

6.1.1 Ibintu bigenga igihe cyo kubika umusaruro wa avoka:

- Urugero rwo kwera avoka zari ziriho mu gihe zasarurwaga;
- Uburyo bwakoreshejwe mu gusarura;
- Impamvu zo mu murima mbere yo gusarura;
- Isuku n’isukura ry’ahagenewe kubikwa umusaruro;
- Ibyakorewe umusaruro ukiri mu murima mbere yo guwusarura;
- Uko uringaniza ubushyuhe;
- Ubuhere bw’umwuka w’aho ubika umusaruro.

Ubuhere rusange (RH) bwa (85%) n’ubushyuhe bw’umusaruro ni ibintu bw’ingenzi byo kwitabwaho mu kugena uko ubika umusaruro wa Avoka ku murima ariko ukurikije agaciro k’umusaruro mu kugerageza kongera uburambe bwawo.

Hariho Tekinoloji zitandukanye zihendutse zikoreshwa mu kubika umusaruro nk’uko zitondetse hano hasi:

1. Ibyumba bikonjesha bidakoresha ingufu z’amashanyarazi ahubwo bikoresha amakara: mu kubyubaka hakoresha ibikoresho biboneka hafi aho kandi bihendutse kandi bikubakwa ku murima kugirango bibikwemo umusaruro mu ijoro kandi ku bushyuhe bwo hasi bityo uburambe bw’umusaruro bukabungwabungwa.

Table 5: Ibisabwa kuba mu bubiko bwa avoka kuri buri rwego rw'uruhererekane nyongeragaciro rwazo

Urwego rwo kubikaho umusaruro wa Avoka	Ibisabwa mu bubiko					
	Ubuhehere bw'umwuka (%)	Ubushyuhe °C	Etilene	Impamvu yo kubika umusaruro	Ukubungwabun gwa gusabwa	Uwo bireba
Ibisheragati byo ku mrima	70	12-15°C	Ntayo	Utegereje kuwujyana aho ujonjorerwa	Ku rugero rwo hasi	Umuhinzi
Ibyumba bikonjesha bidakoresha ingufu z'amashanyarazi	75	9-12°C	Ntayo	Utegereje ko uwohereza mu mahanga aza kuwufata	Ku rugero rwo hasi	Umuhinzi
Mu gisharagati kirobanurirwamo umusaruro	75	10°C	Ntayo	Utegereje kuwutwara	Ku rugero ruringaniye	Umuhinzi
Ibyuma bikonjesha byo mu nzu zitunganyirizwamo umusaruro ugiye koherezwa mu mahanga	85	5-7°C	Ntayo	Icyo isoko risaba, igihe indege iri bubonekere	Ku rugero rwo hejuru	Uwohereza mu mahanga

6.2 Ibigomba kwitabwaho mu kubika ku murima ibyasaruwe

Muri rusange, ubushyuhe bw'umusaruro w'imbutu n'imboga buba bwenda kungana n'ubushyuhe bw'ikirere mu gice tubarizwamo cyegereye umurongo ugabanya isi mo kabiri, bukaba hagati ya dogere 25 na dogere 30 ariko bushobora guhinduka bitewe n'uko ikirere cyifashe. Mu bihe bimwe, ubushyuhe bushobora kuzamuka bukagera kuri dogere 38. Kuri ubwo bushyuhe bwo hejuru, uguhumeka kw'ibyasaruwe kuba kuri hejuru cyane. Uko gukumeka bizamuka (ni ukuvuga ubushyuhe bw'ahabitse umusaruro bwazamutse), ni nako uburambe bw'ibyasaruwe bugenda bugabanyuka, keretse iyo hari uburyo bwo kubihagarika mu maguru mashya. Niyo mpamvu ari byiza gusarura mu gitondo kare kugirango wirinde kubikora ubushyuhe bwazamutse kereka nyine igihe ubona ibisarurwa bigifite ikime cyaturutse ku mvura. Gukonjesha by'ibanze (ishusho ya 6.1) bifasha mu kongera uburambe bw'umusaruro w'ibiribwa bibora vuba nka avoka, imboga rwatsi n'imbuto zibora vuba nk'inkeri.

Kubera ko amashanyarazi ahenda cyane, ikiguzi cyo gukoresha inzu zifite ibyumba bikonjesha kiguma kuri hejuru, bigatuma amwe muri ayo mazu adakoreshwa mu gihe na none ibice bimwe biba bitegereye umurongo mugari w'amashanyarazi bikiri imbogamizi bitewe n'ikiguzi kinini cyo kubaka ahantu ho gukonjeshereza.

Muri iki gihe ikiri gukorwa ni ugushakisha ubundi buryo buhendutse, bwagabanya ubushyuhe bw'umusaruro wasaruwe mu gihe ubitse nijoro ugitegereje ko uza gutwarwa n'abawohereza mu mahanga, muri ubwo buryo harimo nko gukoresha ibyumba bidakoresha ingufu z'amashanyarazi, gukoresha tekinoloji ya kobaliti, ndetse no gukoresha ibyumba bikonjesha bikoresha imirasire y'izuba.



Ishusho ya 68: Ububiko bugezweho bwo guhorezamo umusaruro cyangwa kuwukonjesha by'ibanze.²³



Ishusho ya 69: Ahantu hakonjesha umusaruro w'imbutu hubatswe ku murima hadakoresha ingufu z'amashanyarazi²⁴

6.3 Gucunga ubushyuhe bwo mu bubiko

Ahantu habikwa umusaruro hubatse mu buryo bw'amakusanyirizo, za hangari barobanuriramo umusaruro bawushyira mu byiciro, n'inyubako imwe yubatse mu buryo bugezweho ishyirwamo umusaruro mbere yo koherezwa mu mahanga ndetse n'icyumba gikonjesha cyo ku kibuga cy'indege. Amakoperative cyangwa bimwe mu bishanga byashyirirwe aho kubika umusaruro nk'ibyumba bidakoresha amashanyarazi, hangari zirobanurirwamo umusaruro mu gihe ushyirwa no mu byiciro ndetse n'amakusanyirizo mato.

Kugirango igikorwa cyo gukonjesha kigende neza, ibyashyizwe muri icyo cyumba gikonjesha bigomba gusiga umwanya uhagije hagati y'ibikonjeshwa n'ibibambasi kugirango bifashe gutambukamo nta nkomyi. Umusaruro ufite ubushyuhe bwinshi niwo ushyirwa kure y'urukuta ahateganye n'aho ubukonje buturuka kugirango biwufashe gukonja byihuse. Buri gihe ujye wibuka kutarambika umusaruro hasi, koresha paleti za parasitike cyangwa se utundi tuntu twagenewe kurambikaho amakureti.

6.3.1 Ingaruka nziza zo gukoreshwa uburyo bwo kuvana mu musaruro ubushyuhe uba wavanye mu murima no kuwongerera uburambe

Kuvanamo ubushyuhe umusaruro uba wavanye mu murima nyuma yo kuwusarura ni ikintu cy'ingenzi gifasha avoka zasaruwe kugira uburambe n'ubwiza bukenewe binyuze mu kugabanya ibijyanye no gukora kw'ingirangingo zizigize nko guhumeka no gututubikana mu gihe cyo kuzitwara, kuzibika no kuzigeza ku bakiriya. Kuvanamo burundu ubushyuhe bwavuye mu murima bigerwaho ukoresheje ibyuma bikonjesha by'ibanze (gukoresha umwuka uwuhase) mu gihe gito gishoboka (Ishusho ya 5.1). Gukonjesha gake gake nabyo ni ubundi buryo bwakoreshwa, ariko umusaruro bitanga ntabwo ari mwiza cyane cyane iyo bisaba kubikorera ku musaruro mwinshi.

6.4 Ibisabwa mu kuvangura umusaruro no kuwukurikirana mu nzira zose z'ububiko.

Buri kirundo cy'amakurete kigomba gushyirwaho icyapa kigaragaza umwirondoro w'umusaruro cyangwa ikirango gifasha kuwukurikirana, aho bishoboka ni byiza gushyiraho uturango tw'umwirondoro kuko bifasha kugira umwirondoro w'umusaruro ku rugero rwo hasi rushoboka uhereye ku murima.

6.5 Gupima umusaruro

Imbuzo zivanywe mu mirima zigomba gupimwa kandi zigakorerwa igenzura harebwa ibyiciro ndetse n'uburemere bwa buri mutwaro bukandikwa ukwabwo kugirango harebwe ubushobozi bwa buri musoromyi ndetse n'uburyo yumva amabwiriza y'ubwiza bukenewe.

²³Inkomoko: <https://www.karalsogutma.com/en/our-products/cold-rooms/cold-room/>

²⁴ Inkomoko: <http://energypedia.info-Evaporative-cooling-chamber-energypedia.info>

IGICE CYA KARINDWI

Gutwara avoka

Key highlights: Muri iki gice, abasomyi baravomamo ubumenyi ku ngaruka zituruka ku buryo bunyuranye bwo gutwara umusaruro wa Avoka.

7.1 Gutwara avoka

Gutwara imbuto kuva ku murima zasaruwemo kugera ku bubiko bw'agateganyo cyangwa kuva ahantu hatandukanue (imirima) ugera kuri hangari ugomba kuzipakiriramo ni ingenzi cyane ku bwiza izo mbuto mbuto ziba ziri bugire.

Gupanga uburyo bwo gutwara umusaruro bishobora kugorana cyane bitewe n'imiterere y'abahinzi dufite mu gihugu, kuva ku rugendo rugufi rwo gutwara imbuto zasaruwe rushobora kuzamo guhagarara inshuro nyinshi kugirango ugende upakira imbuto za buri muhinzi muto cyangwa za koperative kugera ku rugendo rurerure uva mu gace runaka werekeza aho zipakirirwa zohererezwaho mu mahanga.

Hari ibintu byinshi bigomba kwitabwaho mu gihe upanga gutwara imbuto kugirango uzitware neza bishoboka mu nzira zitandukanye zigoye ariko ugomba kwita ku kintu nyamukuru aricyo kuzigumisha mu bukonje kugirango zidashya imburagihe cyangwa zikangirika.

Guhitamo neza ubukonje ushyiramo umusaruro no kwuugumisha kuri ubwo bukonje ni ikintu cyo kwitaho cyane, mbere y'uko kuzipakira bitangira, amabwiriza yo gupakira agomba gukurikizwa harimo cyane cyane kubanza gukonjesha imodoka ukayishyira ku bukonje bugomba gutwarwamo umusaruro, kwita ku isuku yayo, kureba neza ko ibyuma bikonjesha biri gukora neza ukabiregera, ukagenda unacunga ko ubukonje bugenda buhindagurika.

7.2 Ibikoresho bikenewe muri aka kazi ko gutwara umusaruro, uko biba bikoze n'uburyo bwo gutwara umusaruro w'ibintu bibora vuba

Gutwara avoka kuva ku murima kugera kunzu utunganyirizwamo mbere yo koherezwa mu mahanga no kugera ku kibuga cy'indege cyangwa ku byambu, bigomba gukorwa hifashishijwe imodoka zabigenewe zifite ubushobozi bwo gukonjesha butuma umuzigo uguma ku bukonje busabwa.



Ishusho ya 70: Imodoka itwara umusaruro itwikiriye neza Ishusho © Shivachi

Kuva mu murima ubwawo ujya ahatunganyirizwa umusaruro, gutwara avoka cyangwa umusaruro w'ibindi bihingwa bishobora gukorwa ukoresheje torotoro zitwikiriye cyangwa taragiteri zikurura utuzu dutwikiriye dufite amapine. Iyo umurima ukoreshwamo amamashini, torotoro z'amapine atatu nazo zishobora gukoreshwa. Imodoka zikoreshwa mu kwikorera umusaruro ntzigomba kuba zikoreshwa mu gutwara imyanda kugirango zidatera ubwandu bwa mikorobe mu musaruro.

7.3 Gucunga ubushyuhe mu gihe utwaye umusaruro (Kuva ku murima uwohereza ku kibuga cy'indege)

Ku murima, bishobora kudakunda gupima ubushyuhe bw'umusaruro mu gihe uri kuwutwara. Ariko rero, iyo nta modoka ifite icyumba gikonjesha ufite, ukaba ukoresha ifite igisanduku gifunze ariko kidakonjesha, ni ngombwa buri gihe kubanza kukirangaza nibura umwanya muto mbere yo gupkiramo umusaruro w'ibicuruzwa bibisi kugirango habanze hatemberemo umwuka ukonje.

Imodoka zidafite uburyo bwo gukonjesha zakagombye nibura kuba zifite uburyo bwo kwinjizamo umwuka ariko icyuma gikurura umwuka wo hanze kikaba gitereye ahantu hakwiriye kugirango ugabanye ingorane zo kuba cyakurura ivumbi mu gihe utwaye umusaruro uwujyana ku nzu utunganyirizwamo.

Kubera ko avoka zihingwa n’abahinzi bato ku buryo bisaba kubanza kuwegeranya mbere yo kuwohereza mu nzu itunganyirizwamo umusaruro ugiye koherezwa mu mahanga (Packhouse), ntabwo ari byiza gukoresha imodoka nini kugirango wirinde ko kumarana igihe kirekire imbuto wasaruye utegereje kubanza kugeza ku muzigo muzigo wuzuye iyo modoka nini uwerekeza aho utunganyirizwa. Kugumisha imbuto mu modoka itwikiriye ariko idafite uburyo bwo gukonjesha bitera guhisha kw’imbuto mbere y’uko zigera mu nzu zipakirirwamo bikangiza ubwiza bwazo ndetse ntizakirwe mu gihe zihageze.



Ishusho ya 71: Imodoka idafite uburyo bwo gukonjesha



Ishusho ya 725: Imodoka ifite uburyo bwo gukonjesha itwara umusaruro ku rugendo rugufi kuva ku nzu ipakirirwamo umusaruro werekeza ku Kibuga cy’indege © Shivachi



Ishusho ya 73: Uburyo bubi bwo gutwara avoka²⁵

7.4 Gutwara umusaruro ku ntera ndende

Gutwara umusaruro mu modoka ifite uburyo bwo gukonjesha, ubukonje bugomba gushyirwa kuri Dogere 5-8°C. Ibicuruzwa bitwawe mu mahanga bicishijwe mu Nyanja bi byiza kubitwara muri Kontineri icunzwe neza mo imbere (controlled atmosphere) hakoreshejwe kushyira ku gipimo gaze carubonike (CO₂) n’umwuka (O₂) ni ukuvuga (CO₂=6% na O₂=3%) kugirango ugumane ubwiza bw’imbuto mu gihe etilene yo ivanwamo hakoreshejwe ibimira etilene muri Kontineri. Imbaho zose zikoreshwa mu gutwara neza avoka nk’izikoze amaparete zigomba gutunganywa hakurikijwe amabwiriza y’umuryango w’Ibihugu by’iburayi (EU) 94/62/EC arebana n’ibikorwshwa mu gupakira umusaruro.

²⁵ inkomoko: <https://www.bizcommunity.co.ke/Article/111/641/173221.html>



Ishusho ya 74: Avoka zipakiye neza mu modoka izitwara

© Shivachi



Ishusho ya 75: amaparete yatunganyijwe neza (Igikoresho cyemewe) ©Shivachi



Ishusho ya 76: Akamashini gaterura kakanapakira © Shivachi



Ishusho ya 77: Kontineri nini ya puse 40 (40ft) ipakiye ibijya mu mahanga bica mu nyanja © Shivachi

7.5 Isuku y'umusaruro n'amabwiriza y'isukura







Isuku n'isukura ni ibintu byo kwitondera kugirango ugere ku buziranenge bw'umusaruro, ibintu bikurikira bigomba gukurikiranwa mu gutwara umusaruro uva ku murima ujyanwa ku nzu zitunganyirizwamo umusaruro mbere yo kuwohereza mu mahanga.

- (a) Umutandiboyi ukora ku musaruro agomba gukurikiza amabwiriza y'isuku;
- (b) Imodoka igomba kuba ifite ubuzima bwiza kandi nta hantu na hamwe imena amavuta;
- (c) Imodoka igomba kozwa buri muni kandi ibipimo byayo bikabikwa;
- (d) Abakozi bakora ku musaruro bagomba kuba bafite imyambaro y'ubwirinzi yabugenewe, harimo ikote, ingofero n'uturindantoki.

7.6 Gupanga no Kuvangura mu gihe cyo gupakira no gupakurura umusaruro.

Mu gihe cyo gutwara ku rugendo rurerure, amaparete ateretseho avoka agomba kuza apanze ku buryo umwuka utembera neza mu mbuto, gapakira amaparete mu bwitonzi bw'inshi ndetse ugakora ku buryo umwuka ugumamo imbere utaba mwinshi mu gihe imodoka ituzuye kugirango umwuka ukonje ubone uko utembera neza mu mbuto. Mu gihe utwara avoka ku ntera ndende, ntugomba kuzivanga n'izindi mbuto zihisha nyuma yo kuzisarura (imineke, imbuto za peshe, imbuto za kiwi, imyembe n'inyanya) kuko zisohora etilene ishobora gutiza umurindi uguhisha kwa avoka, bityo ntizibashe kuramba. Mu gutwara ku rugendo rugufi, kuvanga imbuto n'ibindi bintu bishobora gukorwa, ariko inkuta z'igisanduku cy'imodoka gishyirwamo umusaruro ntigombaga kubaho ivumbi kandi ibyo bintu bindi bigomba kuba

bifubitswe n’akugara gafasha gukonja kugirango umusaruro ugume ukonje ufite n’amazi mu gihe cyose utwawe.

		
Imineke	Imbuto za pishe	pome
		
Imbuto za Kiwi	Imyembe	Inyanya

Ishusho ya 78: Ibirango biba ahapakirirwa – ibintu bitemewe kuvangwa mu gupakira²⁶

7.7 Ibikoresho bikoreshwa mu gutwara umusaruro

Ibikoresho bikoreshwa mu gupakira bigomba kuboneka kandi bigasanwa igihe cyose kandi bigomba kuba bibasha gukora icyo gikorwa cyo gupakira no gupakurura mu gihe gito gishoboka. Ibikoresho byo gupakira no gupakurura bigomba kuba bikoze ku buryo butuma ibyo bikorwa bigenda neza. Utumashini duterura dukoresha gazi ntabwo ari twiza kudukoresha ahantu hafunganye cyane kuko dusohora karubone n’ubushyuhe bigatera kuzamuka kw’ubushyuhe mu cyumba gikonjesha.



Ishusho 79: Akamashini gapakurura imodoka
© Shivachi



Ishusho ya 80: Akamashini gapakira amapareti afite utubaho muni dutuma asunikwa © Shivachi

7.8 Kugira inyandiko no kubika amakuru.

Inyandiko no kubika amakuru harimo inyandiko yo kohereza ibintu igaragaza amakuru y’aho byanyuze hose (Agapande k’umurima, uburemere bw’umusaruro, umurima wahinzemo n’itariki wasaruriyeho umusaruro), amakuru y’uko imodoka yagiye ijya mu igaraje, igihe imodoka yakorewe isuku, amakuru y’ubushyuhe no kubika amakuru yose arebana nabyo kugeza ku bikoresho biteye imbere byo kugenzura ubushyuhe, byose nigombwa kubungwabungwa neza.

²⁶ Ikomoko:

https://www.google.com/search?q=no+banana+signs&sxsrf=ALeKk02Cy18UhqZShBi7t1DKFFHCQAtI3w:1614194894974&tbm=isch&source=iu&ictx=1&fir=xveGFJA4QZ0wRM%252C-u9HKx9A6XBK9M%252C_&vet=1&usg=AI4_-kT0T0bHMVlaj3W4iilB4u9O6kk_UvA&sa=X&ved=2ahUKEwjGqsDKoIPvAhV4QUEAHRtRB8gQ9QF6BAGCEAE#imgrc=xveGFJA4QZ0wRM

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Umugereka wa 1:

Uburyo bwo gupima ingano y'amavuta ndetse n'ibigize urubuto hatabariwemo amazi

UBURYO BWO GUKOresha IFURU NTOYA (Microwave)/(Uburyo bukoresha Amavuta –kongeraho-Amazi)

IBIKOresho N'IBIKENEWE

- Ifuru ntoya ("Microwave" ikoresha imirasire nk'inkomoko y'ingufu zo gutwika)
- Icyuma gityaye
- umunzani (ushobora pupima kugera kuri 0.01g.)
- Ikaramu n'urupapuro
- Isahani yo gukoresha
- Akamashini gakora imibare.
- Akantu gakatamo utuntu dutoya cyane (Rape) n'akabahu ko gukatiraho
- Avoka zo gukoresha
- Imbonerahamwe yifashishwa mu kureba isano y'ibintu (correlation table)

UKO BIKORWA

- Gufata itomboje imbuto zihagarariye izindi (sample) mu itsinda ushaka gupima (urugero nk'imbuto 5).
- Gukata umutwe w'urubuto ukawugabanyamo kabiri impagarike ukoresheje icyuma gityaye.
- Shihuraho igishishwa cy'icyuma cy'icyatsi ukimareho hasigare igice cy'imbere.
- Ukoresheshe akuma gacagagura (Rape) katakatamo uduce dutoya cyane bya gice by'imbere bibiri wari wakasemo kabiri.
- Vangavanga twa duce dutoya twa avoka wakatakase.
- Shyira isahani uri bukoresha ku munzani wandike uburemere bwayo aribwo twise (**P**)
- Fata amagarama icumi (10g) cyangwa arengaho ariyo twise (**F**) ya twa duce wakatakase uyashyire ku isahani hanyuma upime uburemere (ni ukuvuga ko **F**=uburemere bw'isahani + uduce twa wakatakasemo wayishyizeho);
- Sanzagiza twa duce twa avoka dukatakase ku isahani utadutsindagiye.
- Shyira iyo sahani mu ifuru ucanire kugeza igihe ubona yashizemo amazi burundu, uburemere butagihinduka (Shyira isahani iriho twa duce twa avoka wakatakaze wari wapimye mu ifuru. Bigomba kugenzurwa mbere ko uduce dukatakase twakamutse amazi ku rugero rudahinduka kandi ko nta guhindura ibara ngo hazemo ikiginda kubera gushaka gushirira. Regera ku muri wa Wati 500 hanyuma anyuma y'iminota 10, upime uburemere bwabyo utaretse ngo bibanze bikonje bikiri mu ifuru wabianiriragamo. Ongera ubusubize mu ifuru (microwave) bimaremo umunota 1 hanyuma wongere upime. Komeza ugenze ubikora utyo kugeza igihe uragenda ubona ikinyuranyo cy'uburemere ku nshuro ebyiri zikurikirana kitari hejuru ya 0.5mg. Kumaramo amazi burundu bifata kuva ku minota 10 kugera kuri 15 bigendanye n'ingano y'uduce twa avoka washyize ku isahani).
- Pima uburemere bw'isahani iriho twa duce twa avoka wakamuragamo amazi hanyuma wandike uburemere bwumye (**D**)
- Bara ijanisha (%) ry'uburemere bw'ibyakamuwemo amazi ugereranyije n'uburemere bwose bwa mbere yo gukamuramo amazi, ni ukuvuga Uburemere bw'ibyumwe ugabanyije uburemere bwose mbere yo gukamuramo amazi ukakuba 100.
- Bara ijanisha ry'amazi (ugutakaza amazi), hanyuma ukuremo ukuremo ijanisha ry'amazi kugirango ubone ijanisha (%) ry'amavuta.

GUKORA IMIBARE

$\% \text{ ry'ibigize avoka byumye} = \frac{[(D-P) / (F-P)] \times 100}{}$	Ni ukuvuga: Uburemere wakuyemo amazi / uburemere amazi akirimo t x 100
$\% \text{ ry'amazi} = \frac{[(F-D) / (F-P)] \times 100}{}$	Ni ukuvuga 100% - % ry'ibyakuwemo amazi

% ry'amavuta = Uburemere butahindutse – [100 % - [(F-D) / (F-P)] x 100	Ni ukuvuga ibitahindutse - % ry'amzi
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Ni mu gihe,

P = Uburemere bw'isahani ibereye aho

F = Uburemere bumbe bw'isahani iriho ibyo ugiye gupima ($P + 10g$. Za avoka wakataguye)

D = Uburemere mbumbe bw'isahani iriho twa duce dukatagute nyuma yo kubyumisha mu ifuru ($P + uburemere bwa avoka yumishijwe mu ifuru$)

a) Uburemere bw'isahano yonyine = (**P**)

b) Uburemere bw'isahani na avoka wakataguyemo ikirimo amazi (**F**) = $Q + 10g$ za avoka wakataguye

c) Uburemere bwa twa duce twa avoka twonyine wamaze kumisha mu ifuru (**D**) = (Nyuma yo kumisha)

d) Ugutakaza amazi (**x**) = F-D

Ariko kandi; % ry'amazi = $100 \times (X/10g)$ hanyuma

$$\% \text{ ry'amavuta} = KH - 100 (X/10g)$$

ICYITONDERWA: Amoko ya avoka yoherezwa hanze agomba kuba afite ijanisha ry'amazi arimo (moisture content) riri kuri 77- 80%.

(S.K. Lee and C.W. Coggins, Jr)

Dukurikije ibyagaragajwe na **S.K Lee** ijanisha ry'ingano y'amavuta ku bwoko runaka ritangwa n'ikinyuranyo cy'ibibugize bidahinduka (Constant) n'ijanisha ry'ingano y'amazi arimo (Moiture content). Ibi bihinduka uva ku bwoko bumwe ujya ku bundi. Nk'urugero kuri "Hass" na "Fuerte" bimeze nk'uku bigaragara hasi:

Ubwoko (Variety)	Ibidahinduka(Constant) (K)
Hass (H)	(KH) = 87.9 %
Fuerte (F)	(KF) = 89.8 %

Urugero ku bwoko bwa "Hass":

P = Uburemere bw'isahani ibereye aho = 5.00g.

F = Uburemere bumbe bw'isahani iriho ibyo ugiye gupima ($P + 10g$. Za avoka wakataguye) = 15.00g

D = Uburemere mbumbe bw'isahani iriho twa duce dukatagute nyuma yo kubyumisha mu ifuru ($P + uburemere bwa avoka yumishijwe mu ifuru$) = 7.20g

a) **% ry'ibigize avoka byumye = [(D-P) / (F-P)] x 100** i.e. Uburemere bw'ibyumishijwe / uburemere bitari byumishwa x 100

$$= [(7.20-5.0) / (15.0 - 5.0)] \times 100$$

$$= [2.2/10] \times 100$$

$$= 22 \%$$

b) **% ry'amazi = [(F-D) / (F-P)] x 100** cyangwa no nane 100% - 22%

$$= [(15.0-7.2) / (15.0-5.0)] \times 100$$

$$= 7.8/10 \times 100$$

$$= 78 \%$$

c) **% ry'amavuta = Ibitahindutse (Constan) – [(F-D) / (F-P)] x 100** ni ukuvuga ibitahindutse (Constant) - % ry'amazi

$$= KH \% - 78 \%$$

$$= 87.9 \% - 78 \%$$

$$= 9.9 \%$$

ICYITONDERWA Kugirango ibisubizo uza kubona bize kuba byizewe neza, ugomba gufata twa duce twa avoka ducagaguye cyane (sample" difite uburemere buri hejuru y'amagarama 10 (10g).

Umugereka wa 2:

GUKOresha IFURU ISANZWE (Uburyo bukoresha Amavuta –kongeraho-Amazi)

IBIKOresho N'IBIKINEWE

- Ifuru ifite ubushobozi bugera kuri dogere 105. (*Icyumba cyagenewe guwika cyangwa kumisha ikntu runaka kyageza gishizemo amazi*)
- Icyuma gityaye
- Umunzani (ushobora pupima kugera kuri 0.01g.)
- Ikaramu n'urupapuro
- Isahani yo gukoresha
- Akamashini gakora imibare (Calculator).
- Akantu gakatamo utuntu dutoya cyane (Rape) n'akabahu ko gukatiraho
- Avoka zo gukoresha
- Imbonerahamwe yifashishwa mu kureba isano y'ibintu (correlation table)

UKO BIKORWA

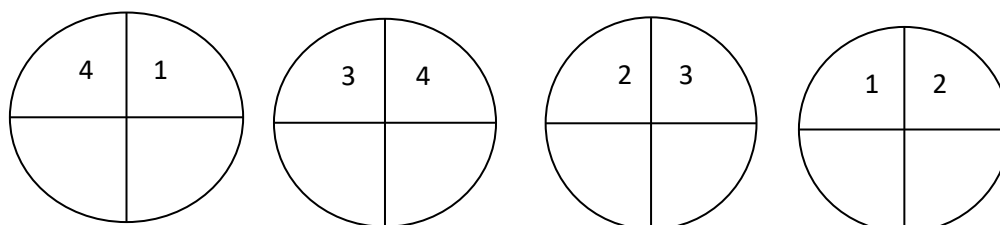
(Ni kimwe n'uko twabivuze haruguru ku gukoresha ifiri ntota ya "microwave")

- Gupima buri sahani, ikirahuri hanyuma ukandika uburemere ubonye aribwo bwiswe (P).

ICYITONDERWA: buri sahani igomba kuba iriho no y'itsinda ugiye gupima (Batch Number).

P Uburemere bw'isahani	F Uburemere bw'ibyo ugiye gushyira mu ifuru (harimo n'uburemere bw'isahani)	D Uburemere bw'ibimaze kvanwamo amazi, byumishijwe (uburemere bw'isahani nabwo burimo)
Urugero: 5.00g		

- Gukata urubuto mo kabiri impagarile, uvaneyemo ikibuto;
- Fata igice kimwe cy'urubuto wakase, shyira mu ifuru uduce duto wacagaguyemo dufite 1.5mm z'umubyima, ugomba kudikata ukoresheje akantu gkata utu duto (slicer).
- Utuntu wakataguye ugomba kutugabanyamo ibice bine, ugakatamo umurambararo watwo uva ku munini ujya ku muto. Hanyuma, ugashyira ibyo byiciro bine ku birahuri bine birambuye bifite numero utabigerekeranyije, ukurikije aya mashusho ari hasi agaragaza twa duce tune wagabanyijemo ushyira muri kimwe cya kane ukwacyo:



- Pima buri sahani/ikirahure kiriho ibyo ugiye gutwika bikiri bibisi wandike uburemere bwacyo (F) ni ukuvuga uburemere bw'ibibisi (Wongeyeho n'uburemere bw'isahani) mbere yo kubishyira mu ifuru ngo ubyumishe.

P Uburemere bw'isahani cg ikirahure	F Uburemere bwa avoka icagaguye (+ isahani) mbere yo kumisha	D Uburemere nyuma yo kumisha (+ isahani)
Urugero: 5.00g	Urugero: 15.00g	

- f) Ifuru igomba kuba iri ku bushyuhe busabwa (105°C) mbere yo gushyiramo ibyo ugiye kumisha.
(Ushobora gushyira akuma kabara ubushuhe “Thermometer” mu gikombe cyuzuyemo amavuta hanyuma ukagishyira mu ifuru kugirango kagufashe kugera ku bushyuhe wifuza).
- g) Shyira ibyo ugiye kumisha mu ifuru. Byotse mu ifuru amasaha 4 ku bushyuhe bwa 105°C (cyangwa se isaha 1 ku bushyuhe bwa 150°C).
- h) Pima buri sahani/ikirahure kiriho ibyo wamaze kumisha hanyuma wandike uburemere bwavyo aribwo (**F**) ni ukuvuga Uburemere bwa avoka icagaguye (+ isahani) mbere yo kumisha.

P	F	D
Uburemere bw'isahani cg ikirahure	Uburemere bwa avoka icagaguye (+ isahani) mbere yo kumisha	Uburemere nyuma yo kumisha (+ isahani)
Urugero: 5.00g.	Urugero: 15.00g	Urugero: 7.20g

- i) Bara ijanisha % ry'amazi yatakaye (Moisture Loss), hanyuma ukuremo ijanisha % ry'amazi mu bitahindutse (**Constant**) kugirango ubone ijanisha % ry'ingano y'amavuta

Urugero ku bwoko bwa “Hass” (nk'uko hejuru bimeze):

P = Uburemere bw'isahani cg ikirahure = 5.00g.

F = Uburemere bwa avoka icagaguye ($P + 10g$. Za avoka zikataguyemo) = 15.00g

D = Uburemere nyuma yo kumisha ($P + ibyumishijwe$) = 7.20g

- d) % ry'ibigize avoka byumye = $[(D-P) / (F-P)] \times 100$ i.e. Uburemere bw'ibyumishijwe / uburemere bitari byumishwa x 100
 $= [(7.20-5.0) / (15.0 - 5.0)] \times 100$
 $= [2.2/10] \times 100$
 $= 22 \%$
- a) % ry'amazi = $[(F-D) / (F-P)] \times 100$ cyangwa no nane 100% - 22%
 $= [(15.0-7.2) / (15.0-5.0)] \times 100$
 $= 7.8/10 \times 100$
 $= 78 \%$
- b) %% ry'amavuta = Ibitahindutse (Constant) - $[(F-D) / (F-P)] \times 100$ i.e. ni ukuvuga ibitahindutse (Constant) - % ry'amazi
 $= KH \% - 78 \%$
 $= 87.9 \% - 78 \%$
 $= 9.9 \%$

IMBONERAHAMWE IGARAGAZA ISANO (CORRELATION TABLE)

Ubwoko bwa Avoka (Variety)	ibidahinduka “Constant” (K)	Ijanisha ryo hasi % - igihe cyo kubyakira		
		% ry'amazi [100 % - % DM]	% ibyumishijwe [100 % - % ry'amazi]	% amavuta arimo [ibidahinduka “Constant” (K) - % ry'amazi]
Hass (H)	(KH) = 87.9 %	79	21	8
Fuerte (F)	(KF) = 89.8 %	80	20	9
Pinkerton		80	20	
Ettinger		80	20	
Reed		80	20	
Nable		81	19	