

UMUGESE WA KAWA MURI AFRIKA

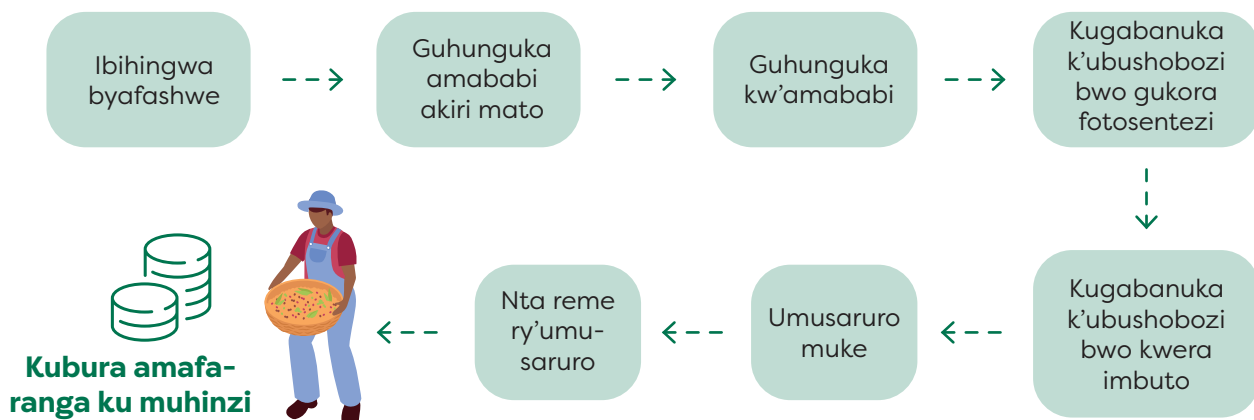
Umugese wa kawa uzwi nk'umugese w'icunga rihye (oranje), uterwa n'uduhumyo duto cyane twitwa *Hemileia vastatrix*. Imenyekanira ku dusabo tw'ifu y'umuhondo umuntu asanga ku ruhande rwo munsu rw'ikibabi cy'ikawa. Umugese wa kawa yangiza cyane igihingwa cy'ikawa bitewe no gutakaza amababi menshi bigatuma umusaruro ugabanuka cyane kugera kuri 75%, kandi mu bihe bimwe na bimwe bishobora no gutuma ubuzima bwose bw'igihingwa bwangirika.



Ishusho ya 1: Amababi y'ikawa arimo n'umugese wa kawa
© Purdue University

Ingaruka ziterwa n'umugese wa kawa

Ibiti by'ikawa byanduye bishobora gutakaza amababi yabyo akiri mato (Ishusho ya 8), kandi indwara zikomeye zishobora gutuma amababi yayo ahindagurika cyane. Ibyo bituma amashami agaragara nkaho ari maremare kandi adatwikiriye, ndetse bikagabanya ubushobozi ibiti bya kawa bifite bwo gukora fotosenteze. Ibyo bikagabanya nanone ubushobozi bw'igiti cy'ikawa bwo kwera imbuto. Bitewe no gutakaza amababi ndetse n'intege nke igihingwa kiba gifite, bituma umusaruro ugabanuka, bikagira ingaruka ku ireme n'ubwinshi bw'umusaruro.

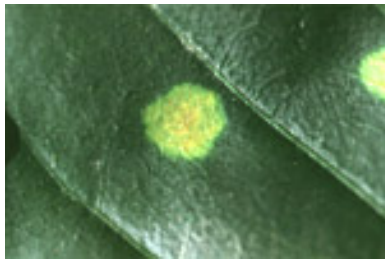


Ishusho ya 2: Uko indwara y'umugese wa Kawa ikura n'ingaruka zayo

Ibimenyetso biranga umugese wa kawa

Uduhumyo twa *Hemileia vastatrix* dutangira kubaho igihe udukoko twayo twinjiye mu mababi y'ikawa. Ku ruhande rwo munsu rw'amababi hazaho ifu y'umuhondo imeze nk'agakungugu gasa n'icunga rihye. Iyo utwo duhumyo tugeze ku butaka, turakura maze indwara igatangira kwandura.

Ibimenyetso by'ibanze biboneka ni utudomo duto tw'umuhondo ku gice cyo hejuru cy'amababi (ishusho ya 4). Amaherezo, uko igihe kigenda gihita, utwo dukoko twishyira hamwe, tugenda turushaho kugera ahantu hanini, maze tukaba utudomo twinshi tw'umuhondo ku ruhande rwo munsu rw'amababi (ishusho ya 5). Ukwangirika kw'amababi yifiteho umukungugu ku gice cyo hasi cy'amababi bishobora kugaragara mu ibara ry'umuhondo w'icunga cyangwa rimwe na rimwe mu ibara ry'umutuku w'icunga, bitewe n'akarere. Udusabo turi ku mababi yafashwe tugenda tuba twinshi tubyara ibidomo binini bidasanzwe (ishusho ya 6). Ku ishusho ya 7 ushobora kubona amababi y'ikawa yanduye uburwayi mbere yuko yuma no guhindura ibara agasa umukara. Uko igihe kizagenda gihita, aho udusabo turi hazagenda huma hagahinduka hagasa umukara nk'uko ubibona, mu gihe imitwe y'amababi yo ikomeza kwanduza umugese uterwa na irediumu.



Ishusho ya 3: Ibimenyetso by'ibanze, ukwangirika byagaragaye ku giti cy'ikawa.



Ishusho ya 4: icyiro cyo gukura kuburwayi buterwa na urediniospores munsu y'amababi mu ibara ry'umuhondo nyuma y'iminsi 10-14 yo kwandura.
© Phil A. Arneson



Ishusho ya 5: icyiro cy'uburwayi bwakomeje kugaragara cyane ku mababi mu ibara ry'umuhondo by'uduhumyo bikomeza kuba byinshi munsu y'ikiabi cy'ikawa. mu gihe cy'ibyumweru 3-4.



Ishusho ya 6: Ibiti by'ikawa byafashwe n'umugese wa kawa.
© Ezequiel Becerra - AFP/Getty Images



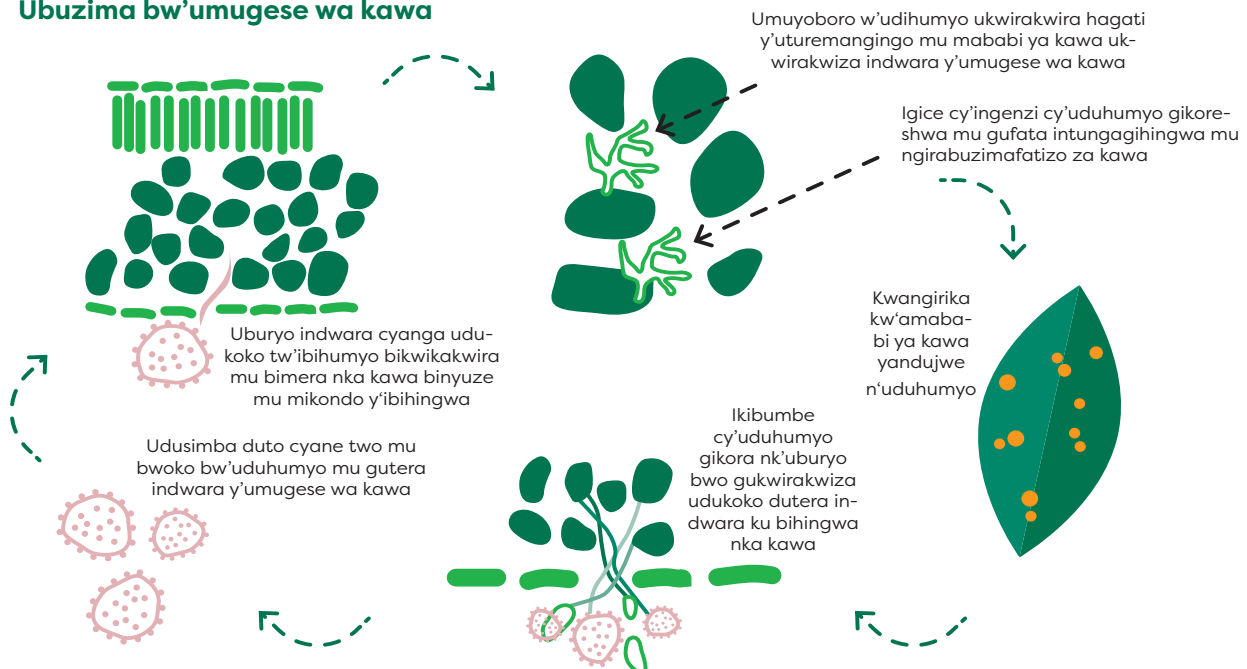
Ishusho ya 7: Gutakaza amababi biterwa n'umugese wa kawa © Dr. Melanie Bordeaux

Imiterere y'ubwiyongere bw'umugese wa kawa

Mu Rwanda, imiterere y'ibidukikije ifasha cyane kororoka k'utwo duhumyo: ubushyuhe bw'ikire-re buri hagati ya 21 na 22 °C, n'igihe cy'imvura kirekire, cyane cyane kuva muri Werurwe kugeza muri Gicurasi n'igihe gito cy'imvura kuva muri Nzeri kugeza mu Gushyamba, bituma haba ubuhehere bwinshi (70 - 80%) bufasha cyane kororoka k'uduhumyo duterwa umugese wa kawa. Imvura ifasha utwo dukoko tw'ibihumyo kororoka igatuma indwara ikwirakwira. Mu gihe cy'imvura, indwara ziroroka kandi zigakwirakwira.

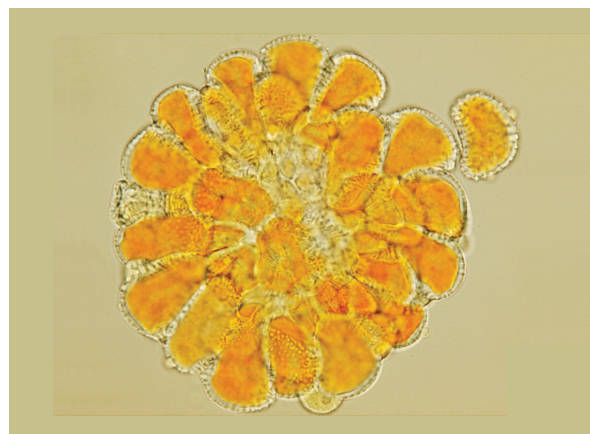
Urubuto rw'uduhumyo tw'umugese wa kawa rwinjira mu mababi y'ikawa binyuze mu tubyimba duto cyane twitwa "stomata" turi ku ruhande rwo munsu rw'amababi y'ikawa. Iyo utwo duhumyo twinjiye mu kibabi imbere, ikwirakwiza igice cyayo cyitwa mycelium, gikurura intungamubiri, kikajya mu ngirabuzimafatizo z'ikibabi. Ikoresha imiterere yihariye yitwa hositoria (haustoria) kugira ngo ifate intungamubiri mu ngirabuzimafatizo. Nyuma y'igihe runaka, haboneka udu-simba tw'ibara ry'icyatsi. Ibitera ibihari biterwa n'uducurama twinjiye mu gashami tuvuye mu gice cy'inyuma, aho utuvungukira duto cyane (utwo bita stomata) ari twinshi.

Ubuzima bw'umugese wa kawa



Ishusho ya 8: Imibereho y'indwara y'umugese wa kawa. Ishusho yavanywe mu nyandiko ya Phil A. Arneson, Kaminuza ya Cornell, 2011

Utwo dukoko tumera mu gihe imvura iguye ikamara byibuze amasaha atandatu, bityo rero igice cyo hejuru cy'ibibabi kigomba kuba gitose kubera imvura igwa idahagarara cyangwa kubera ikime cyinshi. Iyo utwo dusabo twa mbere tw'umuhondo tubonetse kandi tukagaragara mu murima, bivuga ko utwo dukoko tumaze kumera kandi turya amababi y'ikawa, kandi haba hashize iminsi igera kuri 24 icyo gikorwa gitangiye.



Ishusho ya 9: Imiterere ya Uredinium ibyara umugese wa kawa mu ibara ry'umuhondo w'icunga rihye. © Carvalho et. (2011)

Uburyo bwo kugenzura uduhumyo twa “Hemileia vastatrix”

Kurinda amababi y’ikawa kwangizwa n’umugese wa kawa biba ingenzi, cyane cyane mu gihe cy’imikurire y’imbuto, kuko amababi mazima akenewe kugirango haboneke ibi-zitunga harimo na “carbohydrate”. Kugirango hakumirwe umugese wa kawa mu buhinzi bw’umwimerere, hagomba gufatwa ingamba zikurikira harimo izishingiye k’umuco ndetse n’ingamba zo gukumira:

1. Gucunga neza igicucu mu mirima ya Kawa

Igicucu cyiza kirinda umugese wa kawa, bishobora kugerwaho hatewe amoko atandukanye y’ibiti, igihe bimaze, ibiti bitanga igicucu kigereranye n’ibitanga igicucu cyo hejuru mu rwe-go rwo kubona igicucu cyiza ndetse gihagije mu buhinzi bw’ibiti bivangwa n’imyaka. Igicucu nticyagombye gukingira izuba burundu, ahubwo cyagombye gutuma urumuri ruringaniye ru-cengera. Kuba hariho ibiti bifite imyaka itandukanye, bituma habaho igicucu gihoraho, kubera ko ibiti bimaze igihe kinini bishobora gukatwa cyangwa bigasaza. Ibiti bifasha mu kugenzura ikirere cy’imirima y’ikawa, kandi ibyo ni iby’ingenzi cyane kubera ko ibimera by’ikawa byumva cyane impinduka z’ubushyuhe.

Nyuma y’igihe cyo gusarura ikawa, kugabanya amashami y’ibiti by’igicucu bishobora gutangira mu mpeshyi, ndetse bigakomeza gukorwa no mu ntangiriro z’igihe cy’imvura. Mugihe cy’izuba, ibiti by’ikawa bisaba igicucu cyinshi, ku bw’ibyo si ngombwa kugabanya cyane amashami muri kiriya gihembwe cy’umwaka. Mu ntangiriro z’igihembwe cy’imvura, hakenewe urumuri rwinshi ku bita by’ikawa kugirango birinde ibibabi bya kawa, bityo rero ni ngombwa cyane gukonorera. Byongeye kandi, ibiti by’igicucu bifite ubushobozi bwo kongera uburumbuke bw’ubutaka no kongera ifumbire mu bukata kandi ibyo byongerera ubushobozi kawa mu guhangana n’ind-wara ziterwa n’uduhumyo. Igicucu gitanga ibihe byiza kubanzi karemano kandi ibyo birinda kwi-yongera kw’indwara (Reba urupapuro rwerekana “Ibiti bitanga igicucu mu buhinzi bw’ibiti bivangwa n’imyaka mu Rwanda” kuri Naturland Academy)



Dukurikije ibipimo bya Naturland, hakenewe byibuze ibiti 70 bitanga igicucu kuri he-gitari bigatanga igicucu kingana na 40% umwaka wose. Hakenewe na none amoko 12 atandukanye y’ibiti bitanga igicucu kuri hegitari imwe n’ibiti; hanyuma ibiti bya kawa n’ibitanga igicucu bigomba gukora inzego eshatu z’igisenge cyangwa byibuze inzego ebyiri kandi ibi bigira uruhare mu gutuma ibihingwa birushaho kuba byiza no gukumira

2. Gukata kawa no gukuraho ibyonnyi

Ubundi buryo bw’ingenzi ni gukonorera ibiti bya kawa yafasha kuvugurura ibiti bya kawa bishaje. Ibyo bivuze gukuraho amashami n’ibiti bidatanga umusaruro kandi bituma habaho gukura kw’ibiti bishya. Gukata byafa-sha kurandura indwara ziterwa n’uduhumyo no gukura-ho amashami yose yangirirtse kugirango igiti cya kawa gishobore kuvugururwa. Gukonorera bikunda kubaho mu mwaka wa gatatu wo gusarura ikawa iyo hari ibimenyet-so bigaragaza gusaza, bishobora kuba mu mwaka wa gatatu w’umusaruro, cyangwa bishobora kuba nyuma yimyaka itanu kugeza kuri itandatu nyuma yo gutera ika-wa. Ni ngombwa ko gukonorera bikorwa nyuma yo gu-sarura ikawa, bityo bigomba gukorwa mbere yuko ibiti byongera kuzana ururabo.

Ibimenyetso bigaragaza gusaza kw’ibiti bya kawa bishobora kuba:

- amashami adafite um-usaruro
- amashami yangirirtse cyangwa yumye (kuva hagati kugeza ku gice cyo hejuru y’igiti).
- Amababi make cyane
- Yanduye n’ibyonnyi

3. Gukoresha ifumbire y'imborera

Imyunyungugu ikoreshe mu buhinzi ishobora gufasha no gukumira umugese wa kawa binyuze mu kwita ku buzima bwa kawa muri rusange n'ubushobozi bwo guhangana n'ibibazo. Binyuze mu kongeramo ibinyabuzima bito cyane by'ingirakamaro, ubutaka bugira imiterere myiza, bityo ihibingwa bikabasha gufata intungamubiri n'amazi neza. Ibyo bituma ibihingwa birushaho guhangana n'akaga gaterwa n'umugese wa kawa kandi bigatuma birushaho kugira ubuzima bwiza.

- Imikoreshereze myiza y'ibinyabuzima: (ibinyabuzima bitanga umusaruro mwiza ni ibinyabuzima bivanze hakurikijwe umuco bigakura mu buryo busanzwe, kandi bishobora gukoreshwa mu kurumbura ubutaka no gukura kw'ibihingwa)
- Ifumbire y'inka iboze neza

Ushobora kubona izindi mfashanyigisho kurubuga rwa interineti rwa Naturland Academy:

- **Uburyo bwo gukora ifumbire**, Naturland Academy
- **Ifumbire iva mu bishishwa bya Kawa**, Naturland Academy
- **Igitabo ku gukora ifumbire hifashishwa iminyorogoto (Vermicompost)**, Naturland Academy



4. Gukoresha ibiti byiza byabanguriwe no gutoranya ingemwe nziza zo gutera

Ni iby'ingenzi guhitamo ingemwe nziza zidafite udukoko n'indwara, no guhitamo ubwoko bw'ikawa butarwara umugese wa kawa kandi buhuje n'ikirere cy'aho umuhinzi akorera imirimo ye. Niba umuhinzi ahisemo imbuto ze bwite zo guhinga ni ngombwa guhitamo:

- Imbuto zitarimo udukoko n'indwara (ibyo bishobora gukorwa binyuze mu kwitegereza igiti n'amaso y'umuntu)
- Ibityo by'imbuto byiza birebire kandi bishishye.
- Ibishyimbo bifite ingano imwe n'ubuzima bwiza

Umuhinzi ashobora gusuzuma imbuto akoresheje uburyo bwo kuzishyira mu mazi zikareremba kugirango ahitemo imbuto nziza. Shyira imbuto mu ndobo y'amazi hanyuma uhitemo imbuto zibiye hasi. Imbuto za kawa zibiye nizo nziza kuko ziba zifite ubuzima bwiza kandi zikuze.

Niba umuhinzi ahisemo gukoresha ingemwe za kawa, ni ngombwa guhitamo igiti cyiza gifite imiterere yifuzwa akaba aricyo kivaho izo ngemwe, urugero:

- Igiti gishobora guhangana n'indwara zisanze cyangwa gifite ubushobozi bwo gutanga umusaruro mwinshi mu murima w'ikawa kandi kitarwaye udukoko n'ibyonnyi.
- Igiti kimaze hagati y'imyaka 7 na 12
- Igiti cyera imbuto nyinshi



Ishusho ya 10: Gusuzuma imbuto ukoresheje uburyo bwo kuzishyira mu mazi izirwaye zikareremba & naho izimeze neza kandi zeze zo zikibira. © Amanda Bense

Abahinzi bashobora guhitamo ingemwe nzi-za zo gutera hitawe mu gukurikirana aho ituruka muri pepiniyeri zemewe kandi zifite uburenganzira bwo gutubura. Gusuzuma bishobora na none kuba hakoreshejwe amaso, aho abahinzi bashobora kugenzura niba nta bimenyetso by'indwara cyanga ibyonnyi bigaragara ku ngemwe.

Amwe mu moko ashobora guhingwa afite ubudahangarwa bukomeye mu kurwanya umugese wa kawa ni:

Ingemwe	Ubwoko
Ruiru II	Arabica
SL 28	Arabica
Batian	Arabica
Tuzza	Arabica
Sarchimor	Arabica x Robusta
Pop 2/91	Arabica
Catimor T8663	Arabica x Robusta
Timor hybrids	Arabica x Robusta

Imbonerahamwe 1: Amoko meza y'ikawa mu Rwanda,

5. Ibinyabuzima bikoreshwa mu kurwanya umugese wa kawa

Kurwanya uduhumyo dutera umugese nka *H.vastatrix* bishobora gukorwa binyuze mu kwinjiza udukoko duto dutandukanye dushobora gukora nk'imiti y'ibinyabuzima. icyakora, igiciro cy'ibintu nk'ibi bigenzura ibinyabuzima ni igice cy'ingenzi ugomba kuzirikana, kubera ko igiciro cyabyo kiri hejuru gishobora kugira ingaruka ku bukungu bw'ubuhinzi. Ingamba zo kugenzura indwara hakoreshejwe ibinyabuzima, bikoresha uburyo nko guhatana, guhanganyira intungabuzima, cyangwa kurwanya indwara bishobora kurwanya udukoko n'ibyonnyi. Ibi binyabuzima birimo: ibihumyo, bagiteri n'udukoko, bifite ubushobozi bwo kubuza imikurire y'umugese wa kawa. Mu guhinga ibiti by'ikawa muri gahunda y'ibiti bivangwa n'imyaka, aba banzi karemano bashobora kugaragara mu mirima ya kawa.

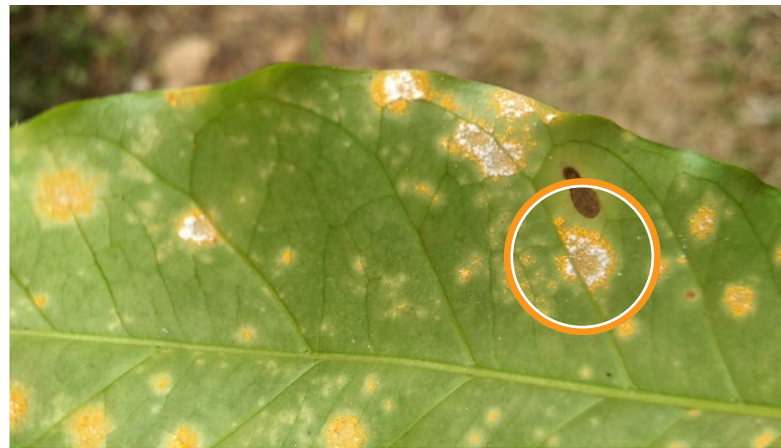
Urutonde rw'ibinyabuzima bikoreshwa mu kurwanya umugese wa kawa:

- Uduhumyo: *Calonectria hemileiae*, *Lecanicillium lecanii* (ishusho ya 13), na *Trichoderma harzianum*.
- Udukoko: *Ricoseius laxocheles*
- Uturemangingo tw'utunyabuzima: *Bacillus lentimorbus* na *Bacillus cereus*.

6. Gutera imiti ikozwe mu muringa yica uduhumyo

- Copper Oxychloride/ "Oxychlorure de cuivre"
- Bordeaux mixture
- Copper sulphate + ishwagara
- Sulphur + ishwagara (ishwagara yifitemo sulphur)

Kimwe no gukoresha ibinyabuzima karemano, imiti yica uduhumyo (fungicide) ikozwe mu muringa irahenze cyane, kandi ntishobora kugera ku bahinzi bato. Gukoresha imiti yica uduhumyo

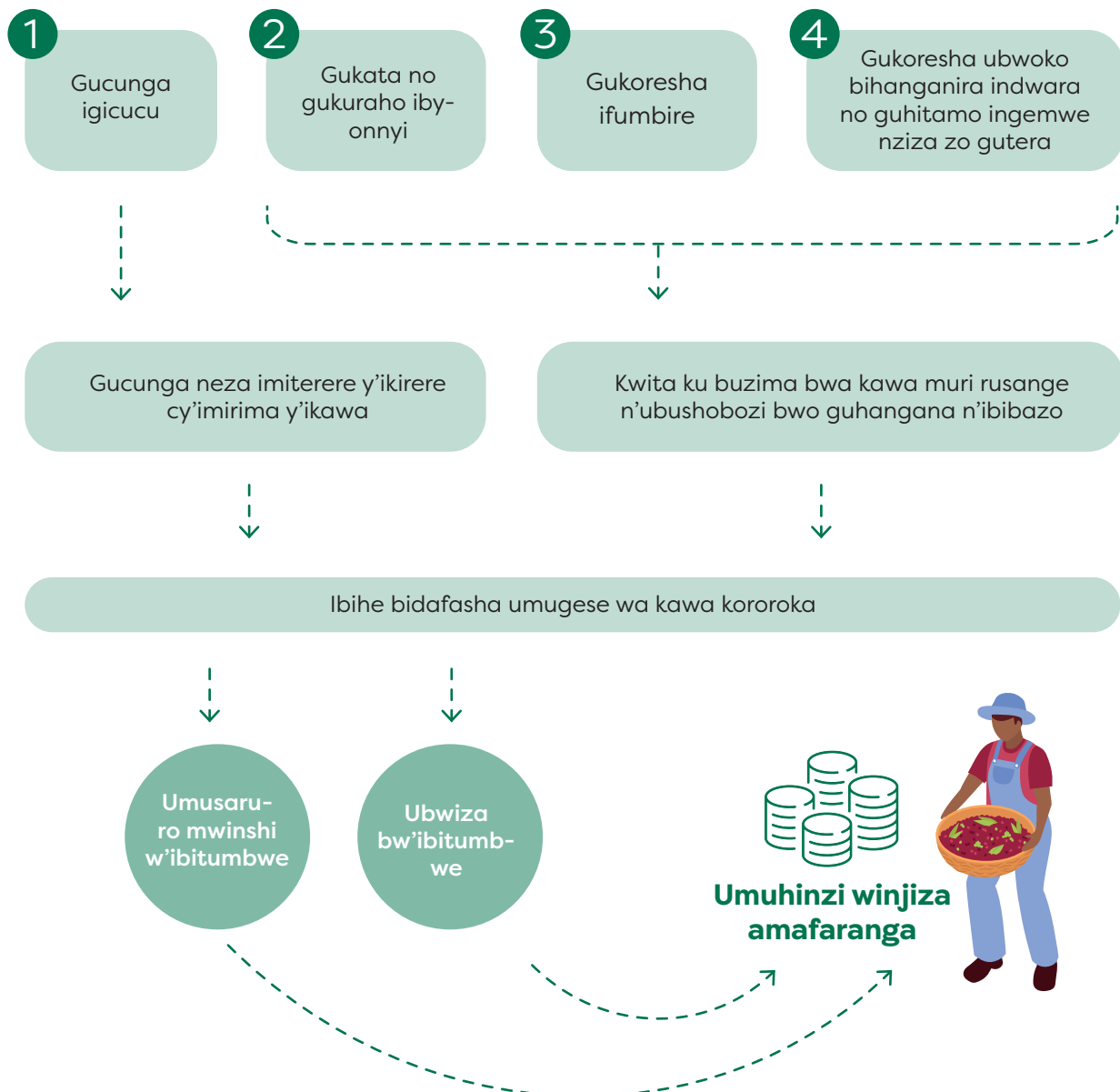


Ishusho ya 12: *Lecanicillium lecanii* (sipore z'umweru) zigaba igitero kuri *H.vastatrix* (udusabo tw'umuhondo) ku mababi y'igiti cya kawa. © Dr. Melanie Bordeaux

ukurikije ibipimo bya Naturland bisaba gutegura umuringa ukoreshwa nk'uburyo bwo gukingira kandi ingano ntiyarenza kg 3 kuri hegitari mu mwaka.

Uburyo bwo kurwanya indwara hakoreshejwe ibinyabuzima bushobora kuba budakwiriye gukoreswa mu mirima yose. Gushyira mu buhinzi ibikoresho byo kurwanya indwara n'imiti yica uduhumyo ikozwe mu muringa bizaba bihenze, bisaba abakozi n'ibikoresho bikwiye byo kuyikora. Urwego rw'ubuziranenge rushobora kuba rutari rumwe buri gihe kuko biterwa n'uburemere bw'ubwandu, ikirere, imiterere iboneye y'ibinyabuzima kugira ngo byororoke n'ibindi. Hakwiye gushyirwa imbaraga nyinshi mu gukumira ubwandu hakurikijwe ingamba 1, 2, 3 na 4. Ibi bishobora kongera umubare n'ubwiza bw'ibitumwe bikongera n'umusaruro

Kurwanya indwara mu mirima ya kawa bisaba gukurikrana mu buryo buhoraho no kugenzura mu murima hagamijwe kumenya uburwayi bushya hakiri kare. Ibyo bituma abahinzi bagira igihe gihagije cyo kugira icyo bakora mbere y'uko hagira ibyangirika.



Ishusho ya 13: Incamake y'ingaruka zo guhangana n'umugese wa kawa binyuze muco

Inkomoko

Koutouleas, A. (2023). Coffee leaf rust: wreaking havoc in coffee production areas across the tropics. *Plant health cases*, (2023), phcs20230005.

De Filho, E.V. and Domian, C.A. (2019) Prevention and Control of Coffee Leaf Rust: Handbook of Best Practices for Extension Agents and Facilitators. Tropical Agricultural Research and Higher Education Center (CATIE): Turrialba, Costa Rica. 2019.

Koutouleas, A. and Collinge, D.B. (2022) *Coffee Leaf Rust*.

Carvalho, C.R., Fernandes, R.C., Carvalho, G.M.A., Barreto, R.W. and Evans, H.C. (2011) Cryptosexuality and the genetic diversity paradox in coffee rust, *Hemileia vastatrix*. *Plos One*6(11), e26387.

Koutouleas, A., Collinge, B.D. and Ræbild, A. (2022) Alternative plant protection strategies for tomorrow's coffee. *Plant Pathology*.

African Organic Agriculture Training Manual: FiBL, Research Institute of Organic Agriculture

Arneson, P.A. 2000. Coffee rust. The Plant Health Instructor (Updated 2011). DOI: 10.1094/PHI-I-2000-0718-02. <http://www.apsnet.org/edcenter/intropp/lessons/fungi/Basidiomycetes/Pages/CoffeeRust.aspx>

Arneson, P.A (2011) Coffee rust. Available at: <https://www.cabdirect.org/cabdirect/abstract/2013780411>

Inkomoko y'amafoto

Ishusho ya 1: Purdue University (photo/courtesy of Catherine Aime)

Ishusho ya 3 na 4: Arneson, P.A. 2000. Coffee rust. The Plant Health Instructor. DOI: 10.1094/PHI-I-2000-0718-02, updated 2011. <https://www.apsnet.org/edcenter/disandpath/fungalbasidio/pdlessons/Pages/CoffeeRust.aspx>

Ishusho ya 5: Nigel Cattlin/Alamy, <https://www.britannica.com/science/coffee-rust/images-videos>

Ishusho ya 6: Ezequiel Becerra – AFP/Getty Images, <https://www.britannica.com/science/coffee-rust/images-videos>

Ishusho ya 7 na 12: Courtesy of Dr. Melanie Bordeaux, director of NICA FRANCE Foundation's research center, Nicaragua

Ishusho ya 8: Figure adjusted from Vickie Brewster (Arneson, 2011)

Ishusho ya 9: Courtesy of Carvalho et al. (2011), Creative Commons Attribution 2.5 via Wikimedia Commons, https://commons.wikimedia.org/wiki/File:Hemileia_vastatrix_Uredinium_02.png

Ishusho ya 10: Amanda Bense, <https://sites.middlebury.edu/amandabense/2012/08/07/the-coffee-process-from-field-to-roastery/>

Ishusho ya 11: Figure adjusted African Organic Agriculture Training Manual: FiBL, Research Institute of Organic Agriculture. Suitable coffee varieties for East Africa, Rwanda.

Itariki yavugurwe bwa nyuma: 08/2024.

