



SCIENTIFIC WRITING TRAINING



Data presentation, visualization and reproducibility



Robert Kawuki, PhD

17 JUNE, 2026
10 AM – 12 PM

REGISTER NOW

MEETING ID 924 7554 6434
PASSCODE 693214

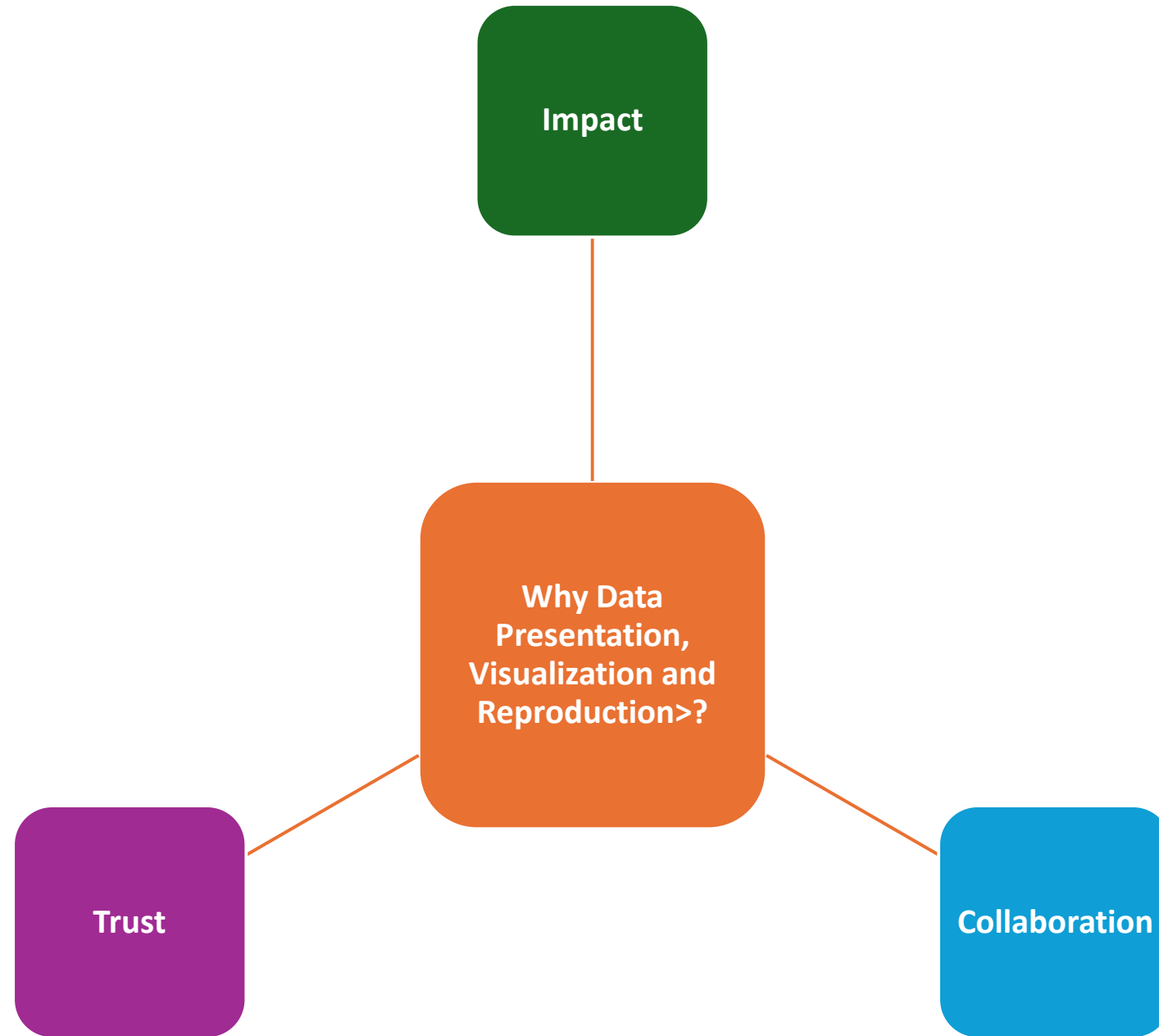


ujas@naro.go.ug

Data Presentation, Visualization and Reproducibility

Kawuki Robert

UJAS-NARO Scientific Writing Workshop scheduled on 17th June 2026



Data Presentation, Visualization and Reproducibility

- **Final mile of data analysis**
- **Core of Scientific Communication and Analysis**
 - Data presentation = Art
 - Data Visualization = Science
 - Data Reproducibility = Truth
- **Foundation of credible science**

REVIEW article

Front. Plant Sci., 15 January 2026

Sec. Plant Breeding

Volume 16 - 2025 | <https://doi.org/10.3389/fpls.2025.1719980>

Genetic improvement of robusta coffee (*Coffea canephora*) in the 20th and 21st centuries: prospects for increasing future breeding effectiveness and impact

-  Robert Kawuki ^{1*}
-  Abraham Akperley ²
-  Santos Barrera ¹
-  Jorge C. Berny Mier y Teran ¹
-  Jeena Devasia ³
-  K Kraig Kraft ¹
-  M Miftahur Rizqi Akbar ⁴
-  B B.R. Shivalingu ³
-  Godfrey Sseremba ⁵
-  A Alessandro Teixeira ^{6,7}
-  Rodrigo Barros Rocha ^{6,7}
-  P Phan Viet Ha ⁸
-  A Ari Wibowo ⁴
-  T Tania Humphrey ¹
- [See less](#)

 Article metrics [View details](#)

3,3k

Views

535

Downloads



PDF



 Cite article

 Share article

Frontiers' impact



Annual report 2025

Case Study
1

Review
Article

Genomic prediction accuracy for low hydrogen cyanide selection in fresh cassava roots. Comparative model analysis

[Michael Kanaabi](#)^{1,2,}, [Settumba B Mukasa](#)¹, [Ephraim Nuwamanya](#)¹, [Ismael Siraj Kayondo](#)³, [Henry Wagaba](#)⁴, [Paula Iragaba](#)⁵, [Julius K Baguma](#)⁵, [Nicholas Muhumuza](#)⁵, [Ann Ritah Nanyonjo](#)^{1,5}, [Enoch Wembabazi](#)⁵, [Mary Buttibwa](#)⁵, [Williams Esuma](#)⁵, [Robert Kawuki](#)⁶

► [Author information](#) ► [Article notes](#) ► [Copyright and License information](#)

PMCID: PMC13162526 PMID: [41917826](#)

Abstract

Cassava (*Manihot esculenta* Crunz) is a staple food crop for millions of people in Africa. The crop's tolerance to drought, ability to survive in marginal soils and amenability to a variety of uses endears it to farmers. However, utilization of the crop's full potential for food security is limited by the presence of cyanogenic glucosides (HCN) in the roots. These not only make cassava bitter to the taste but can also be toxic to lethal levels. Breeding for low HCN cassava is necessary to mitigate against high dietary HCN consumption. However, efforts at variety development have been slow, in part due to limited use of molecular tools. This study assessed genomic prediction accuracy for fresh cassava root HCN content using the GBLUP model and compared its performance to 5 Bayesian models (Bayes A, Bayes B, Bayes C,

 PDF (2.9 MB)

 Cite

 Collections

 Permalink

RESOURCES

Similar articles +

Cited by other articles +

Links to NCBI Databases +

ON THIS PAGE

Abstract

[Background](#)

[Materials and methods](#)

[Results](#)

[Discussion and conclusions](#)

[Acknowledgements](#)

[Authors' contributions](#)

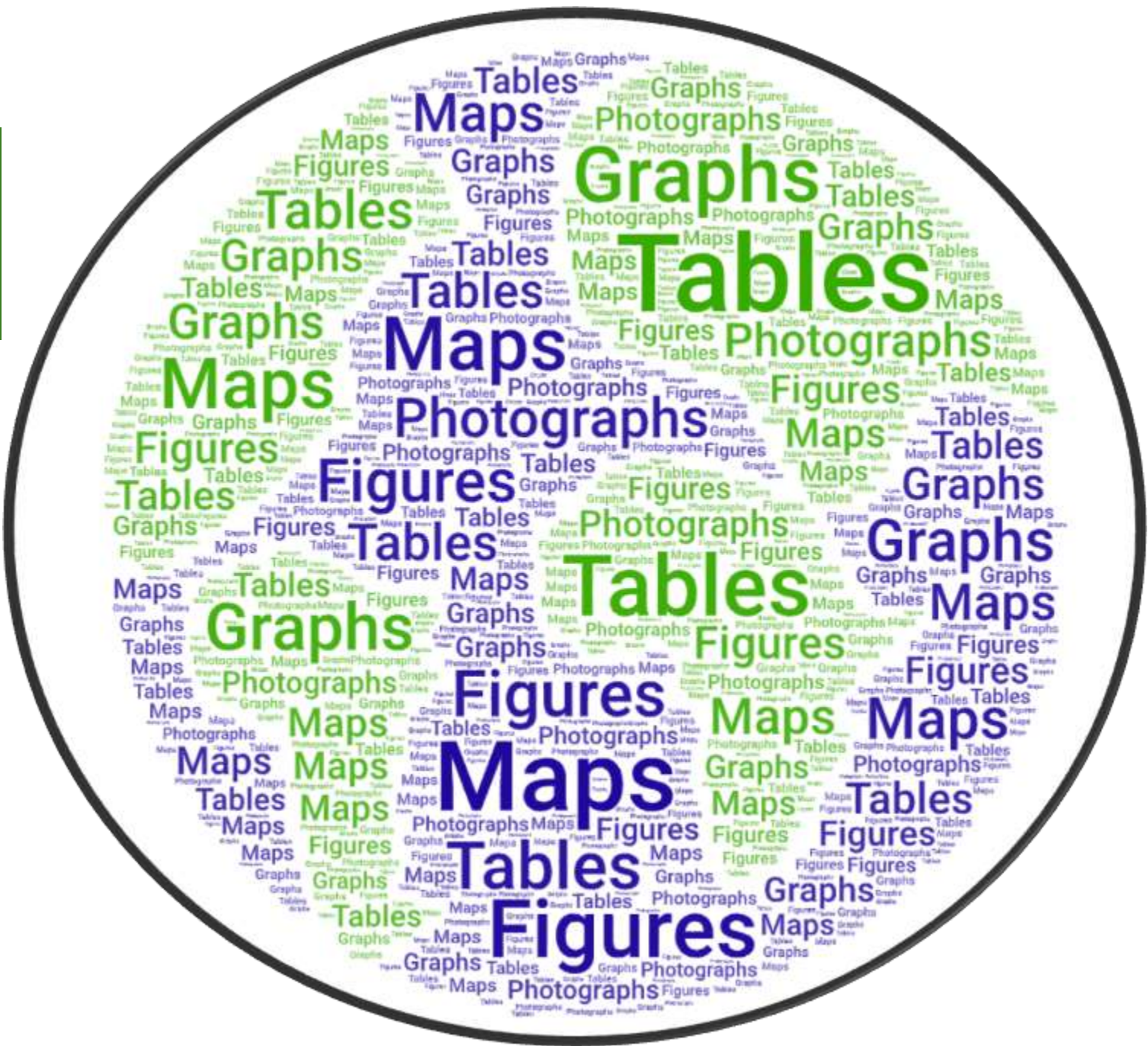
[Funding](#)

[Data availability](#)

Case Study
2

Empirical
Article

Data Presentation Formats



Why Focus on Data Presentation

- Communicate Scientific findings effectively
- Highlight patterns and trends
- Facilitate interpretation
- Support decision-making and thus policy
- Enable verification of results

Data Presentation: Key Consideration

- **Clarity over complexity** – Use the simplest table/figure
- **Context** – Always include sample size (N), units, and uncertainty (SD, SEM, CI).
- **Avoid distortion** – Avoid truncated or misleading scales for Figures/Charts.
- **Raw data where possible** – distributions (boxplots, or scatter)
- **Tables:** Best for exact values, multiple comparisons, or small datasets.
- **Figures:** Better for trends, patterns, and relationships

Table 1 [View in article](#)

Origin	Destination	Year	Inherent traits being sought	References
Democratic Republic of Congo (DRC)	Indonesia	1901	Coffee leaf rust (CLR) resistance, vigor, growth traits, productivity and bean size	(Herrera and Lambot, 2017 ; Ferwerda, 1948)
Indonesia	Uganda	1910	Growth traits, early fruiting, and bean size	(Thomas, 1935)
DRC, Indonesia	Vietnam	1900s	Growth and productivity traits	(Phan, 2017)
Congo, Indonesia	Brazil	1912	CLR resistance, drought tolerance	(Herrera and Lambot, 2017)
Indonesia	India	1916	Growth and productivity traits	(Herrera and Lambot, 2017)
Uganda	Indonesia	1916	Growth and productivity traits	(Ferwerda, 1948)
DRC	Uganda	1940 to 1944	Plant architecture (i.e. erect) and quality traits	(Davis et al., 2023 and references therein)
Guinea, Cameroon, and the DRC	Ivory Coast	1930 to 1960s	Agronomic and resilience traits	(Herrera and Lambot, 2017)

The exchange of robusta genetic resources that initiated breeding across the globe.

Robusta genetic resources used to initiate breeding across the globe are based on a few founders, most of which originated from central and/or eastern Africa region. Thus, sites of origin retain substantial genetic variation not used by breeding programs.

REVIEW article
Front. Plant Sci., 15 January 2026
Sec. Plant Breeding
Volume 16 - 2025 | <https://doi.org/10.3389/fpls.2025.1729980>

Article metrics
3,3k Views
535 Downloads

Genetic improvement of robusta coffee (*Coffea canephora*) in the 20th and 21st centuries: prospects for increasing future breeding effectiveness and impact

PDF

Cite article

Share article

Robert Kawuki^{1*}

Abraham Alpertey²

Santos Barrera¹

Jorge C. Berry Mier y Teran¹

Jeena Devasia³

Kraig Kraft¹

Miftahur Rizqi Akbar⁴

B.R. Shivalingu³

Godfrey Sseremba⁵

Alexandro Teixeira^{6,7}

Rodrigo Barros Rocha^{6,7}

Phan Viet Ha⁸

Ani Wibowo⁴

Tania Humphrey¹

See less

Frontiers' impact
2025
Annual report 2025

Simplicity: story from 1901 to 1960s; **Comparisons** in countries, Traits and Years; **Communication;** Clarity & Honesty

Table 6 [View in article](#)

Country	Traits and trial design	Quantitative insights	References
Indonesia	Traits: yield, and pest and disease resistance Design: single-tree and multiple-tree plots; evaluations done over 5 years	• Change from mass to progeny-based selection led to >50% higher yield • Yield gains attained through change from “single-clone” to “multiple-clone” deployment	Ferwerda (1948)
Ivory Coast	Traits: productivity; vigor; architecture; quality; drought; pest and disease resistance Design: single-tree plots; evaluations for 2–4 years	• 100 progenitors • Overall performance of inter-group > intra-group hybrids • Higher selection accuracy for bean size than for caffeine content	(Leroy et al., 1993)
Ivory Coast	Traits: vigor and yield Design: single-tree plots; evaluations for 5 years	Genetic gain for yield from BC1 to BC2 ~22% following <i>C. canephora</i> x <i>C. liberica</i> crosses	(Yapo et al., 2003)
Cameroon	Traits: bean weight; pea berry percentage; cherry yield Design: Single-tree plots with multiple stems/trees; evaluations done for 14 years	• 22 progenitors • Yield had higher heritability ($H^2 = 0.43$) than pea berry traits ($H^2 = 0.09$) and berry dimension traits ($H^2 = 0.06$ to 0.18)	Cilas and Bouharmont (2005)

REVIEW article

Front. Plant Sci. 15 January 2026
Sec. Plant Breeding
Volume 16 – 2025 | <https://doi.org/10.3389/fpls.2025.1719980>

Article metrics View details

3,3k Views535 Downloads

Genetic improvement of robusta coffee (*Coffea canephora*) in the 20th and 21st centuries: prospects for increasing future breeding effectiveness and impact

[PDF](#)[Cite article](#)[Share article](#)

Robert Kawuki^{1*}

Jorge C. Berry Mier y Teran¹

Kraig Kraft¹

Godfrey Seremba⁵

Rodrigo Barros Rocha^{6,7}

Abraham Akperley²

Miftahur Rizqi Akbar⁴

Phan Viet Ha⁸

Santos Barrera¹

Jeena Devasia³

B.R. Shivalingu³

Alexandro Teixeira^{6,7}

Ari Wibowo⁴

[See less](#)[Tania Humphrey¹](#)

Frontiers' impact

2025

Annual report 2025

Simplicity: story from 1940s to 2000s; **Comparisons** in Breeding Methods; **Communication;** Clarity & Honesty

Table Descriptions: Clarity, Context & Accuracy

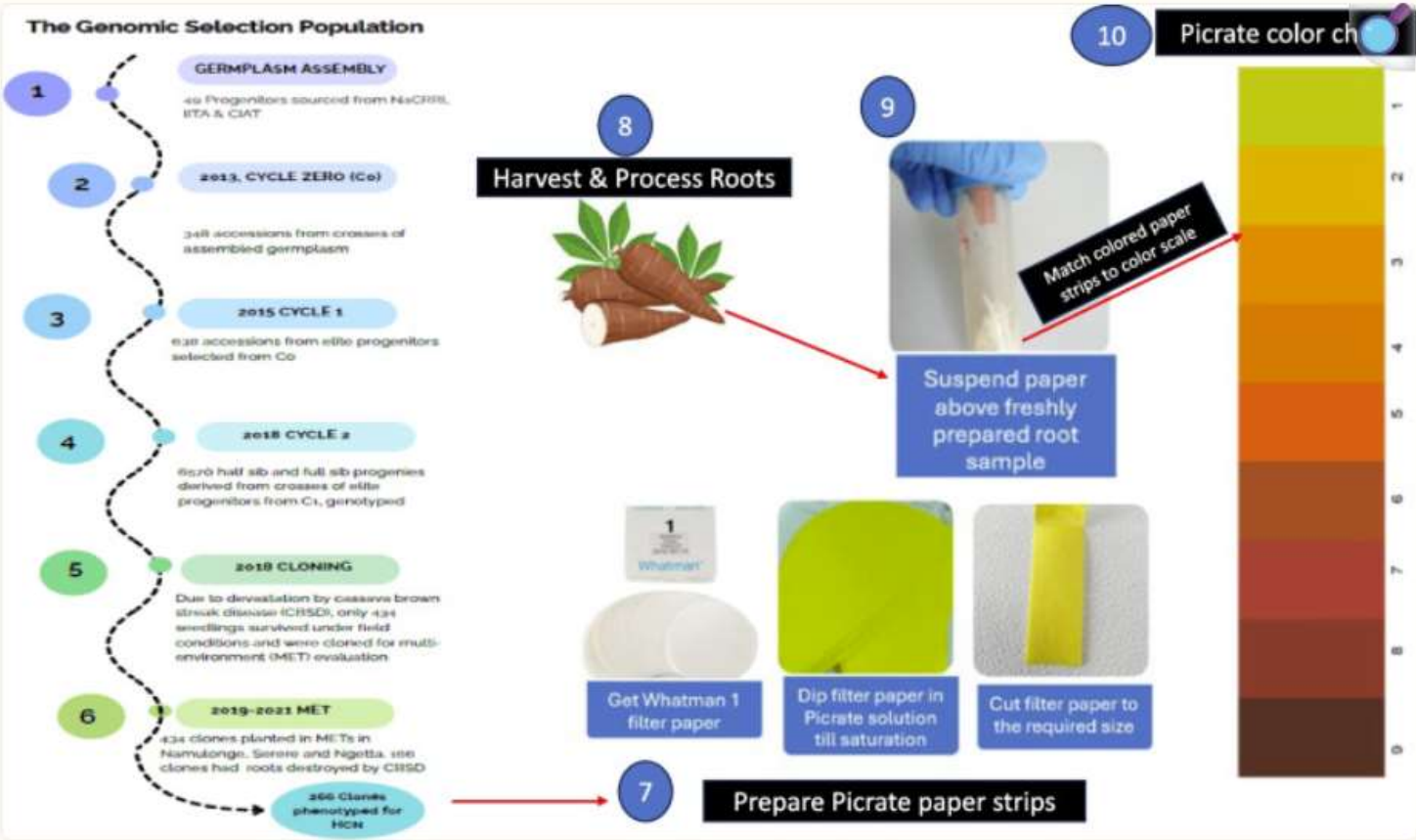
Quantitative insights into operations, knowledge generated, and progress attained by selected robusta breeding programs.

Datasets from selected robusta breeding operations in the 1930s, 1990s, early 2000s, and in 2023. Progress achieved demonstrates interconnectivity of the adopted breeding steps; types of varieties developed using specific germplasm; human resources, and technology available. AMMI, Additive Main-effects and Multiplicative Interactions. Traits: This refers phenotypes (attributes) evaluated in the experimental trial. Design: This entails the experimental field layout, plot assignment, number of clones evaluated and/or duration of field evaluations.

Table 6 [View in article](#)

Country	Traits and trial design	Quantitative insights	References
Indonesia	Traits: yield, and pest and disease resistance Design: single-tree and multiple-tree plots; evaluations done over 5 years	• Change from mass to progeny-based selection led to >50% higher yield • Yield gains attained through change from "single-clone" to "multiple-clone" deployment	Ferwerda (1948)
Ivory Coast	Traits: productivity; vigor; architecture; quality; drought; pest and disease resistance Design: single-tree plots; evaluations for 2–4 years	• 100 progenitors • Overall performance of inter-group > intra-group hybrids • Higher selection accuracy for bean size than for caffeine content	(Leroy et al., 1993)
Ivory Coast	Traits: vigor and yield Design: single-tree plots; evaluations for 5 years	Genetic gain for yield from BC1 to BC2 ~22% following <i>C. canephora</i> x <i>C. liberica</i> crosses	(Yapo et al., 2003)
Cameroon	Traits: bean weight; pea berry percentage; cherry yield Design: Single-tree plots with multiple stems/trees; evaluations done for 14 years	• 22 progenitors • Yield had higher heritability ($H^2 = 0.43$) than pea berry traits ($H^2 = 0.09$) and berry dimension traits ($H^2 = 0.06$ to 0.18)	Cilas and Bouharmont (2005)

Fig. 1.



[Open in a new tab](#)

Workflow for generating the cassava genomic selection population and phenotyping cassava roots for HCN using the Picrate paper color scale protocol

Figures

Communicate – Clearly, Honestly, and Efficiently.

Clarity over complexity – Simply tell a nice story.

BMC Plant Biology

Genomic prediction accuracy for low hydrogen cyanide selection in fresh cassava roots. Comparative model analysis

Michael Kanaabi^{1,2,3*}, Setumba B Mukasa⁴, Ephraim Nuwamanya⁵, Ismael Siraj Kayondo⁶, Henry Wagaba⁴, Paula Irigaba⁵, Julius K Bayuma⁵, Nicholas Muhumuza⁵, Ann Ritah Nanyonga^{1,5}, Enoch Wembabazi⁵, Mary Butibwa⁵, Williams Esuama⁵, Robert Kavuki⁵

Abstract

Cassava (*Manihot esculenta* Crunz) is a staple food crop for millions of people in Africa. The crop's tolerance to drought, ability to survive in marginal soils and amenability to a variety of uses endears it to farmers. However, utilization of the crop's full potential for food security is limited by the presence of cyanogenic glucosides (HCN) in the roots. These not only make cassava bitter to the taste but can also be toxic to lethal levels. Breeding for low HCN cassava is necessary to mitigate against high dietary HCN consumption. However, efforts at variety development have been slow, in part due to limited use of molecular tools. This study assessed genomic prediction accuracy for fresh cassava root HCN content using the GBLUP model and compared its performance to 5 Bayesian models (Bayes A, Bayes B, Bayes C, ...)

Table 5 [View in article](#)

Trait categories	Trait benefit	Potential traits of emphasis	Trait priority for
Abiotic stress traits	If not addressed, drought and higher temperatures diminish quality and yield, increase price volatility and thus hinder income growth	Flowering phenology traits, leaf physiological traits, and root-related traits	Grower, based on where and how robusta is grown
Biotic stress traits	Resistance protects yields and thus sustains higher incomes	Coffee leaf rust; coffee wilt disease; coffee berry disease; coffee red blister disease; coffee berry borer; coffee shoot borer; black coffee twig borer; and nematodes	Grower, based on where robusta is grown
Quality traits	Higher cup quality raises product market share, pricing, and thus incomes	Physical and organoleptic traits	Processor and roaster, based on who purchases, what they purchase, and how they process and consume
Processing and value chain traits	Lower processing costs and wastage resulting in higher incomes	Outturn; defects; bean density; and consistent bean size	Processor and grower, based on who purchases and what they purchase, and how they process
Propagation traits	Enable faster access to new varieties so growers can sustain incomes	Rooting ability; growth rate; suckering ability; shooting ability; and amenability to high-	Seed entrepreneur and grower, based on how and where seed propagation is done

Tables –
Besides values,
can present text

REVIEW article

Front. Plant Sci., 15 January 2026
Sec: Plant Breeding
Volume 16 – 2025 | <https://doi.org/10.3389/fpls.2025.5719980>

Article metricsView details

3,3k Views535 Downloads

PDF

Cite article

Share article

Genetic improvement of robusta coffee (*Coffea canephora*) in the 20th and 21st centuries: prospects for increasing future breeding effectiveness and impact

Robert Kawuki^{1*}

Abraham Akperley²

Santos Barrera¹

Jorge C. Berry Mier y Teran¹

Jeena Devasia³

Kraig Kraft¹

Miftahur Rizqi Akbar⁴

B.R. Shivalingu³

Godfrey Sseremba⁵

Alexandro Teixeira^{6,7}

Rodrigo Barros Rocha^{6,7}

Phan Viet Ha⁸

Ari Wibowo⁴

See less

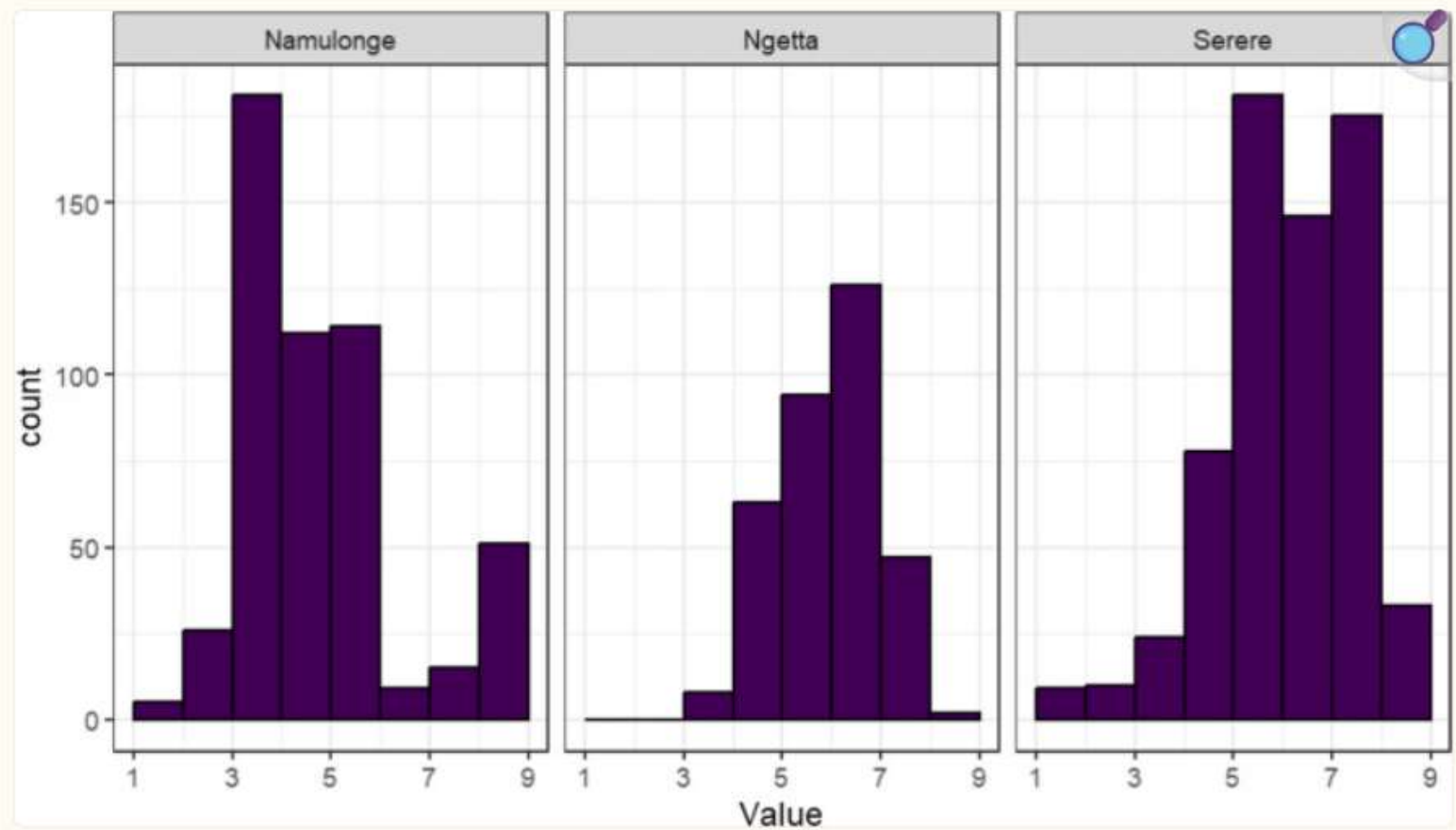
Tania Humphrey¹

Frontiers' impact

2025

Annual report 2025

Fig. 2.



Distribution of fresh cassava root HCN content across study locations

Present raw data where possible – Show distributions

[Open in a new tab](#)

BMC Plant Biology

BMC Plant Biol. 2026 Mar 31;26:830. doi: 10.1186/s12870-026-08650-3

Genomic prediction accuracy for low hydrogen cyanide selection in fresh cassava roots. Comparative model analysis

Michael Kanaabi^{1,2,3*}, Setumba B Mukasa⁴, Ephraim Nuwamanya⁴, Ismael Siraj Kayondo⁵, Henry Wagaba⁶, Paula Iragaba⁵, Julius K Bayuma⁵, Nicholas Muhumuza⁵, Ann Ritah Nanyonga^{1,5}, Enoch Wembabazi⁵, Mary Butibwa⁵, Williams Esuma⁵, Robert Kavuki⁵

* Author information • Article notes • Copyright and License information

PMCID: PMC13162526 PMID: 41917826

Abstract

Cassava (*Manihot esculenta* Crunz) is a staple food crop for millions of people in Africa. The crop's tolerance to drought, ability to survive in marginal soils and amenability to a variety of uses endears it to farmers. However, utilization of the crop's full potential for food security is limited by the presence of cyanogenic glucosides (HCN) in the roots. These not only make cassava bitter to the taste but can also be toxic to lethal levels. Breeding for low HCN cassava is necessary to mitigate against high dietary HCN consumption. However, efforts at variety development have been slow, in part due to limited use of molecular tools. This study assessed genomic prediction accuracy for fresh cassava root HCN content using the GBLUP model and compared its performance to 5 Bayesian models (Bayes A, Bayes B, Bayes C,

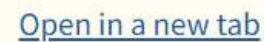
RESOURCES

- Similar articles +
- Cited by other articles +
- Links to NCBI Databases +

ON THIS PAGE

- Abstract
- Background
- Materials and methods
- Results
- Discussion and conclusions
- Acknowledgements
- Authors' contributions
- Funding
- Data availability

Box plots showing variability in narrow-sense heritability (h^2) between the Bayesian models and the RKHS model






• BMC Plant Biol. 2026 Mar 31;26:830. doi: [10.1186/s12870-026-08650-3](https://doi.org/10.1186/s12870-026-08650-3)

Genomic prediction accuracy for low hydrogen cyanide selection in fresh cassava roots. Comparative model analysis

[Michael Kanabji](#)^{1,2,3*}, [Settumba B Mukasa](#)⁴, [Ephraim Nuwamanya](#)¹, [Ismael Siraj Kayondo](#)², [Henry Wagaba](#)⁴, [Paula Iregaba](#)⁵, [Julius K Baguma](#)⁵, [Nicholas Muhumura](#)⁵, [Ann Ritah Nanyonyi](#)^{1,5}, [Enoch Wembabazi](#)⁵, [Mary Rutllana](#)⁵, [Williams Esuma](#)⁶, [Robert Kanuku](#)⁶

• Author information • Article notes • Copyright and License information

PMCID: PMC13162526 PMID: [41917826](https://pubmed.ncbi.nlm.nih.gov/41917826/)

Abstract

Cassava (*Manihot esculenta* Crunz.) is a staple food crop for millions of people in Africa. The crop's tolerance to drought, ability to survive in marginal soils and amenability to a variety of uses endears it to farmers. However, utilization of the crop's full potential for food security is limited by the presence of cyanogenic glucosides (HCN) in the roots. These not only make cassava bitter to the taste but can also be toxic to lethal levels. Breeding for low HCN cassava is necessary to mitigate against high dietary HCN consumption. However, efforts at variety development have been slow, in part due to limited use of molecular tools. This study assessed genomic prediction accuracy for fresh cassava root HCN content using the GBLUP model and compared its performance to 5 Bayesian models (Bayes A, Bayes B, Bayes C,

 PDF icon
  Full text icon

 Cite

 Collections

 Permalink

RESOURCES

 Similar articles
 

 Cited by other articles
 

 Links to NCBI Databases
 

ON THIS PAGE

 Abstract

 Background

 Materials and methods

 Results

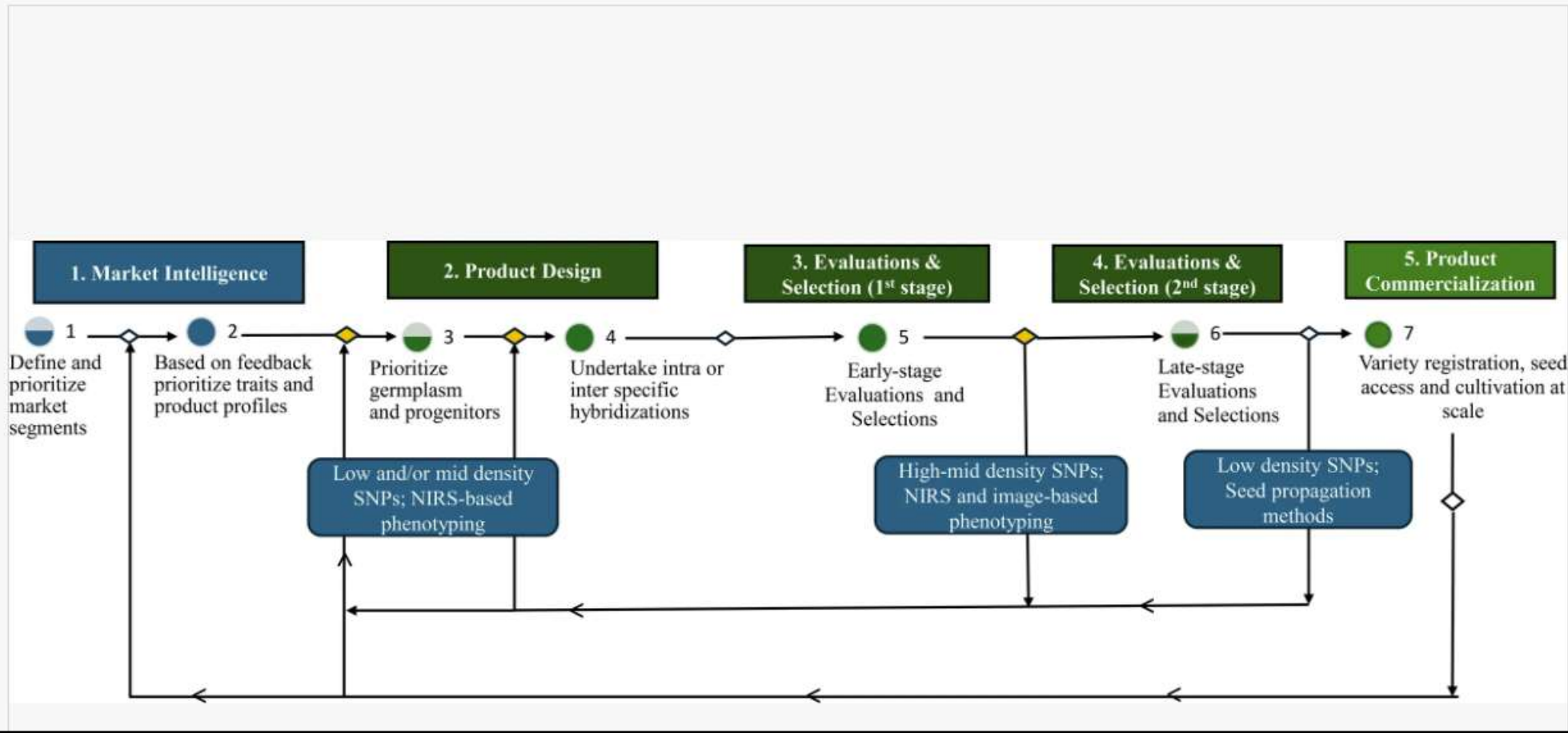
 Discussion and conclusions

 Acknowledgements

 Authors' contributions

 Funding

 Data availability



Clarity over complexity – Breeding Processes Mapped; Breeding Tools Integrated; Breeding Outputs Highlighted

REVIEW article

Front. Plant Sci. 15 January 2026
Sec. Plant Breeding
Volume 16 - 2025 | <https://doi.org/10.3389/fpls.2025.1719860>

Genetic improvement of robusta coffee (*Coffea canephora*) in the 20th and 21st centuries: prospects for increasing future breeding effectiveness and impact

Robert Kawuki ^{1*} Abraham Alpertey ² Santos Barrera ¹
Jorge C. Berry Mier y Teran ¹ Jeena Devasia ³
Kraig Kraft ¹ Miftahur Rizqi Akbar ⁴ B.R. Shivalingu ³
Godfrey Sseremba ⁵ Alexandro Teixeira ^{6,7}
Rodrigo Barros Rocha ^{6,7} Phan Viet Ha ⁸ Ari Wibowo ⁴

[See less](#) [Tania Humphrey ¹](#)

Article metrics View details

3,3k Views 535 Downloads

[PDF](#) [Cite article](#) [Share article](#)

Frontiers' impact

2025
Annual report 2025

Data Presentation: Take Home

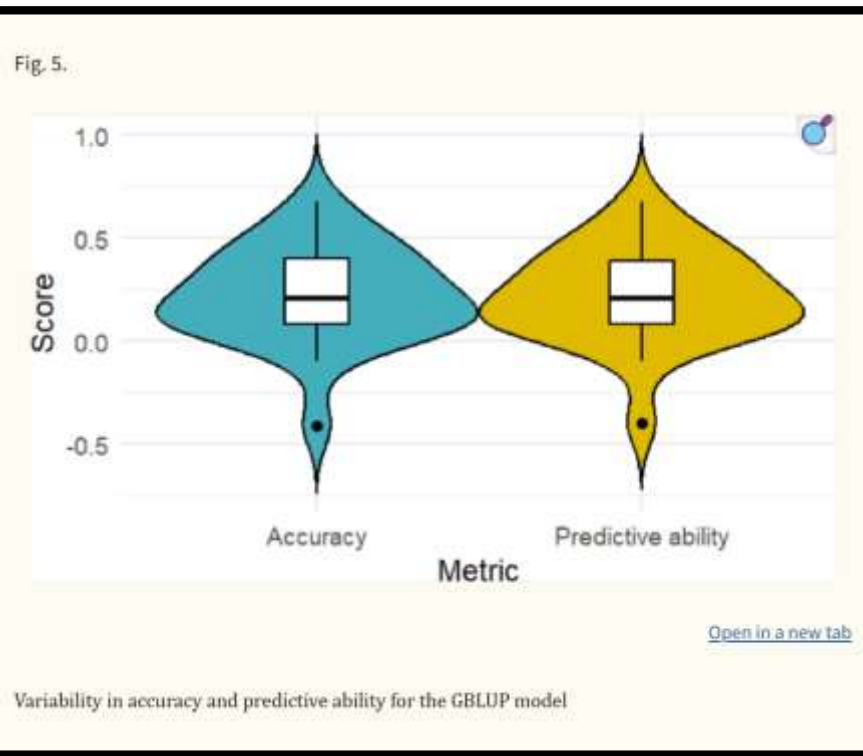
- Use informative titles and captions.
- Include units of measurement.
- Report sample sizes (n).
- Present measures of variability
- Avoid excessive decimal places.
- Ensure consistency in formatting.

Data Visualization

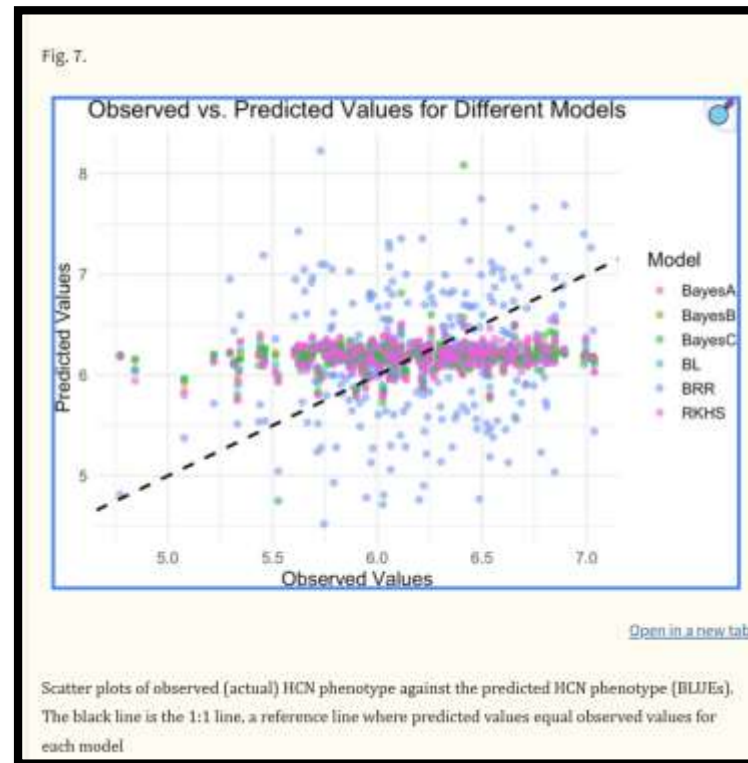
Data Visualization: Graphics

- **Data:** The numbers.
- **Aesthetics (AES):** What maps to X, Y, Color, Size, Shape?
- **Geoms:** Are you using bars, points, lines, or boxes?
- **Facets:** Are you splitting into small multiples?

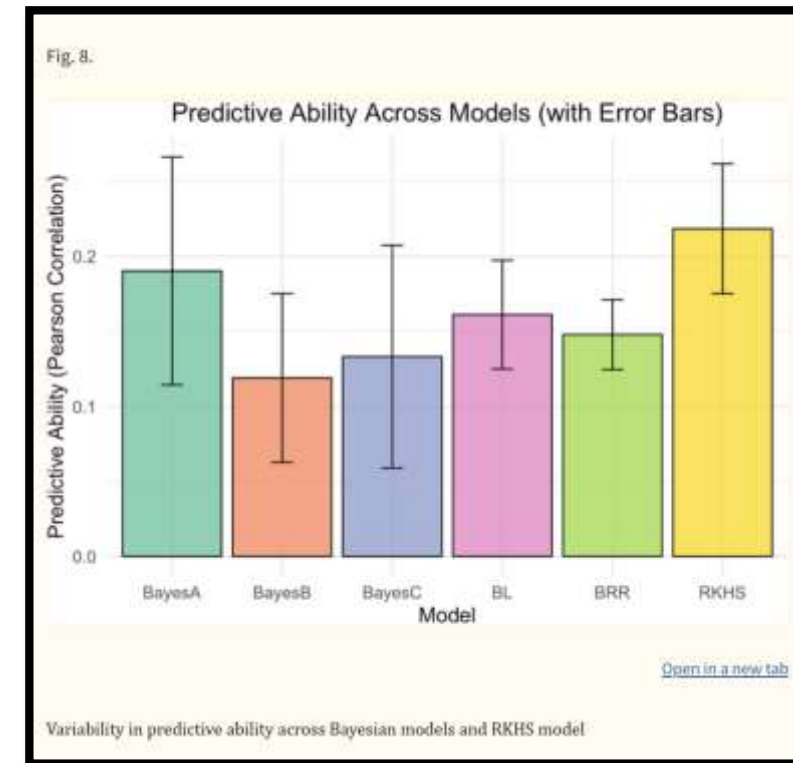
Choose the right chart (Keep visuals simple, label axes clearly, use color sparingly but meaningfully)



Distribution → Histogram
or Boxplot



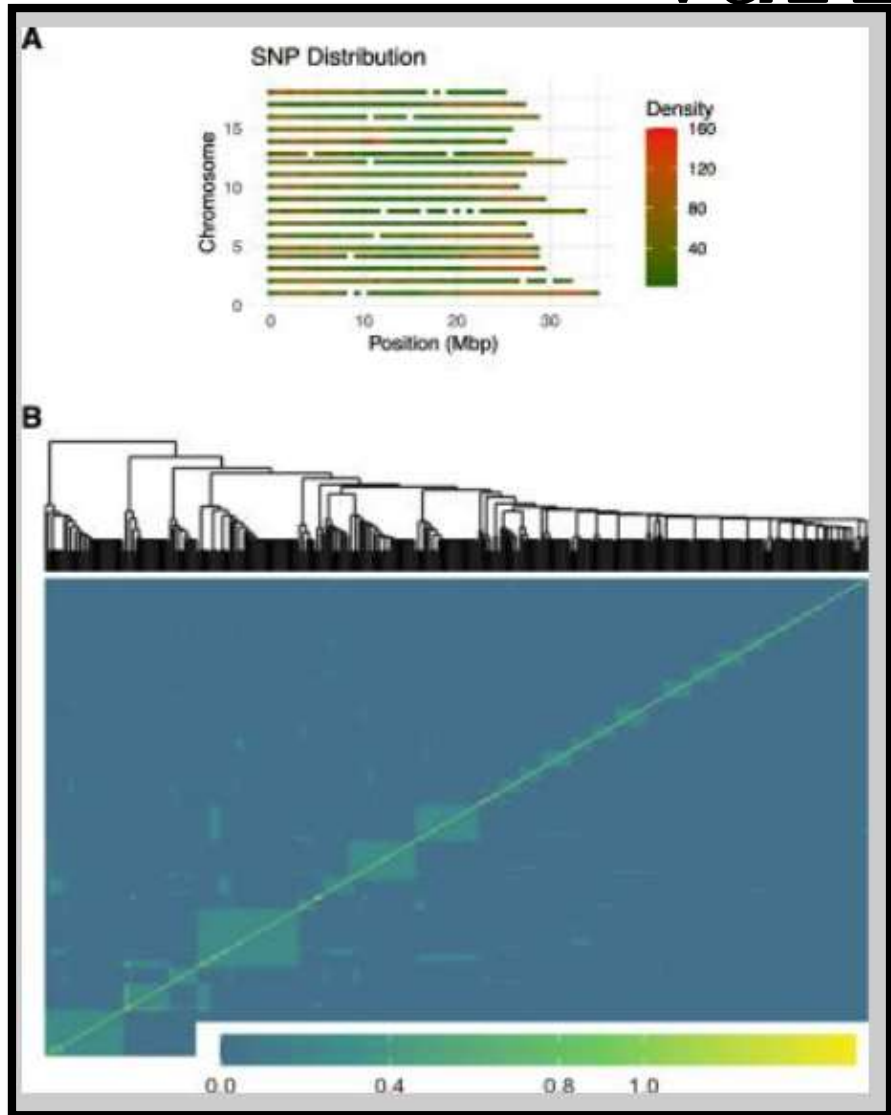
Relationship →
Scatterplot.



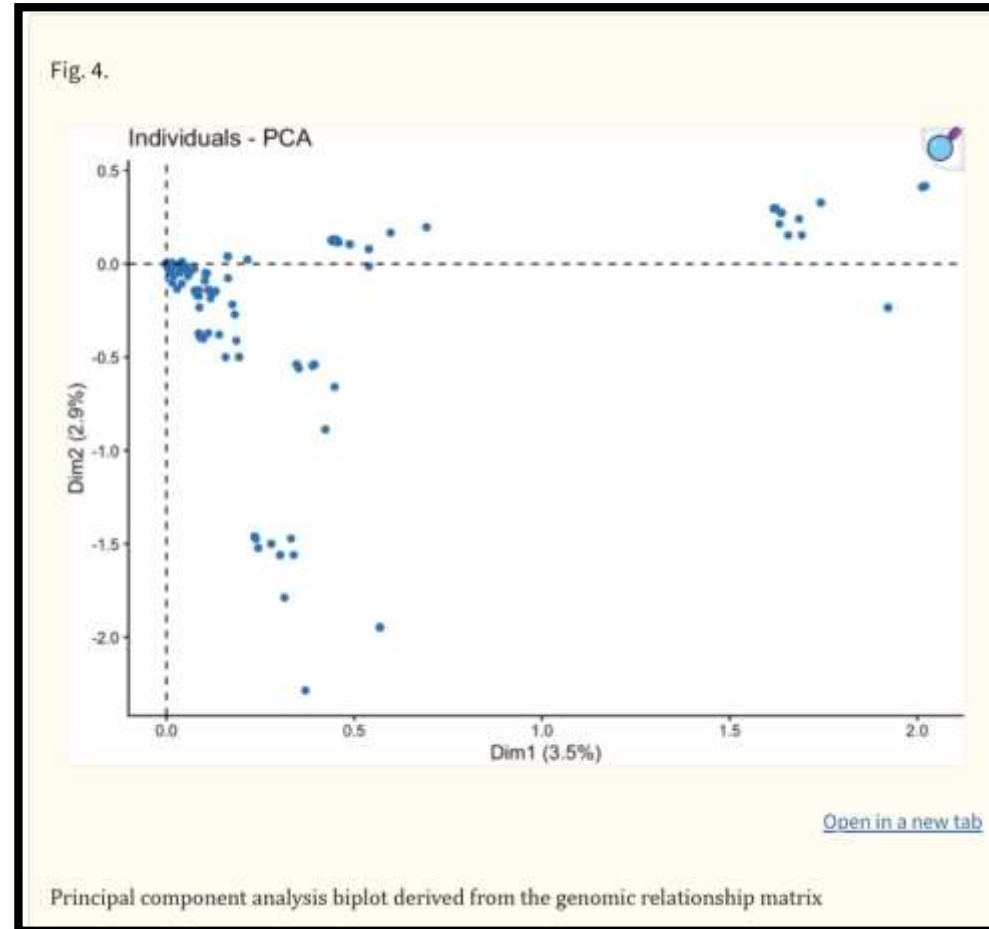
Comparison → Bar chart
(not pie).

Show uncertainty; one chart one message;

Visualization: Complex and multi-variate datasets



Trends → Heat
maps:



Relationships → PCA
plots

Visualization

- **Aesthetics matter**

- Accessible color palettes (e.g., ColorBrewer, viridis) – avoid red-green only.
- Clear labels, legends, and title.
- Sufficient size/resolution for print and screen.

- **Software:** R (ggplot2, plotly), Python (matplotlib, seaborn), and specialized tools like Tableau or Power BI.

Data Reproducibility

“Ability of independent researchers to obtain the same results using the same data and methods”

Why is “Data Reproducibility” Pertinent?

- Increases confidence in findings
- Enhances transparency
- Facilitates collaboration
- Supports scientific integrity
- Enables meta-analysis

Components of Reproducible Data



FAIR Data Principles

- **F — Findable**; Should be easy for humans and computers to find.
 - Adopting DOI
 - Use standard naming
 - Registering data in repositories
- **A — Accessible**; Retrievable through standardized protocols.
 - Access conditions clearly specified
 - Request access if restrictions exist
- **I — Interoperable**; Compatible with other datasets and software systems
 - Vocabularies and ontologies
 - Machine readable
 - Standard formats
- **R — Reusable**; sufficiently described so that others can reuse them.
 - Information on data quality
 - Detailed methods
 - Detailed meta data

Components of Reproducible Data

- **Data Availability (Provide)**
 - Raw data
 - Processed data
 - Meta data
- **Analysis code (Share)**
 - R/Python scripts
 - Statistical workflows
- **Experimental protocols (Document and share)**
 - Trial design
 - Phenotyping approaches
 - Sampling procedures
 - Laboratory procedures
- **Data repositories**
 - Figshare; <https://figshare.com/>
 - Zenodo; <https://zenodo.org/>
- **Version Control**
 - GitHub or GitLab

Data availability

Data sets generated and/or analysed are available from Cassavabase, an open access cassava breeding database via the link the [<https://cassavabase.org/breeders/trial/6707?format=> ].



► BMC Plant Biol. 2026 Mar 31;26:830. doi: [10.1186/s12870-026-08650-3](https://doi.org/10.1186/s12870-026-08650-3) 

Genomic prediction accuracy for low hydrogen cyanide selection in fresh cassava roots. Comparative model analysis

[Michael Kanaabi](#)^{1,2,✉}, [Settumba B Mukasa](#)¹, [Ephraim Nuwamanya](#)¹, [Ismael Siraj Kayondo](#)³, [Henry Wagaba](#)⁴, [Paula Iragaba](#)⁵, [Julius K Baguma](#)⁵, [Nicholas Muhumuza](#)⁵, [Ann Ritah Nanyonjo](#)^{1,5}, [Enoch Wembabazi](#)⁵, [Mary Buttibwa](#)⁵, [Williams Esuma](#)⁵, [Robert Kawuki](#)⁶

► Author information ► Article notes ► Copyright and License information

PMCID: PMC13162526 PMID: [41917826](https://pubmed.ncbi.nlm.nih.gov/41917826/)

Abstract

Cassava (*Manihot esculenta* Crunz) is a staple food crop for millions of people in Africa. The crop's tolerance to drought, ability to survive in marginal soils and amenability to a variety of uses endears it to farmers. However, utilization of the crop's full potential for food security is limited by the presence of cyanogenic glucosides (HCN) in the roots. These not only make cassava bitter to the taste but can also be toxic to lethal levels. Breeding for low HCN cassava is necessary to mitigate against high dietary HCN consumption. However, efforts at variety development have been slow, in part due to limited use of molecular tools. This study assessed genomic prediction accuracy for fresh cassava root HCN content using the GBLUP model and compared its performance to 5 Bayesian models (Bayes A, Bayes B, Bayes C,

 PDF (4.5 MB)

 Cite

 Collections

 Permalink

RESOURCES

Similar articles 

Cited by other articles 

Links to NCBI Databases 

ON THIS PAGE

 Abstract

 Background

 Materials and methods

 Results

 Discussion and conclusions

 Acknowledgements

 Authors' contributions

 Funding

 Data availability

Original Article | [Open Access](#) |    

Large-scale genome-wide association study, using historical data, identifies conserved genetic architecture of cyanogenic glucoside content in cassava (*Manihot esculenta* Crantz) root

[Alex C. Ogbonna](#), [Luciano Rogerio Braatz de Andrade](#), [Ismail Y. Rabbi](#), [Lukas A. Mueller](#),
[Eder Jorge de Oliveira](#) ✉, [Guillaume J. Bauchet](#) ✉

First published: 08 November 2020 | <https://doi.org/10.1111/tpj.15071> | [VIEW METRICS](#)

Accessibility issue? [Request accessibility update](#).

☰ SECTIONS



PDF



CITE



TOOLS

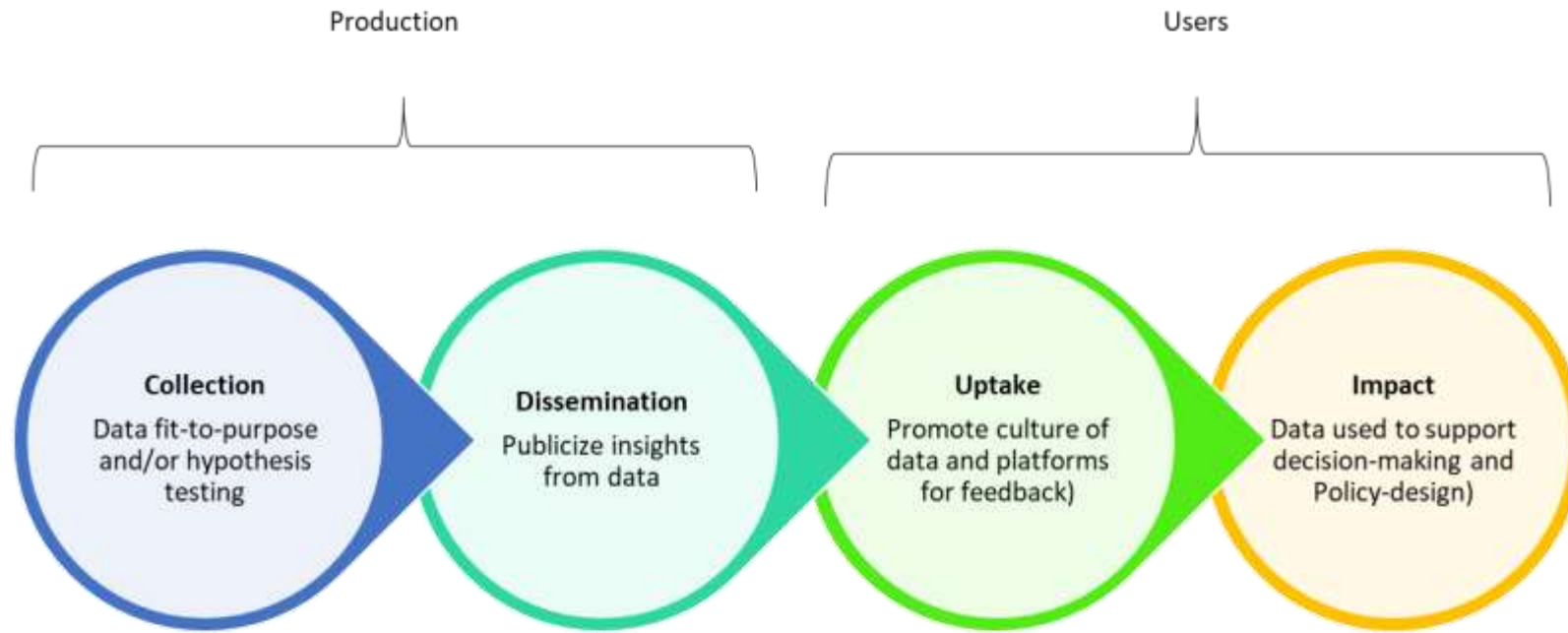


SHARE

Summary

Manihot esculenta (cassava) is a root crop originating from South America that is a major staple in the tropics, including in marginal environments. This study focused on South American and African germplasm and investigated the genetic architecture of hydrogen cyanide (HCN), a major component of root quality. HCN, representing total cyanogenic glucosides, is a plant defense component against herbivory but is also toxic for human consumption. We genotyped 3354 landraces and modern breeding lines originating from 26 Brazilian states and 1389 individuals were phenotypically characterized across multi-year trials for HCN. All plant material was subjected to high-density genotyping using genotyping by sequencing. We performed genome-wide association mapping to characterize the genetic architecture and gene mapping of HCN. Field experiments

Wrap up



Data collected using proven methods & tools.

Data dissemination only done after data curation to reveal insights.

Data uptake done through varied platforms targeting different end-users and thus prompting timely feedback.

Data impact manifested in enhanced decision-making.

Its always team effort

REVIEW article

Front. Plant Sci., 15 January 2026

Sec. Plant Breeding

Volume 16 - 2025 | <https://doi.org/10.3389/fpls.2025.1719980>

Genetic improvement of robusta coffee (*Coffea canephora*) in the 20th and 21st centuries: prospects for increasing future breeding effectiveness and impact



Robert Kawuki ^{1*}



Abraham Akperter ²



Santos Barrera ¹



Jorge C. Berny Mier y Teran ¹



Jeena Devasia ³

K

Kraig Kraft ¹

M

Miftahur Rizqi Akbar ⁴

B

B.R. Shivalingu ³



Godfrey Sseremba ⁵



Alexandro Teixeira ^{6,7}



Rodrigo Barros Rocha ^{6,7}



Phan Viet Ha ⁸



Ari Wibowo ⁴

[See less](#)



Tania Humphrey ¹

Article metrics [View details](#)

3,3k

Views

535

Downloads

PDF

Cite article

Share article

Frontiers' impact



Annual report 2025

Acknowledgments

We are grateful to our respective counterparts at the National Coffee breeding programmes, with whom we have discussed robusta research and development in great detail and who have provided valuable insights based on their vast knowledge and experience. Due to their individual expertise, the industry partners involved in coffee processing, roasting, and marketing provided additional context and market-related insights. We thank the reviews and editorial support provided by Hanna Neuschwander.

BMC Plant Biology



BMC Plant Biol. 2026 Mar 31;26:830. doi: [10.1186/s12870-026-08650-3](https://doi.org/10.1186/s12870-026-08650-3)

Genomic prediction accuracy for low hydrogen cyanide selection in fresh cassava roots. Comparative model analysis

Michael Kanaabi ^{1,2,✉}, Settumba B Mukasa ¹, Ephraim Nuwamanya ¹, Ismael Siraj Kayondo ³, Henry Wagaba ⁴, Paula Iragaba ⁵, Julius K Baguma ⁵, Nicholas Muhumuza ⁵, Ann Ritah Nanyonjo ^{1,5}, Enoch Wembabazi ⁵, Mary Buttibwa ⁵, Williams Esuma ⁵, Robert Kawuki ⁶

Author information Article notes Copyright and License information

PMCID: PMC13162526 PMID: [41917826](https://pubmed.ncbi.nlm.nih.gov/41917826/)

Abstract

Cassava (*Manihot esculenta* Crunz) is a staple food crop for millions of people in Africa. The crop's tolerance to drought, ability to survive in marginal soils and amenability to a variety of uses endears it to farmers. However, utilization of the crop's full potential for food security is limited by the presence of cyanogenic glucosides (HCN) in the roots. These not only make cassava bitter to the taste but can also be toxic to lethal levels. Breeding for low HCN cassava is necessary to mitigate against high dietary HCN consumption. However, efforts at variety development have been slow, in part due to limited use of molecular tools. This study assessed genomic prediction accuracy for fresh cassava root HCN content using the GBLUP model and compared its performance to 5 Bayesian models (Bayes A, Bayes B, Bayes C,

PDF (2.5 MB)

Cite

Collections

Permalink

RESOURCES

Similar articles +

Cited by other articles +

Links to NCBI Databases +

ON THIS PAGE

Abstract

Background

Materials and methods

Results

Discussion and conclusions

Acknowledgements

Authors' contributions

Funding

Data availability

Acknowledgements

The authors are grateful to staff of the Nutrition and Bioanalytical Laboratory at NaCRRI for their dedicated work during HCN phenotyping and to the field staff and management of NaCRRI, the National Semi-arid Resources Research Institute and Ngetta Zonal Agricultural Research Institute for hosting the field trials.