

IITA CASS3 Annual Meeting Update

25 Sept 2025



CASS3 regulatory, lab and field activities



CFT Application



Import permit



Plant importation



Hardening



Multiplication



CFT planting

CFT permit obtained

CFT Permit Application (25 June 2024)


FEDERAL REPUBLIC OF NIGERIA
Application Form for a Confined Field Trial

This form should be forwarded to **Director General/Chief Executive Officer, National Biosafety Management Agency** on completion.

This application form consists of seven parts:

1. Administrative information
2. Plant Information
3. Trial Description
4. Genetic Confinement
5. Material Confinements
6. Records, Personnel, and Planning
7. Declaration

1. Administrative information

Purpose of Application:
[Application for a confined field trial for *Manihot esculenta* storage root yield.]

Transgenic cassava plants aiming at increased storage root yield, i.e. bigger or more storage roots per plant have been created. The construct was created at Friedrich-Alexander-University (FAU) Erlangen-Nuremberg (Germany) in the laboratory of Prof. Dr. Uwe Sonnewald and transformed into cassava genotype 60444 in the laboratory of Prof. Dr. Wilhelm Gruissem at Eidgenössische Technische Hochschule (ETH) Zurich (Switzerland). The construct targets plant assimilate transport from source to sink.

Previous Applications or Approvals:
[Information on the status of this crop and trait, including pending, approved, or denied applications for field trials and commercial releases here or in other jurisdictions. Indicate also if this is a new application or a renewal.]

This is a new application. We have previously applied for confined field trials that were approved under the IDs NBMA/CFT/005, NBMA/CFT/006, and NBMA/CFT/010. We have not applied for commercial releases in Nigeria or in any other country.

Applicant:
[Name of applying institution, which may also include the name of the Principal Investigator or other key personnel.]

Permit NBMA/CFT/016 issued (November 2024)


**FEDERAL
REPUBLIC OF
NIGERIA**


National
Biosafety
Management
Agency
NBMA

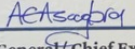
BIOSAFETY PERMIT

ISSUED TO:

INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE

For Confined Field Trial of Cassava Genetically Modified to increase storage root yield.

This permit is with effect from 6th November 2024 to 5th November 2026 in line with the decision document.


Director General/ Chief Executive Officer

Permit No: NBMA/CFT/016

Permit valid from Nov 6, 2024 to Nov 5, 2026

Import permit processing

Application for Import Permit

Reference No: GHU-2025007

Unit & Location:	Cassava Breeding - IITA, Ibadan
Contact person (if different from requestor):	Peter ILUEBBEY
Contact Email:	p.iluebbey@cgiar.org
Date Required:	14/01/2025
Budget code:	CC6515
Crop:	Cassava TC plantlets
Material type:	TC
Original planting material:	Germany - 2024
Total number of accessions:	5 accession of 350 plantlets
Material Location Use:	Ibadan Nigeria
Any special instructions:	
Country of Import:	Nigeria
Purpose of Import:	For Planting -
Port of Entry:	
Consignee:	Dr. Wolfgang Zierer
Consignee Email:	wolfgang.zierer@fau.de
Consignee Address:	Department of Biological Chair Biochemistry,
Other Details:	
Supporting documents	
File(s):	1 available
Supporting result documents	
File(s):	0 available

Import Permit

13/2025/003
PERMIT NO.

PLANT MATERIAL
DELIVER TO
PLANT QUARANTINE SERVICE
MOORE PLANTATION
P. M. B. 5672
IBADAN
NIGERIA

10/01/2025
Date

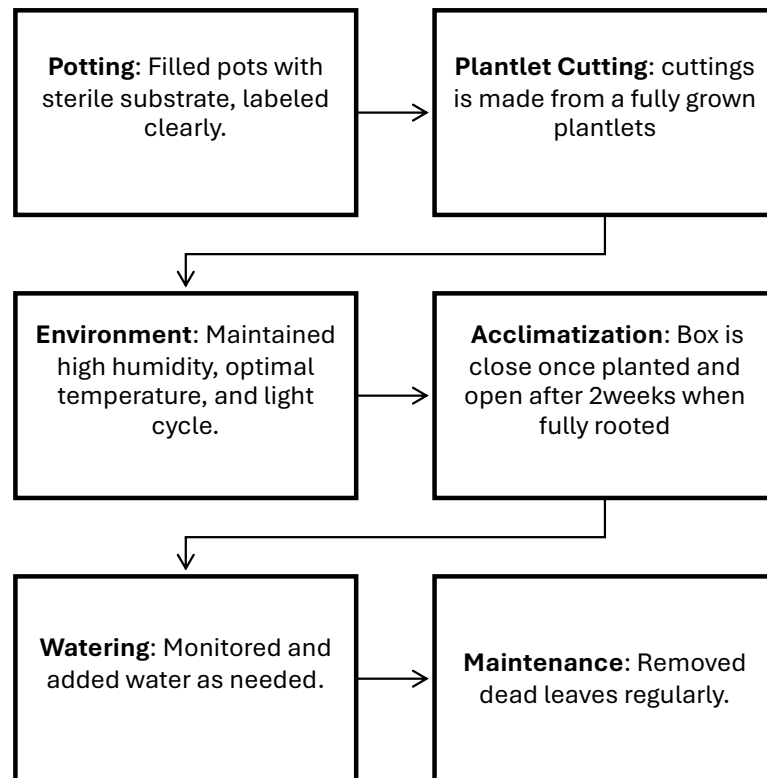
No. 18/2025/003

PLANT IMPORT PERMIT

Permission is hereby given to..... Dr. Ismail Rabbi
of..... IITA-Ibadan, P.M.B. 5320, Ibadan, Oyo State, Nigeria
to import into Nigeria from..... Dr. Wolfgang Zierer
Department of Biology chair Biochemistry, Staudtstr.5, 91058, Erlangen, Germany
the following..... 5 accessions invitro plantlet of Cassava ---- 350 tubes
Subject to the conditions overleaf:
FOR: DR. S. A. KAZEEM
DIRECTOR GENERAL
NIGERIA AGRICULTURAL QUARANTINE SERVICE
Valid for 1 year (January to December) 2025

dan
permit for importing 5
pection and clearance by
certificate issued by the
ld be enclosed with the
tcopy to the exporter, and
rier company to facilitate
nit.

TC plantlets acclimatization and hardening



In vitro plantlets.



Filling pots with substrate



Barcoding



Washing plantlets



Transplanting in pots into humid growth boxes



92% survival rate during hardening achieved

Multiplication carried out on each genotype to produce more plantlets for field transplanting



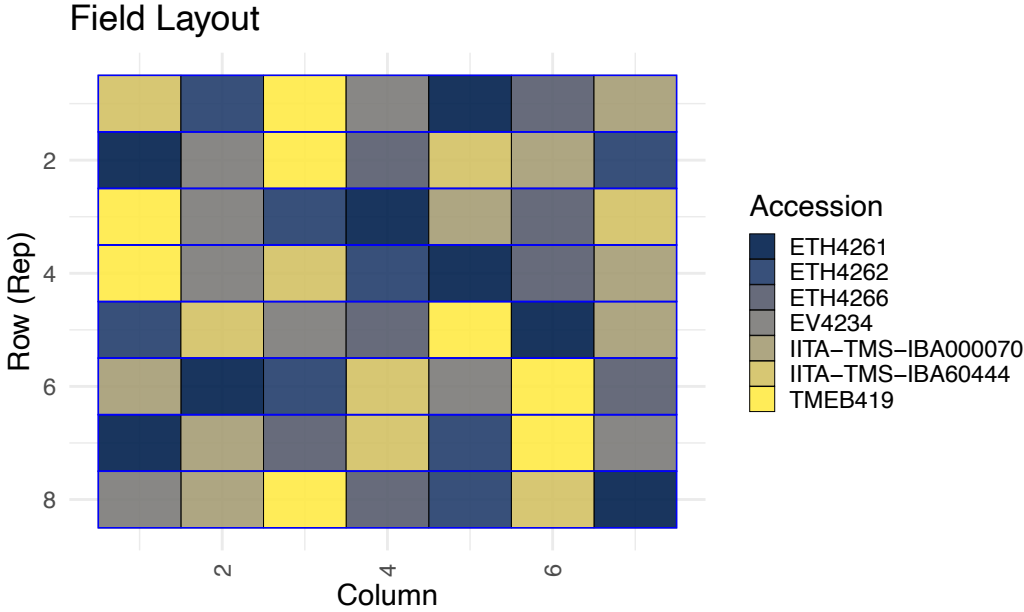
Multiplication carried out on each genotype to produce more plantlets for field transplanting



Construct	Plantlets received	Plantlets as of end of August
ETH 4261	80	1092
ETH 4262	76	659
ETH 4266	80	968
EV 4234	80	626
TMS60444	80	813
Total	396	4158

Field trials

Batch number	Planting Date	Number plants (total)	Design		
			Entries	Rep	Plot
1	5/6/2025	200	5	2	20
2	8/7/2025	150	5	1	30
3	1/8/2025	800	5	8	20
4	2/9/2025	180	5	8	SH, CRD
5	November 2025	1000	5	10	20



Current status of the field

Batch 1



Batch 2



Current status of the field

Batch 3



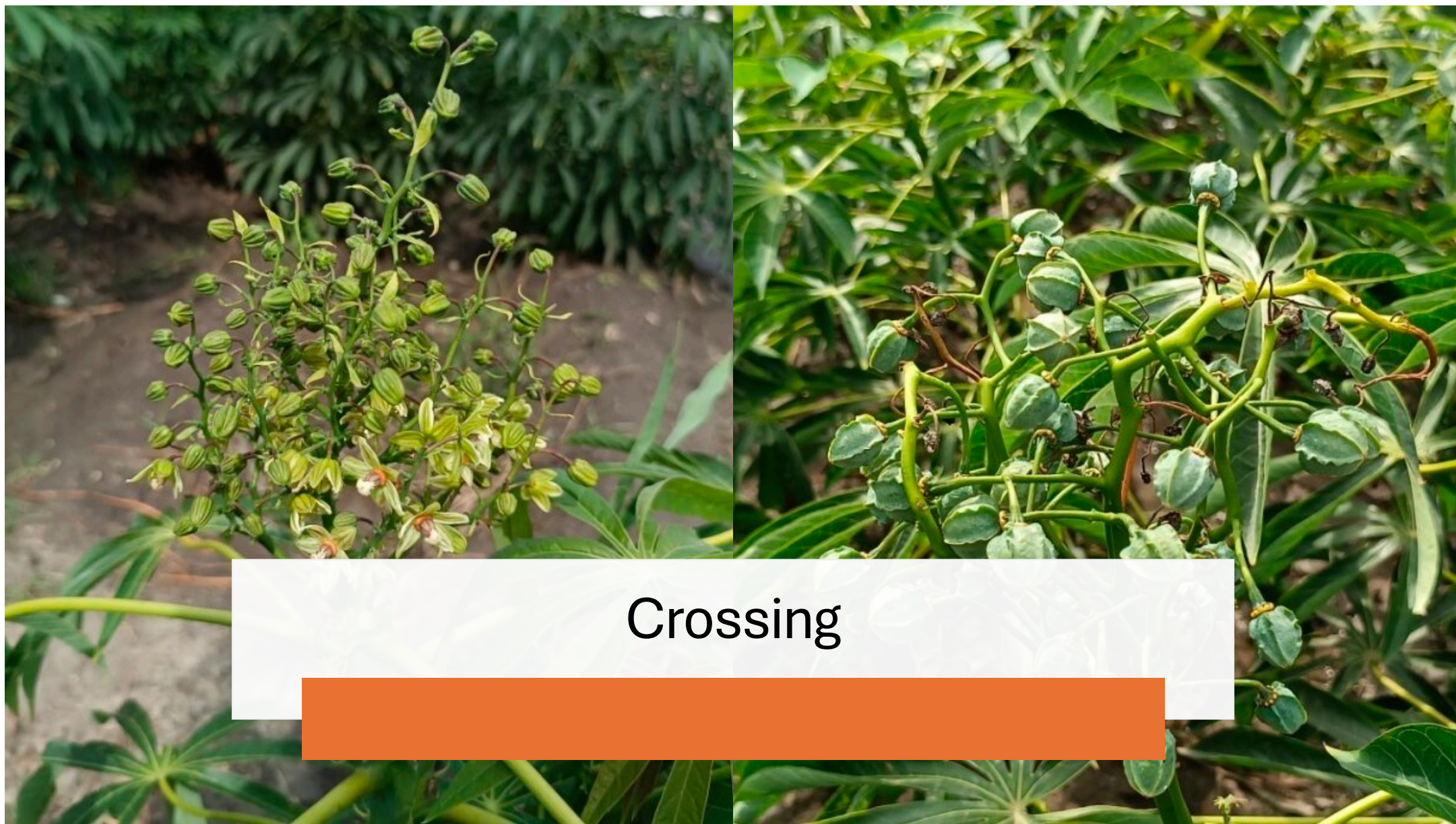
Batch 4



Phenotyping

- Recording plot data
 - Sprout (count)
 - Vigor (1 month after planting)
 - Plant height (3, 6, 9, 12 MAP)
 - Leaf retention, stay green (dry season)
 - Yield
 - Fresh root weight, root number, root size
 - Dry matter %, starch %, Dry yield
- Image capture
 - UAV – monthly interval
 - Root characterization at harvest

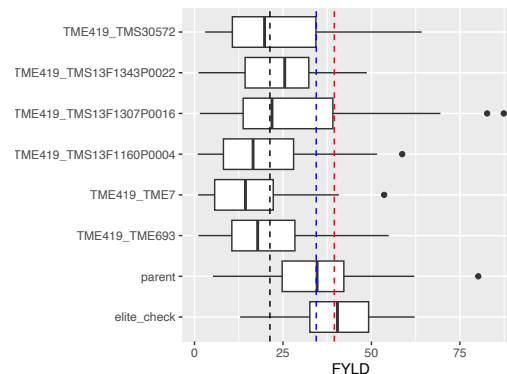
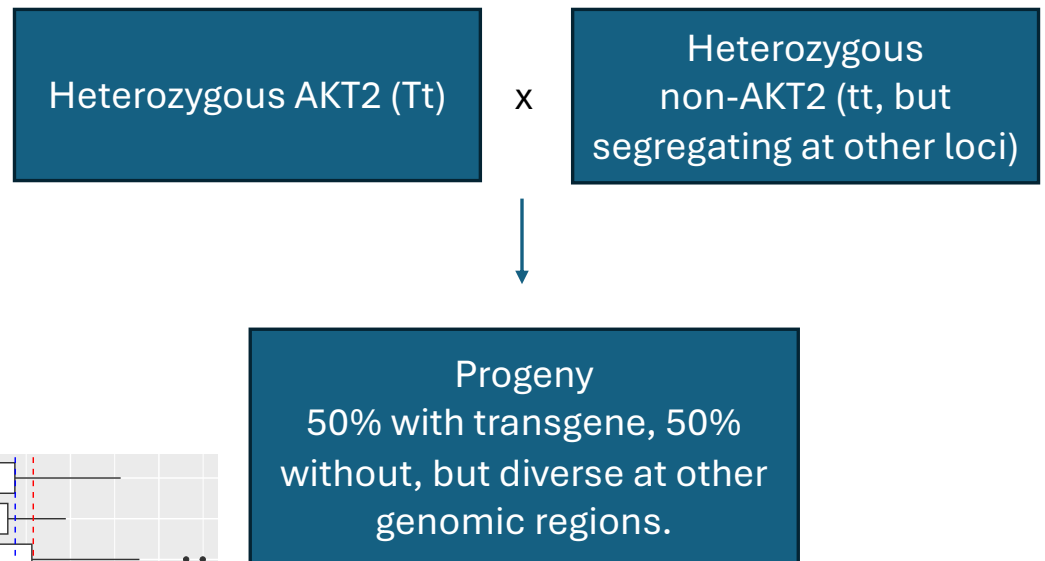




Crossing

Genetic Background and Trait Segregation

- Both parents are heterozygous across the genome → progeny segregate for many loci.
- This leads to wide phenotypic variation, including in yield.
- On top of this background variation, we aim to detect the specific effect of the transgene.



Controlling for Confounders (CMD2)

- Cassava Mosaic Disease (CMD) resistance is a major confounder for yield evaluation.
- To avoid bias, we use a clone fixed for CMD2 resistance gene as the genetic background.
- This ensures that any disease pressure does not obscure the detection of the transgene effect.



Experimental schema

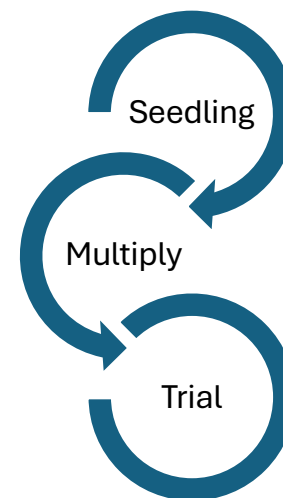
1. Start with CMD2-fixed parental clone.
2. Introduce single-locus transgene (Tt).
3. Cross GM (Tt) × non-GM (tt), both CMD2-fixed.
4. Progeny segregate 1:1 for transgene, but uniform for CMD2.
5. Compare GM+ vs GM– progeny across segregating genetic background for yield and other traits.

Evaluation

Conventional strategy

Year	Stage	Design		
		Plot size	Rep	Loc
1	Seedling	Single plant	1	1
2	Clonal	Single row	1	1
3	Prel. Yield Trial	2 row	2	2
4	Adv. Yield Trial	4 row	3	3
5	Unif. Yield Trial	4	3	10

Accelerated evaluation strategy



Single plant

Rapid multiplication

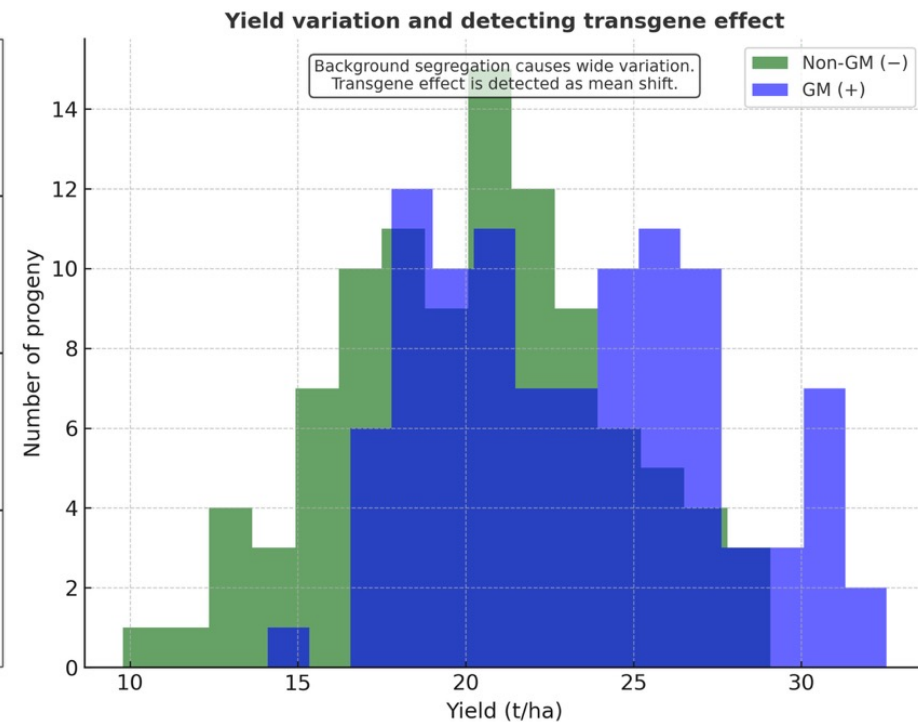
Replicated, multi-environment trial

Mock-up of results (het parents)

Cross: GM (Tt, CMD2-fixed) × non-GM (tt, CMD2-fixed)

	t	t	(100% t)
T	Tt GM (+)	Tt GM (+)	50%
t	tt non-GM (–)	tt non-GM (–)	50%
	50%	50%	

Expected 1:1 segregation for transgene
All progeny CMD2-resistant background

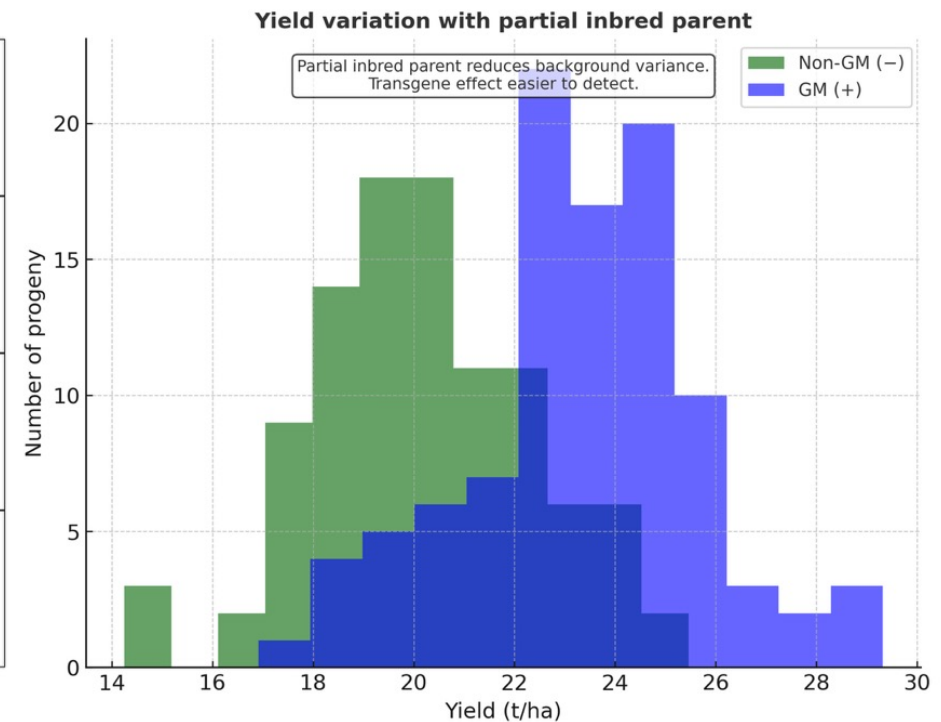


Mock-up of results (partial inbred parents)

Cross: GM (Tt, CMD2-fixed) × partial inbred (tt, CMD2-fixed)

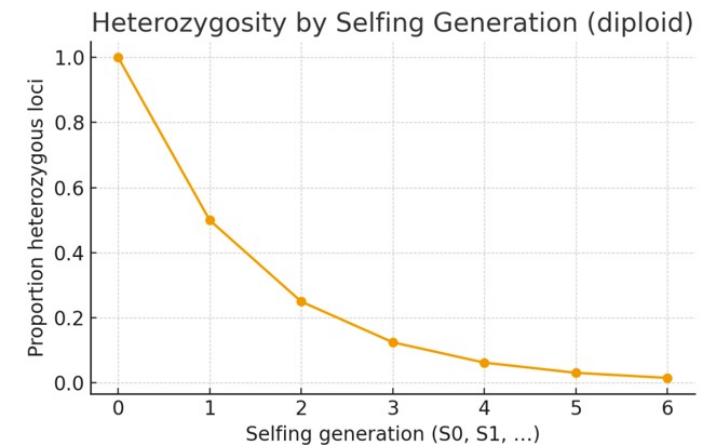
	t	t	(100% t)
T	Tt GM (+)	Tt GM (+)	50%
t	tt non-GM (–)	tt non-GM (–)	50%
	50%	50%	

Expected 1:1 segregation for transgene
All progeny CMD2-resistant, partial inbred background



Scenario 2: Inbred Parents (CMD2-Fixed)

- Use parental lines fixed for CMD2 to remove disease confounding.
- Develop partial inbreds via selfing: S_0 (founder) $\rightarrow S_1 \rightarrow S_2 \rightarrow \dots$
- Each selfing generation halves heterozygosity across the genome.
- Cross GM(+) hemizygous line (Tt, CMD2) to CMD2-fixed partial inbreds.
- Testcross progeny segregate 1:1 for transgene presence/absence, with reduced background genetic variance as inbreeding increases.



Parent A: partial inbred (CMD2-fixed)

- Genotype at transgene locus: tt
- Reduced heterozygosity ($S_1/S_2/\dots$)

X

Parent B: GM hemizygous (CMD2-fixed)

- Genotype at transgene locus: Tt
- Similar genetic background

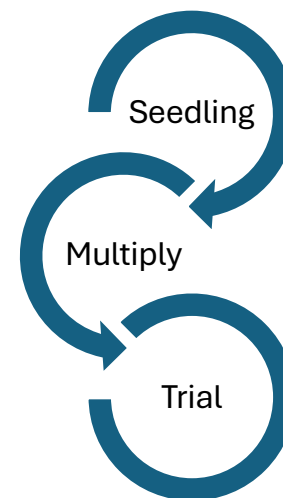
- Testcross progeny $\rightarrow$ 1:1 segregation for transgene, variance reduced with inbreeding.
- **Greater power to detect mean yield difference** between GM(+) and CMD2 fixation avoids confounding from CMD disease pressure.

Evaluation

Conventional strategy

Year	Stage	Design		
		Plot size	Rep	Loc
1	Seedling	Single plant	1	1
2	Clonal	Single row	1	1
3	Prel. Yield Trial	2 row	2	2
4	Adv. Yield Trial	4 row	3	3
5	Unif. Yield Trial	4	3	10

Accelerated evaluation strategy



Single plant

Rapid multiplication

Replicated, multi-environment trial

Request for submission of annual reports NBMA-010



NBMA/CFT/010/I

11th February 2025

The Principal Investigator

International Institute of Tropical Agriculture
Ibadan, Oyo State

**REQUEST FOR SUBMISSION OF ANNUAL REPORTS ON TRANSGENIC
CASSAVA CONFINED FIELD TRIAL RESEARCH**

Reference is made to the permit Ref.: NBMA/CFT/010 and the subsequent ones granted to you to conduct confined field trial (CFT) on transgenic cassava.

2. It has come to the notice of the Agency that since inception of the permit granted to your Institute dated 13th October 2021, you have not submitted any progress report on the CFTs to the Agency, except reports the Agency got during its regular inspections.

3. In view of the above, I am directed to request you to furnish the Agency with the Annual Performance reports (per year) of each CFT research conducted from inception of the research, including challenges encountered, some observed variations and reasons for the additional applications on the research. The report is expected to reach the Agency on or before the 31st of March 2025.

4. Please accept the warm regards of the Director-General/CEO.

Hauwa Tahir Ahmed

Ag. Director (Biosafety Enforcement & Operations Department)
for: Director-General/Chief Executive Officer



Annual Scientific Report on Confined Field Trials of Genetically Modified Cassava Conducted by the Cassava Source Sink Project (2019–2025)

Submitted by:

Dr. Ismail Y. Rabbi
IITA - PI, CASS Project
International Institute of Tropical Agriculture (IITA)
Ibadan, Nigeria

Project Location:

IITA Confined Field Trial Site
Ibadan, Oyo State, Nigeria

Permits Covered: NBMA/CFT/008 and NBMA/CFT/010

Reporting Period: January 2019 – August 2025

Preparation Dates: May 2025

Confidentiality Statement:

This report is submitted in compliance with the NBMA regulatory requirements. It contains detailed data and observations from regulated field evaluations of genetically modified cassava. Any reproduction or dissemination requires prior written consent from IITA and the National Biosafety Management Agency.

Thank You