



Maintaining productivity in Mainland Southeast Asia by addressing CMD

-- Cassava Breeding

Thuy, Cu Thi Le
Country Breeding Lead

Breeding Associate



Pham, Phuong Duc

P.Pham@cgiar.org

2 years of experience at CIAT

- Manage breeding trials in the lowland tropics
- Manage crossing nurseries

CMD challenge

- **Spread quickly:**
102 ha in Tây Ninh in 2017 to 120,000 ha in 24 provinces in 2021
- **Loss** 1.5 millions tons fresh root (101 million USD)
- **Loss** stems
- Whiteflies controls didn't work



Opportunities

- High number of cassava starch **processing factories**
 - 120 factories
 - High demand of fresh roots
 - Annual production: 10 mill tons/600,000ha
 - Annual import – 3 million tons
- Supportive **government**
- Strong engaged **national** research institutions
- **Private** sectors start to engage

Research findings and impacts

Introduced 107 new varieties from CIAT and IITA: 2019

CMD Resistance

		2020_donn	2020_tayn	2021_tayn	2021phuy	2021_quan	CMD_10mon
	KU50	4.0	4.0	3.4	2.3	1.0	3.0
HN1	TMEB419	1.0	1.0	1.4	1.3	1.0	1.1
HN36	CR24-16	1.0	1.0	1.1	1.1	1.0	1.0
	CR13-8	1.0	1.0	1.0	1.0	1.0	1.0
	CR24-3	1.0	1.0	1.0	NA	NA	1.0
	CR52A-2	1.0	1.0	NA	NA	NA	1.0
HN97	AR9-48	1.0	1.0	1.1	1.1	1.0	1.0
	CR52A-4	0.9	0.9	0.9	NA	1.0	0.9
HN80	CR27-20	0.9	0.9	0.9	NA	1.0	1.0
HN5	IBA980581	1.1	1.1	1.0	0.9	1.0	1.0
HN3	IBA972205	1.0	1.0	0.9	1.1	1.0	1.0
	IBA920057	1.1	1.1	1.1	0.9	NA	1.0
	IBA980505	1.0	1.0	NA	1.0	NA	1.0
	HL-S11	3.1	3.1	4.1	4.0	NA	3.7
	KM140	2.7	2.7	3.1	3.9	NA	3.5
	KM419	3.7	3.7	3.8	2.8	3.3	3.5
	KM505	2.6	2.6	NA	NA	2.1	2.6

Starch Yield

		2020_donn	2020_tayn	2021_tayn	2021phuy	2021_quan	starch_yield (ton/ha)
	KU50	13.3	2.4	11.0	6.4	7.8	8.0
HN1	TMEB419	7.6	13.5	10.1	4.4	9.0	7.9
HN36	CR24-16	5.8	10.2	11.7	3.3	8.0	7.6
	CR13-8	7.0	8.5	9.4	4.4	6.1	7.2
	CR24-3	8.7	7.3	12.7	NA	NA	7.1
	CR52A-2	8.7	8.9	NA	NA	NA	7.1
HN97	AR9-48	8.1	6.6	9.6	4.5	8.6	6.7
	CR52A-4	7.2	8.1	9.2	NA	6.5	6.7
HN80	CR27-20	8.9	7.4	8.9	NA	4.6	6.5
HN5	IBA980581	4.7	13.1	8.1	2.6	5.9	6.1
HN3	IBA972205	5.5	7.7	11.6	3.8	3.1	5.9
	IBA920057	5.5	4.8	10.6	4.1	NA	5.8
	IBA980505	4.8	6.1	NA	2.1	NA	5.2
	HL-S11	11.6	1.1	7.0	3.4	NA	5.8
	KM140	7.5	6.0	6.4	3.2	NA	5.8
	KM419	5.0	3.4	6.5	3.2	5.9	5.7
	KM505	6.4	5.6	NA	NA	6.2	5.3

Research findings and impacts

Introduced 107 new varieties from CIAT and IITA: 2019

Released 6 varieties: 2020-2021



IBA-972205

6 released varieties in 2020-2021



CR27-20



AR9-48



IBA980581

CMD resistant varieties adoption

- **TMEB419**: 170 ha/2 provinces
- **IBA980581**: 300 ha/7 provinces
- **IBA972205**: 23 ha/1 province
- **CR24-16**: 2 ha/1 province: Limited – CBB/Fungal like disease
- **CR27-20**: 3ha/1 province: limited – unpreferable plant type
- **AR9-48**: 1 ha/1 province: Limited – yellow pulp/Root rots

Preferable plant types



CR24-16



TMEB419



IBA980581

Scaling pathways

- Deliver the best clones to **Laos, Cambodia and Thailand** for adaptation evaluation
- Attract funds from **private foundation** for new varieties development
- Recurrent selection method with **national** breeding program
 - Validated and routinely used CMD **marker**
 - Evaluated performance of new varieties created from crossing between CMD resistant donors and elite varieties

Emerging research questions

Relatively **lower starch content** of 1st generation CMD-resistant varieties than the elite cultivars

	2020_donn	2020_tayn	2021_tayn	2021phuy	2021_quan	starch (%)
KU50	28.4	28.2	27.2	24.1	29.1	27.1
CR24-16	27.1	30.9	27.0	22.5	27.2	26.0
AR9-48	25.8	25.8	25.9	23.2	25.8	25.4
CR52A-4	26.8	29.6	29.3	NA	26.9	27.1
TMEB419	26.8	29.7	25.3	20.0	24.1	24.3
IBA980581	21.0	27.1	20.5	18.0	19.8	20.5
IBA972205	21.4	26.1	21.0	12.8	14.2	18.5
IBA920057	22.0	25.8	26.6	19.0	NA	22.8
IBA980505	21.4	23.5	NA	14.8	NA	18.9

Emerging research questions and opportunities

- **Genetic architecture** on dry matter, plant architecture, CBB and witches' broom
- Implement **genomic selection** to increase breeding efficiency
- Inbred-progenitor-based **hybrid cassava** breeding in Asia
 - KU50 selfed and will be evaluated in 2023-2024
- Evaluation of **CBSD resistance**
 - Multiplication of dual CBSD-CMD and increase in 2023: 15 genotypes introduced from **Germany**
 - Evaluation of F1 in 2023: 250 F1 introduced from **Colombia**



Thanks!

c.thuy@cgiar.org