



# Alliance



## Experimental field-level impacts of CMD and CWBD: Developing short-term recommendations for farmers based on best-bet information

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Final Review AGB-2018-172  
4<sup>th</sup> October 2023



# Pest and disease in the region- a new challenge

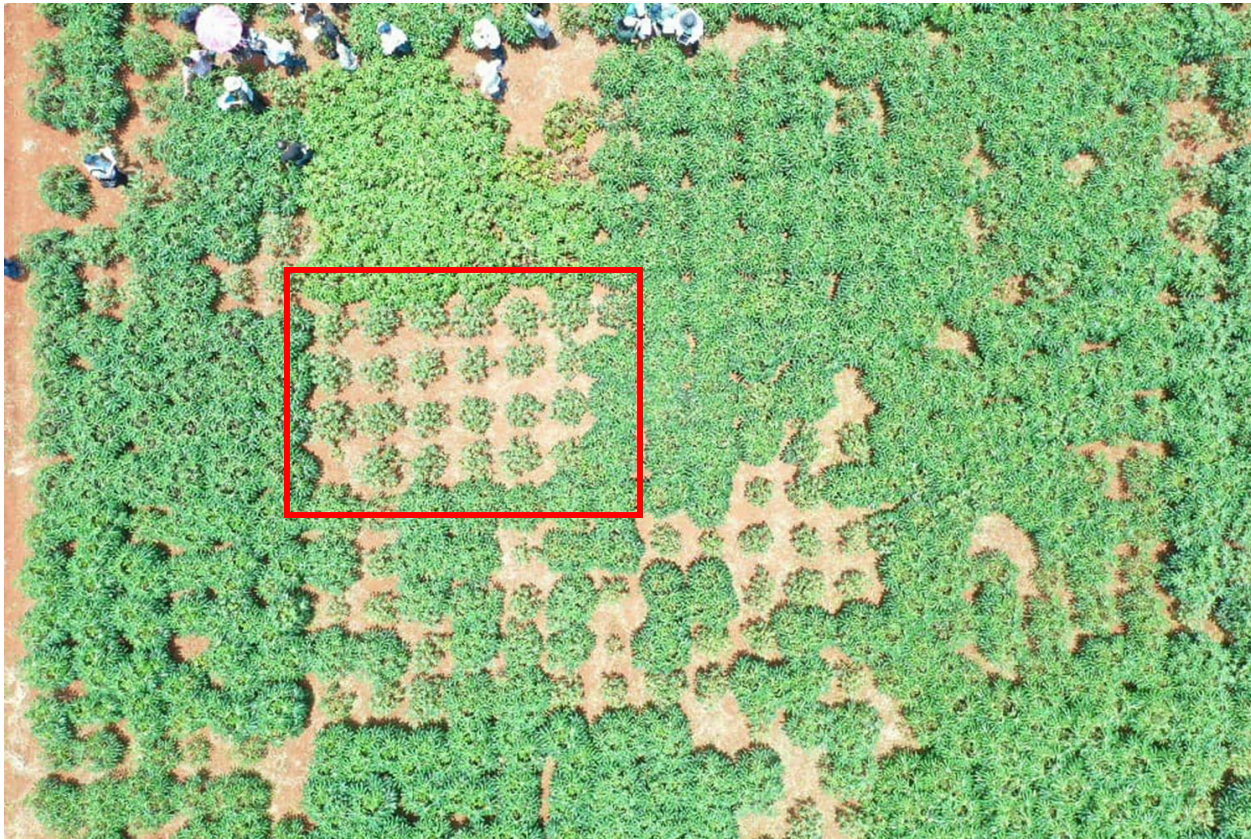


Cassava witches broom



Cassava Mosaic Disease Geminiviruses

# Screening for disease resistance and seed degeneration



CMD Cambodia



CWBD Laos

# CAVAC funded screening for CMD resistance (2018-19 and 2020)

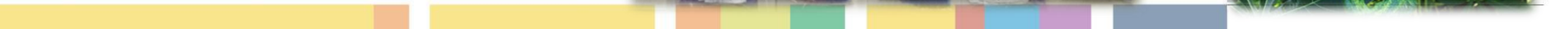
- Systematic evaluation of resistance to CMD in current varieties
- Effect of fertilizer application (building on results with CWBD in Laos)
- Evaluate yield impacts on different varieties

Variety	Origin	Genetic background
KU50	Thailand	R 1 x R 90
Rayong 11	Thailand	R 5 x OMR 29-20-118
SC8	China	CMR38-120-10
HuayBong60	Thailand	R 5 x KU 50
KM98-1	Vietnam	R 1 x R 5
Rayong 5	Thailand	27-77-10x R3





Mr. Sophearith Sok diligently collected leaf samples and send for PCR analysis



# Asymptomatic plants tested positive in PCR analysis

Percentage of asymptomatic plants testing positive for Sri Lanka cassava mosaic virus (SLCMV) over 2 years. Young leaves from 33.3 % of plants without any symptoms from each plot were collected for diagnosis of SLCMV by PCR of 9 varieties of cassava listed. Samples were collected after 63 and 270 days after planting (DAP) during 2019-20 season (year 2) and after 21 (DAP) during 2020-21 season (year 3).

Varieties	Clean	Positive selection	Clean	Positive selection
	2019-20		2020-21	
KU50	6.7 ±0.07	0	6.7 ±0.07	0
R11	12.5 ±0.09	66.7 ±0.13	20 ±0.20	26.7±0.12
HB60	26.7 ±0.12	23.5 ±0.11	0	18.8±0.10
R5	46.7 ±0.13	35.3 ±0.12	6.7 ±0.07	0
SC8	NA	42.9 ±0.14	NA	NA
TME3*	30.8 ±0.13	NA	15.4 ±0.10	NA
KM98-1	NA	31.3 ±0.12	NA	18.8 ±0.10
HB80**	31.3 ±0.12	NA	26.7 ±0.12	NA
R72	-	-	NA	0

# How much yield is lost from planting diseased stakes?

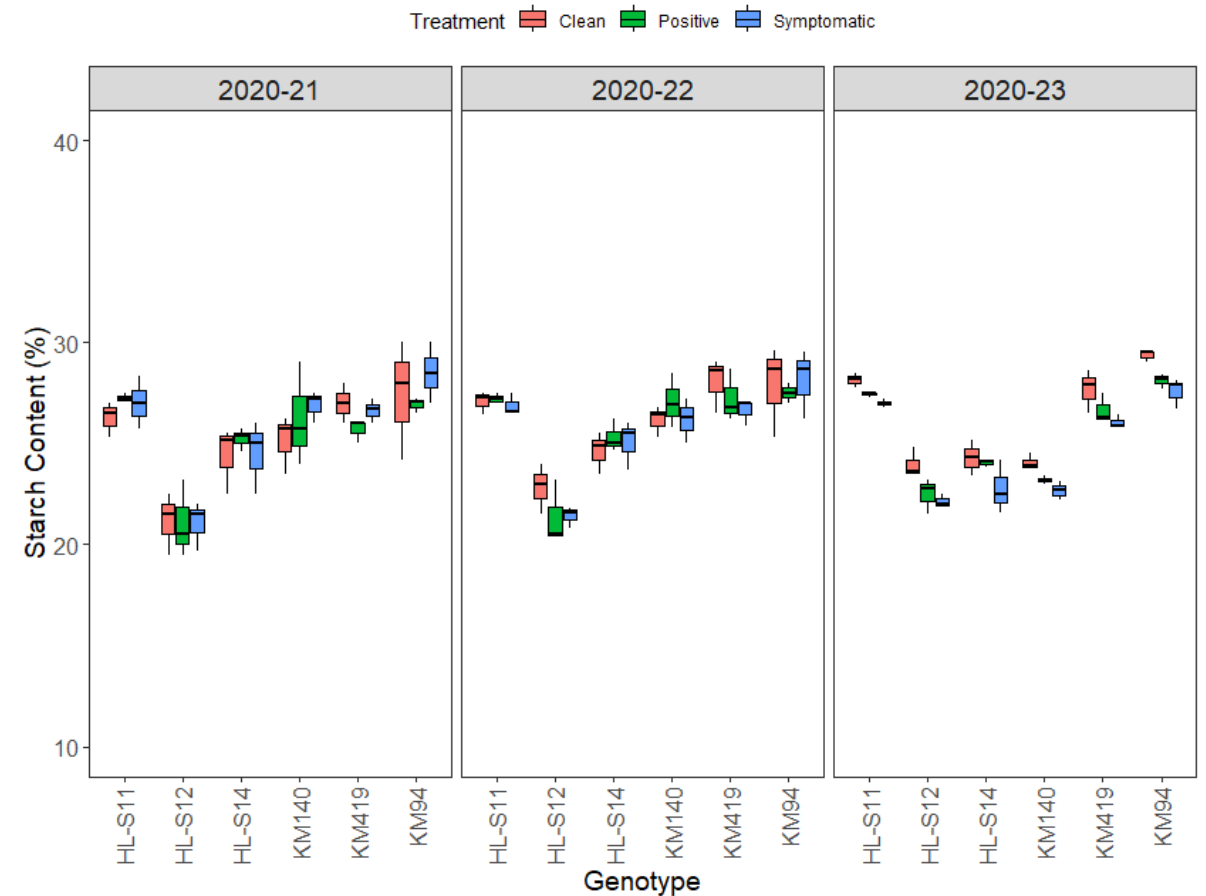
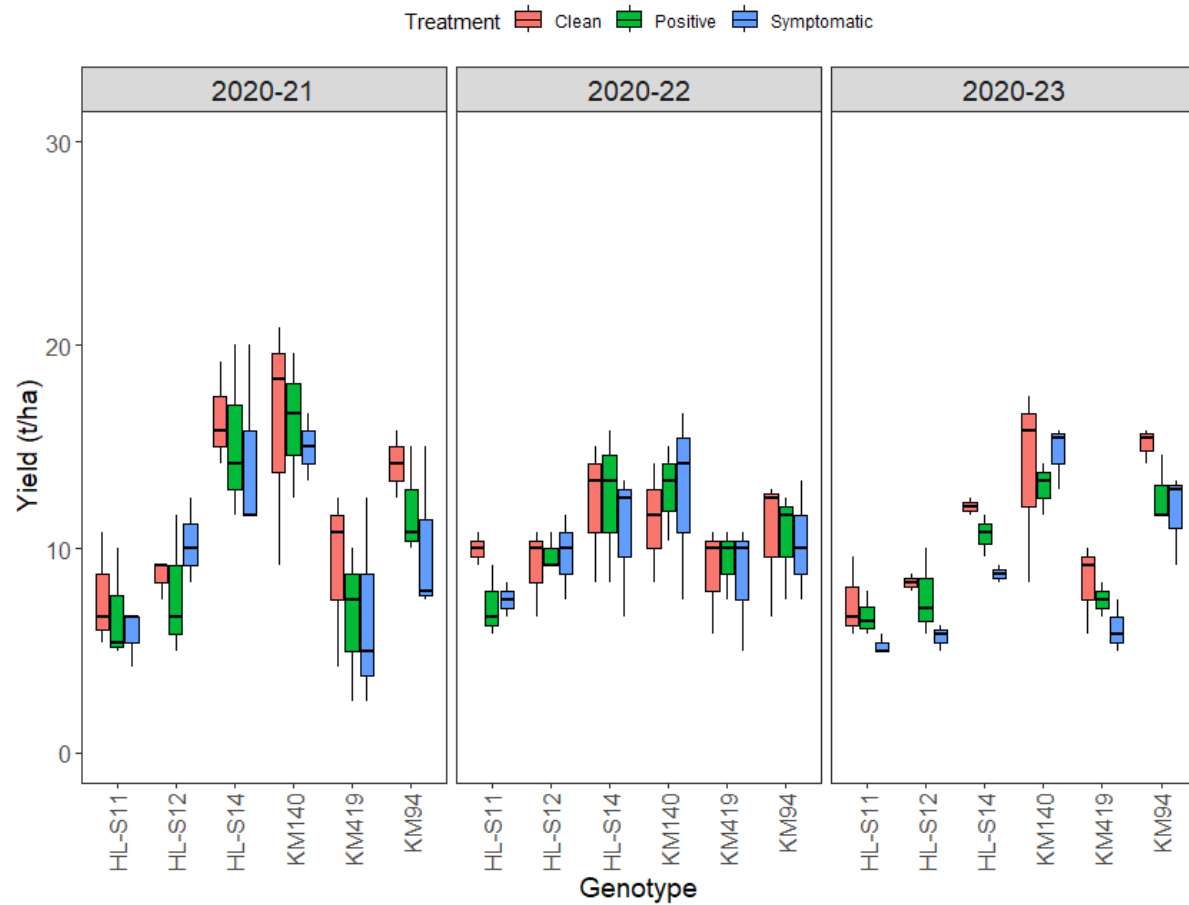


(1) + selected (i.e. visually healthy looking) planting material from 2018–19 multiplication block

(2) symptomatic planting material from 2018–19

(3) CMD-free planting material from TTDI

# Fresh root yield was significantly higher for clean planting material over symptomatic planting material ( in Vietnam)



In Vietnam, where above 90% of plants developed symptoms within 30 days after planting yielded very low even when clean planting material were used



# Lessons

- Number of infected plants  $\uparrow$  with time
- Some plants from symptomatic planting material not developing symptoms
- Plants from clean and positive selection planting material produced **2- to 3-times higher yields** than diseased planting material



# Single plant with symptomatic and asymptomatic branches



# Effect of CWBD on cassava root yield and starch content with different fertilizer treatment

## Treatment

T1 = KU50 Clean + F

T2 = KU50 Clean - F

T3 = Rayong 11 Clean + F

T4 = Rayong 11 Clean - F

T5 = KU50 CWBD + F

T6 = KU50 CWBD - F

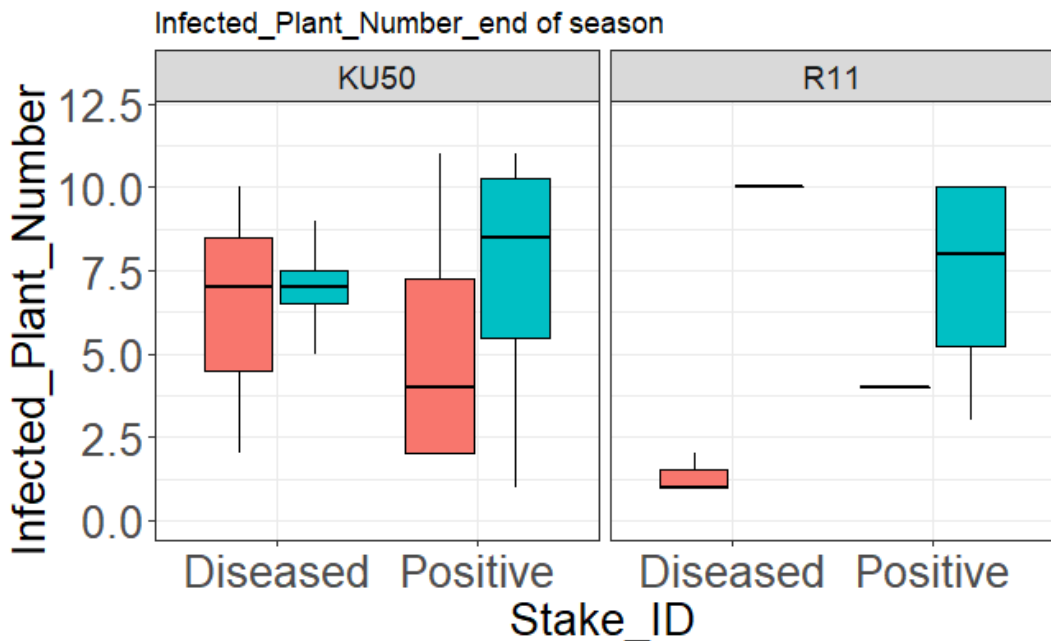
T7 = Rayong 11 CWBD + F

T8 = Rayong 11 CWBD - F

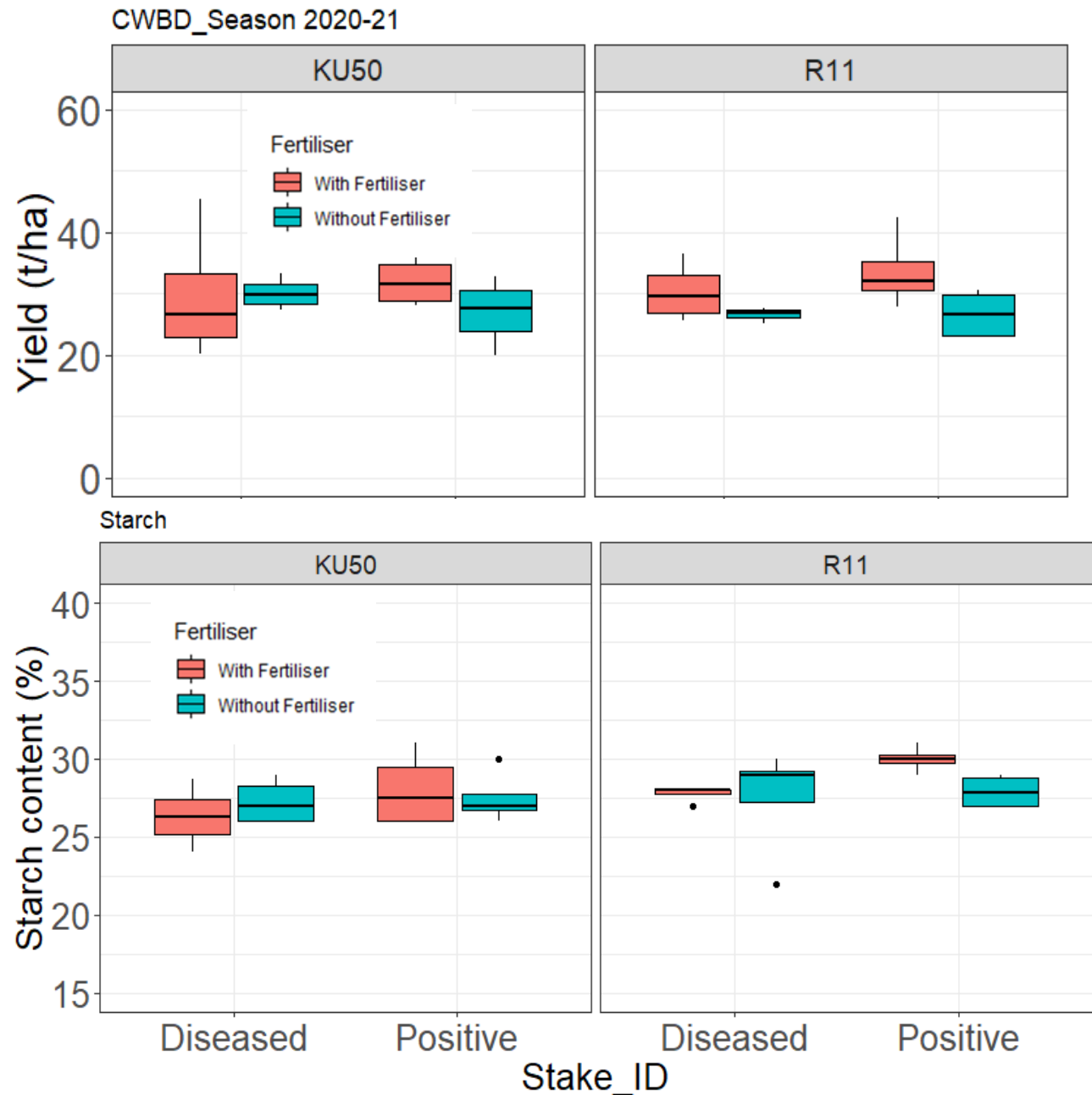
**F= Fertiliser (300 Kg/ha)**



# Diseased planting material and positive selection yielded similarly (season 2020-21)

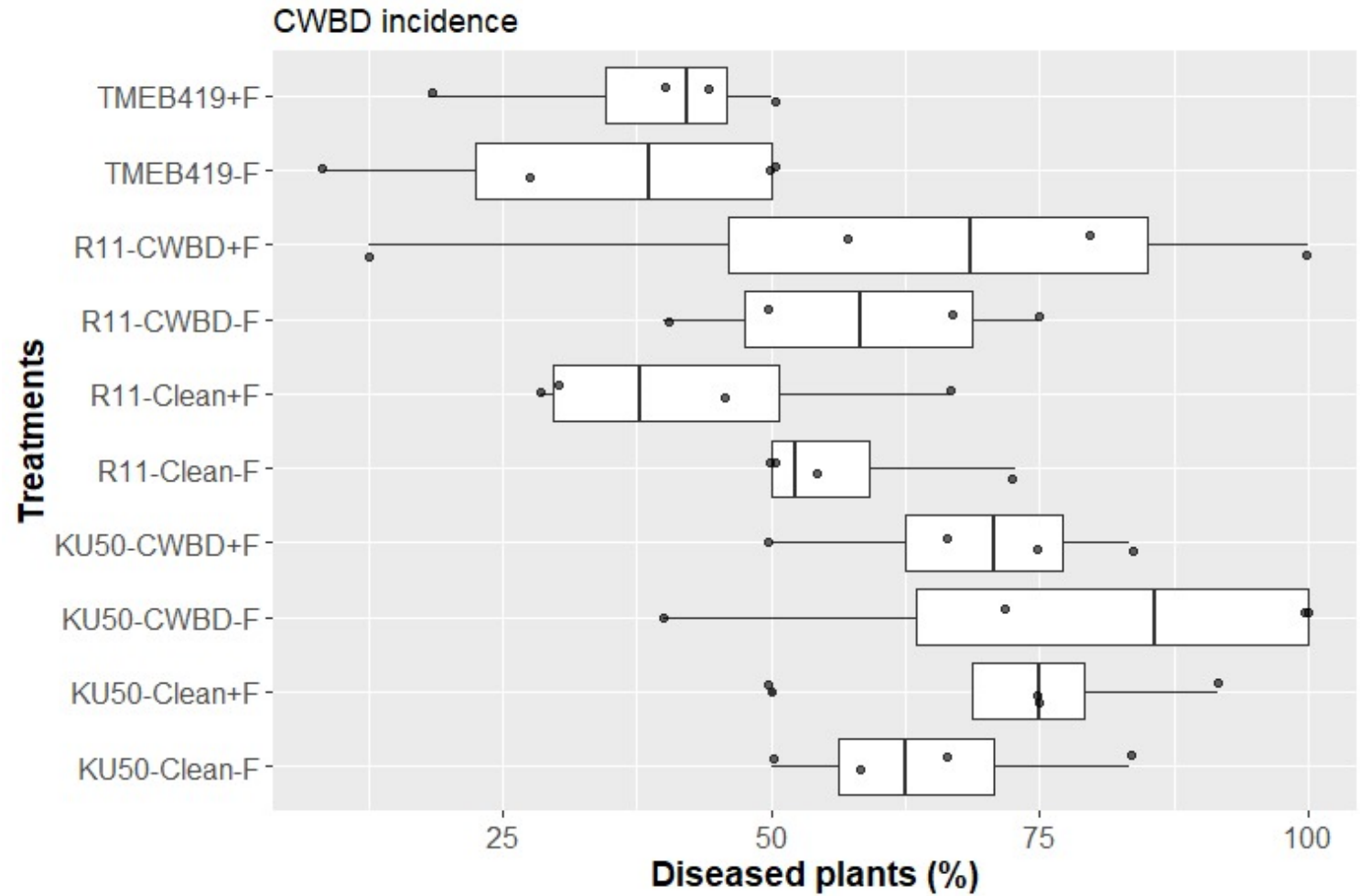


- KU50 showed more infection compared to Rayong11
- Fertiliser may have positive effect on infection ( less infection in fertilised plots)



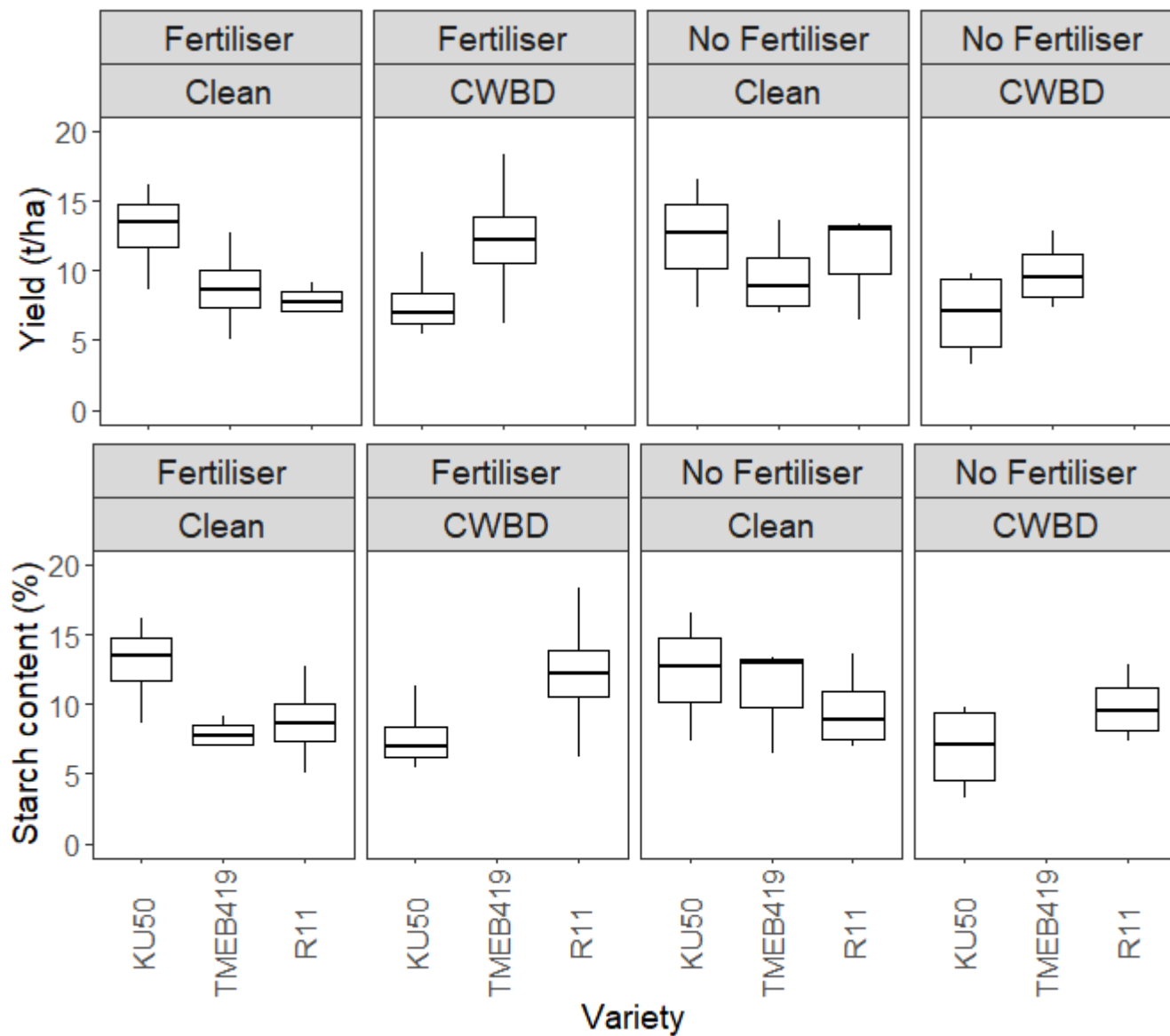
# Season 2022-23

- TMEB419 no CWBD infected plants
- CWBD infected planting material low germination 50%



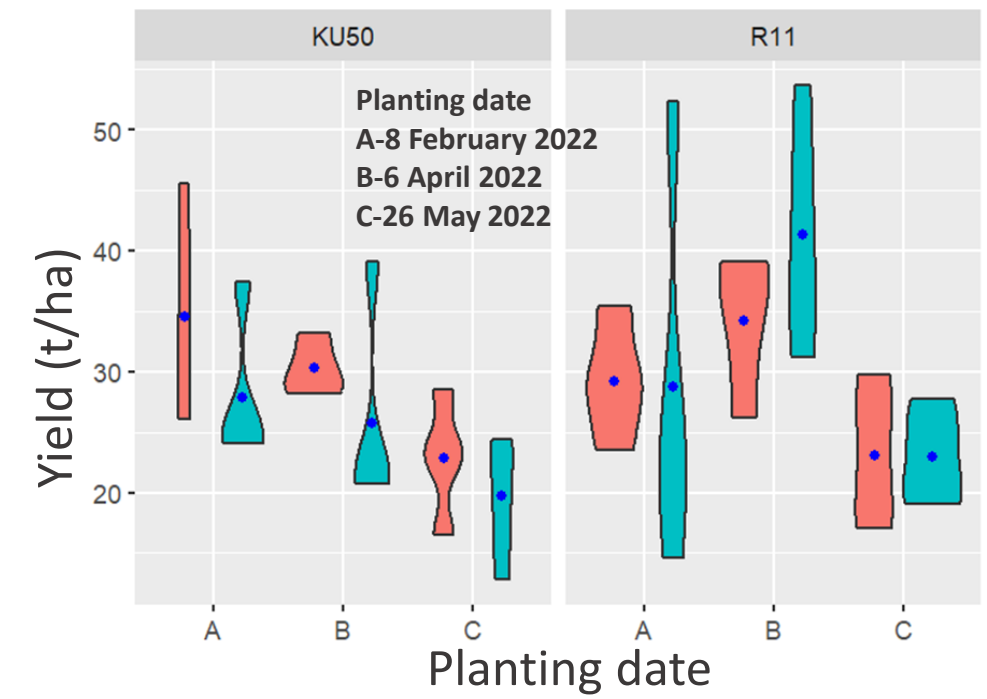
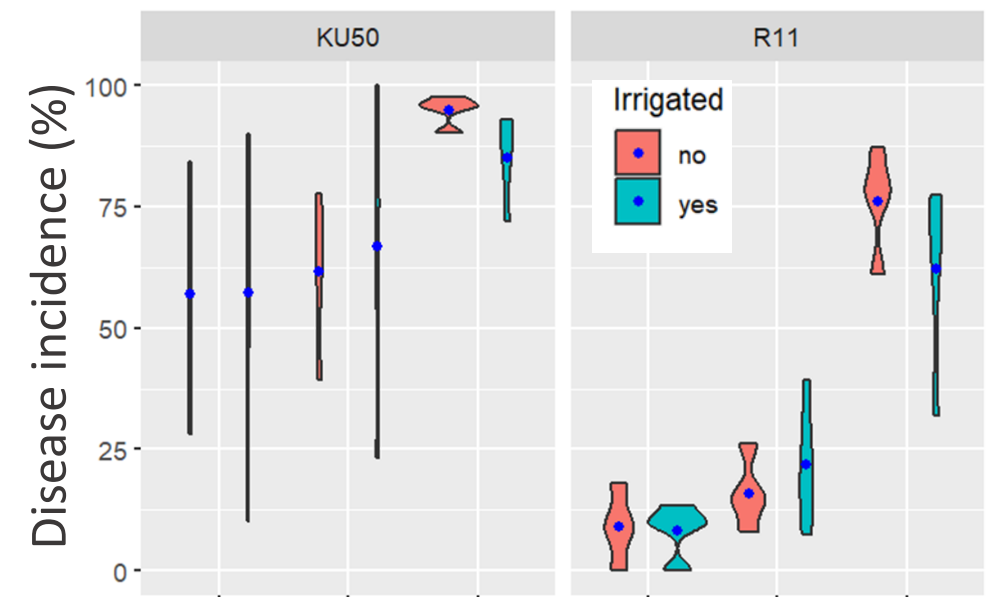
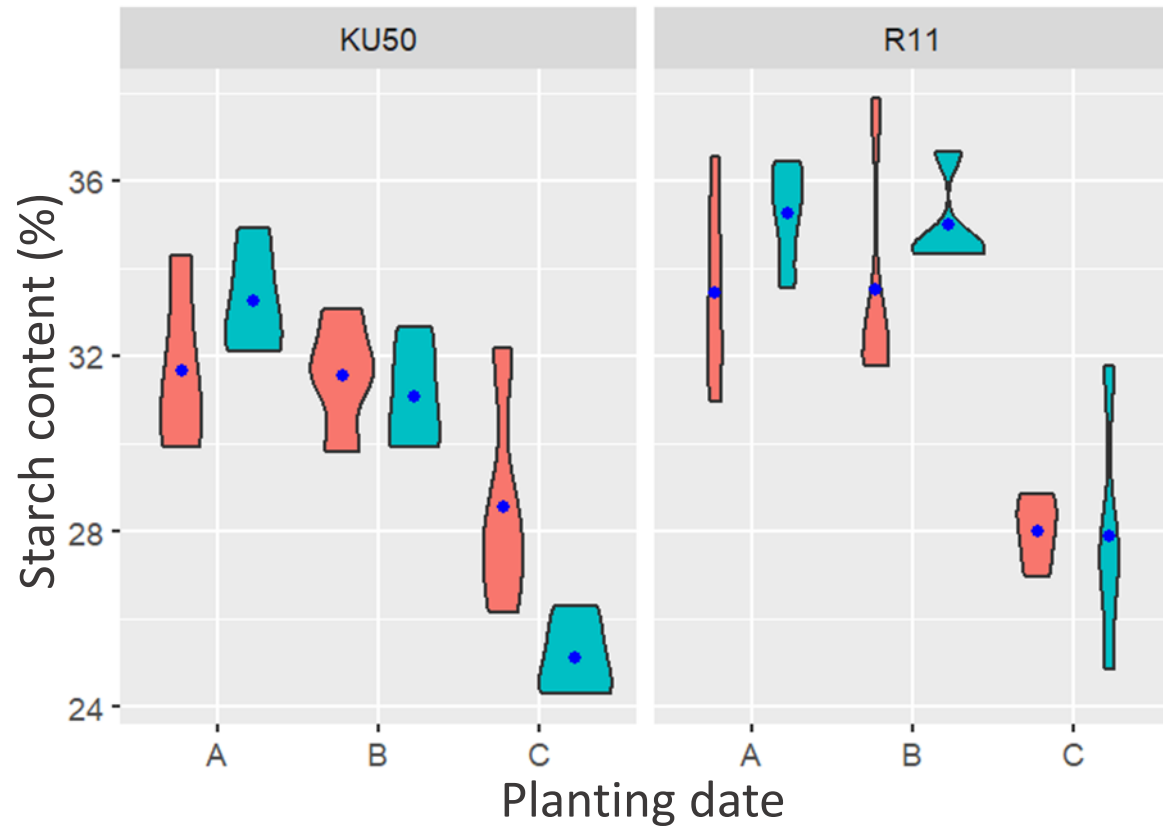
# Season 2022-23

Low yield and starch content



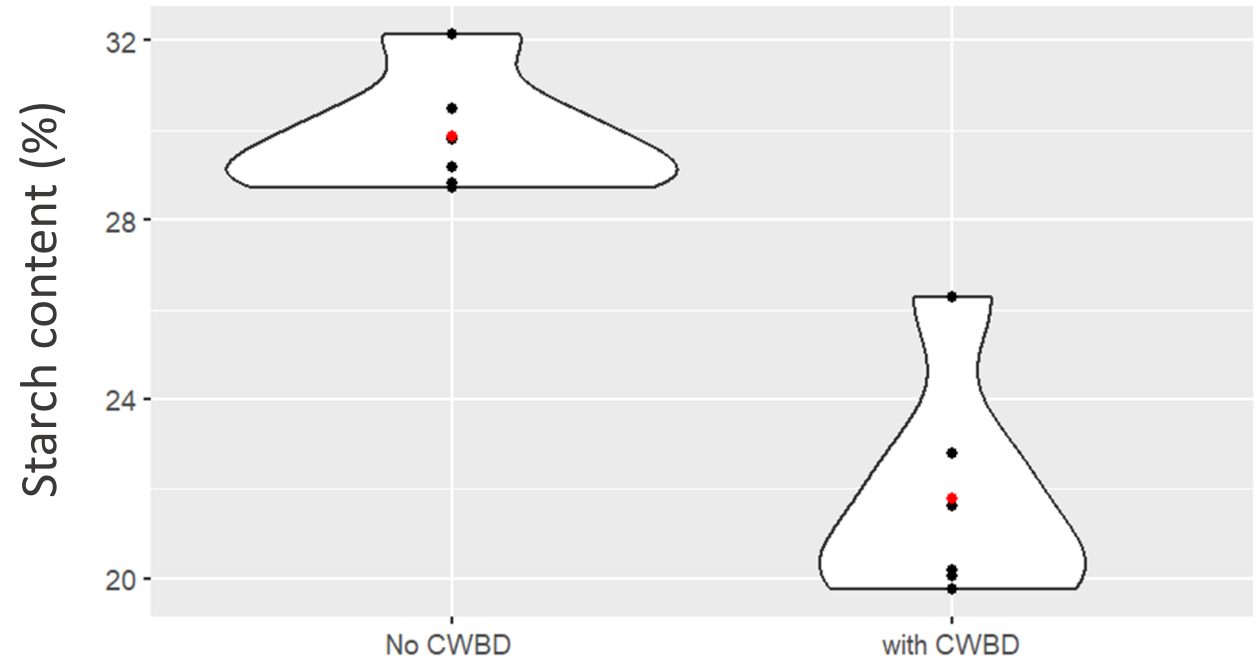
# Time of planting matters

CWBD incidences greater in late-planting and that impacted on plot yield and starch content



## CWBD infection significantly diminishes KU50 starch content

Starch content was 27% lower in CWBD infected plants compared to healthy plant (visually without symptoms) for KU50. There were not enough roots of R11 to compare between healthy and infected plants' starch content.





# Lesson learned

- Asymptomatic plants tested PCR positive for CMD virus at the end of the season
- CMD infection early in the season cause significant yield loss- suggest clean seed may be the solution to maintain yield.
- CMD resistant varieties are essential for maintaining productivity
- Until disease resistance varieties are available clean seed sources are essential to keep cassava production sustainable and profitable- for CWBD



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# Thank you!



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