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

Sophearith Sok, Laothao Youbee, Saythong Oudthachit, Jonathan Newby, Wilmer Cuellar, Erik Delaquis, Warren Arinaitwe, Troung Minh Hoa, Pham Thi Nhan, Imran Malik

e-mail- [a.malik@cgiar.org](mailto:a.malik@cgiar.org)

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# Pest and disease in the region- a new challenge



Cassava witches broom

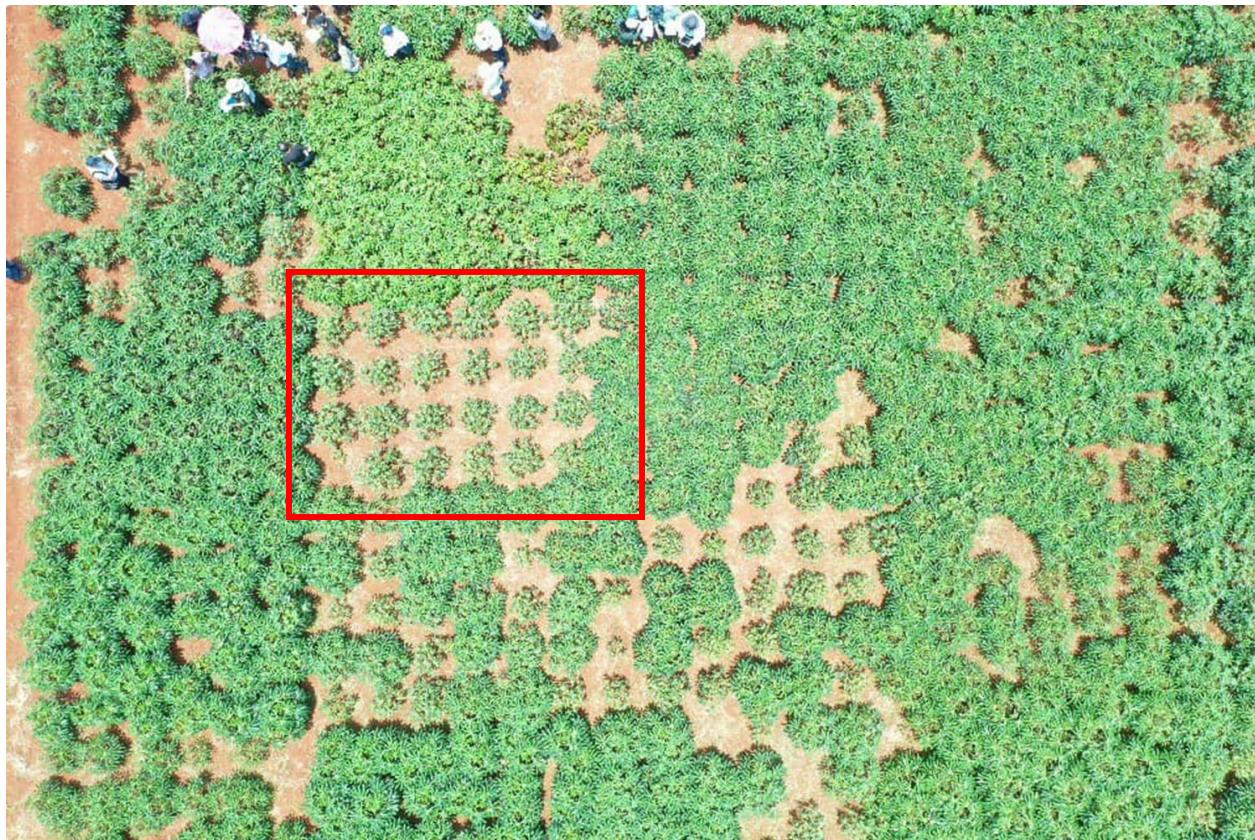


Cassava Mosaic Disease Geminiviruses

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# 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
<b>KU50</b>	Thailand	R 1 x R 90
<b>Rayong 11</b>	Thailand	R 5 x OMR 29-20-118
<b>SC8</b>	China	CMR38-120-10
<b>HuayBong60</b>	Thailand	R 5 x KU 50
<b>KM98-1</b>	Vietnam	R 1 x R 5
<b>Rayong 5</b>	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).

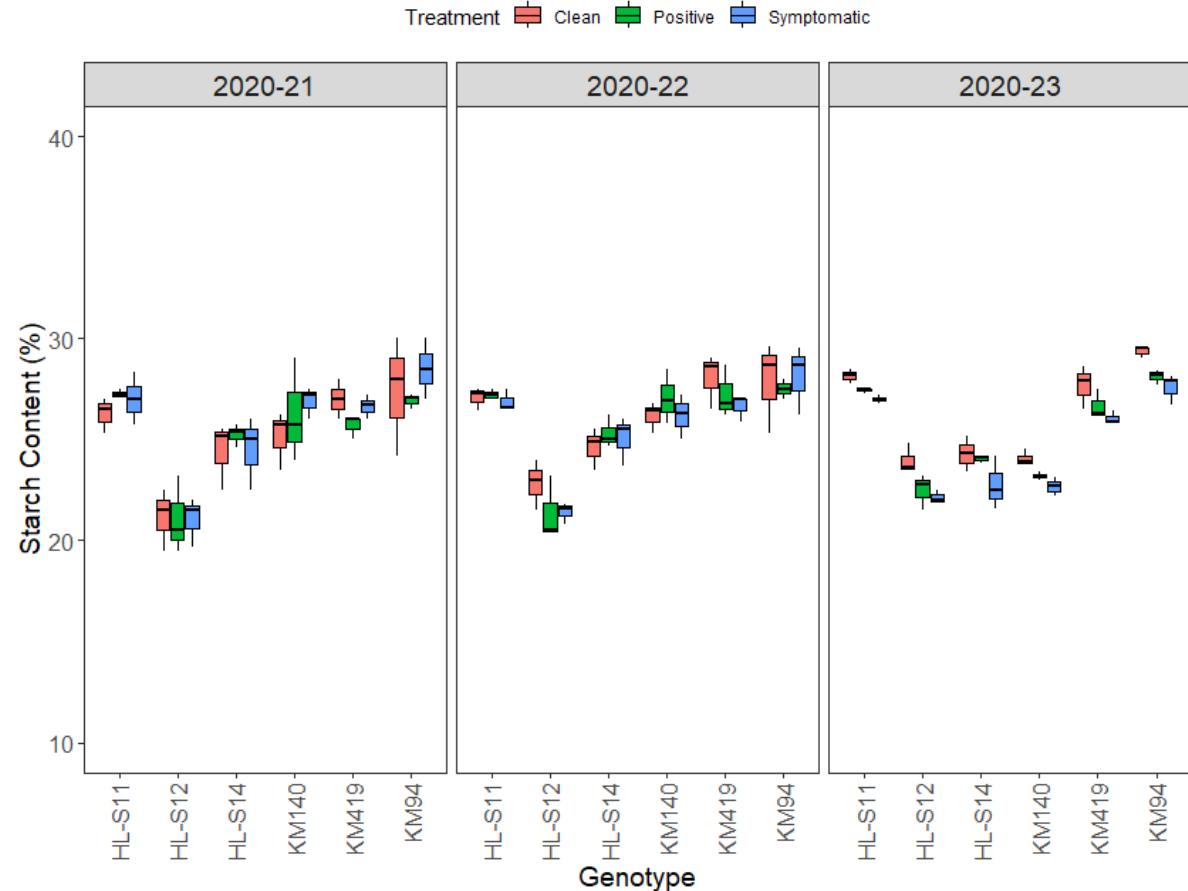
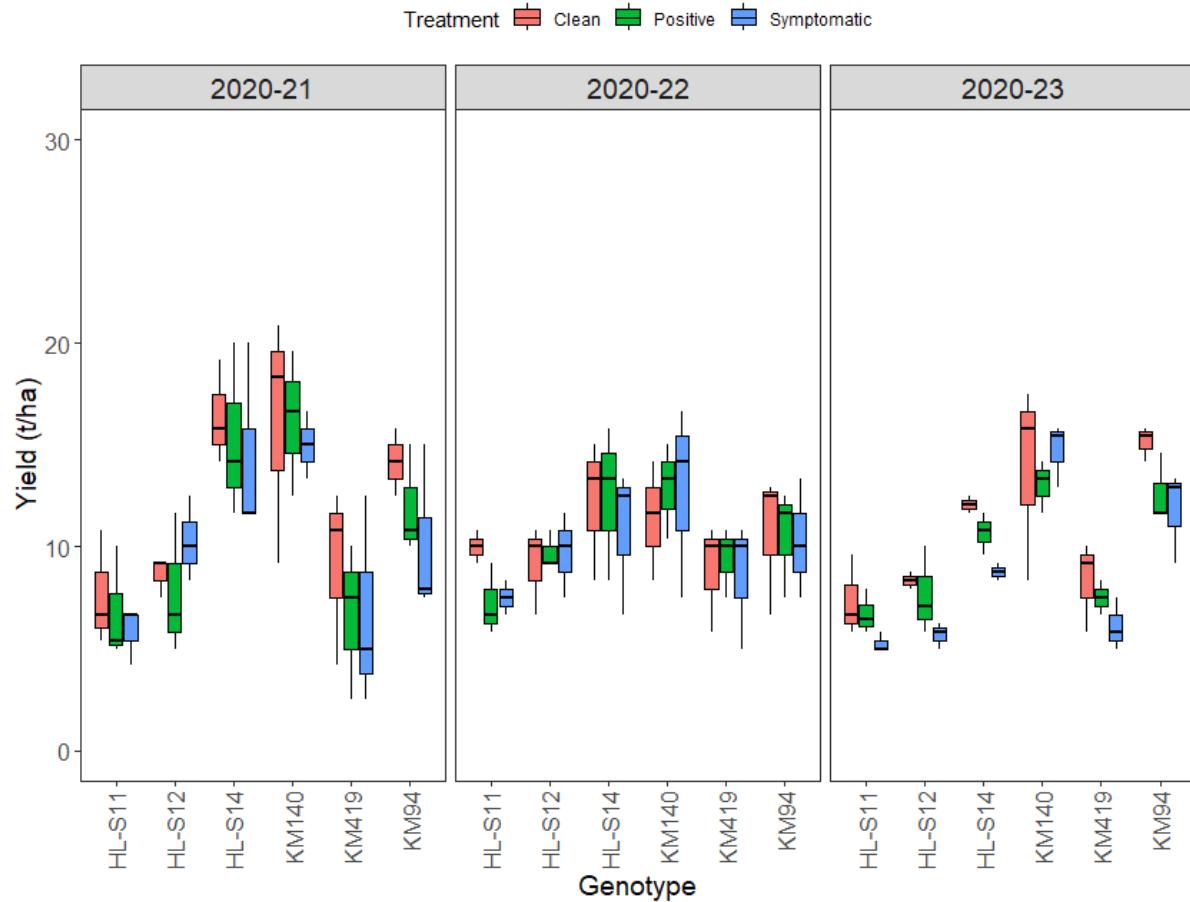
Varieties	Positive selection		Positive selection	
	Clean 2019-20	Clean 2020-21	Clean 2019-20	Clean 2020-21
KU50	$6.7 \pm 0.07$	0	$6.7 \pm 0.07$	0
R11	$12.5 \pm 0.09$	$66.7 \pm 0.13$	$20 \pm 0.20$	$26.7 \pm 0.12$
HB60	$26.7 \pm 0.12$	$23.5 \pm 0.11$	0	$18.8 \pm 0.10$
R5	$46.7 \pm 0.13$	$35.3 \pm 0.12$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



CMD



CWBD

# 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

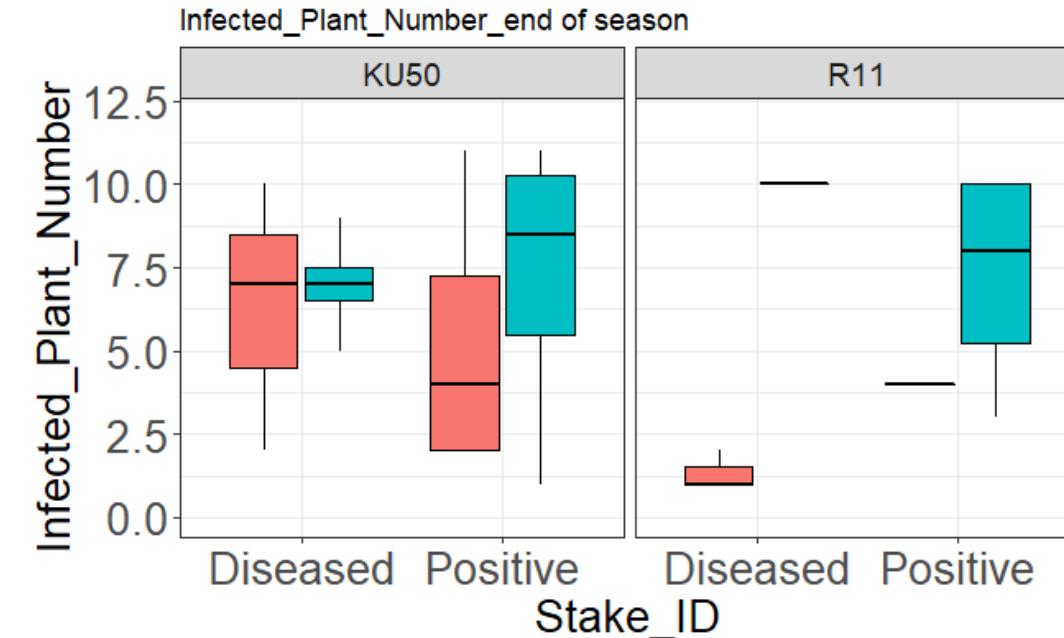
T7 = Rayong 11 CWBD + F

T8 = Rayong 11 CWBD - F

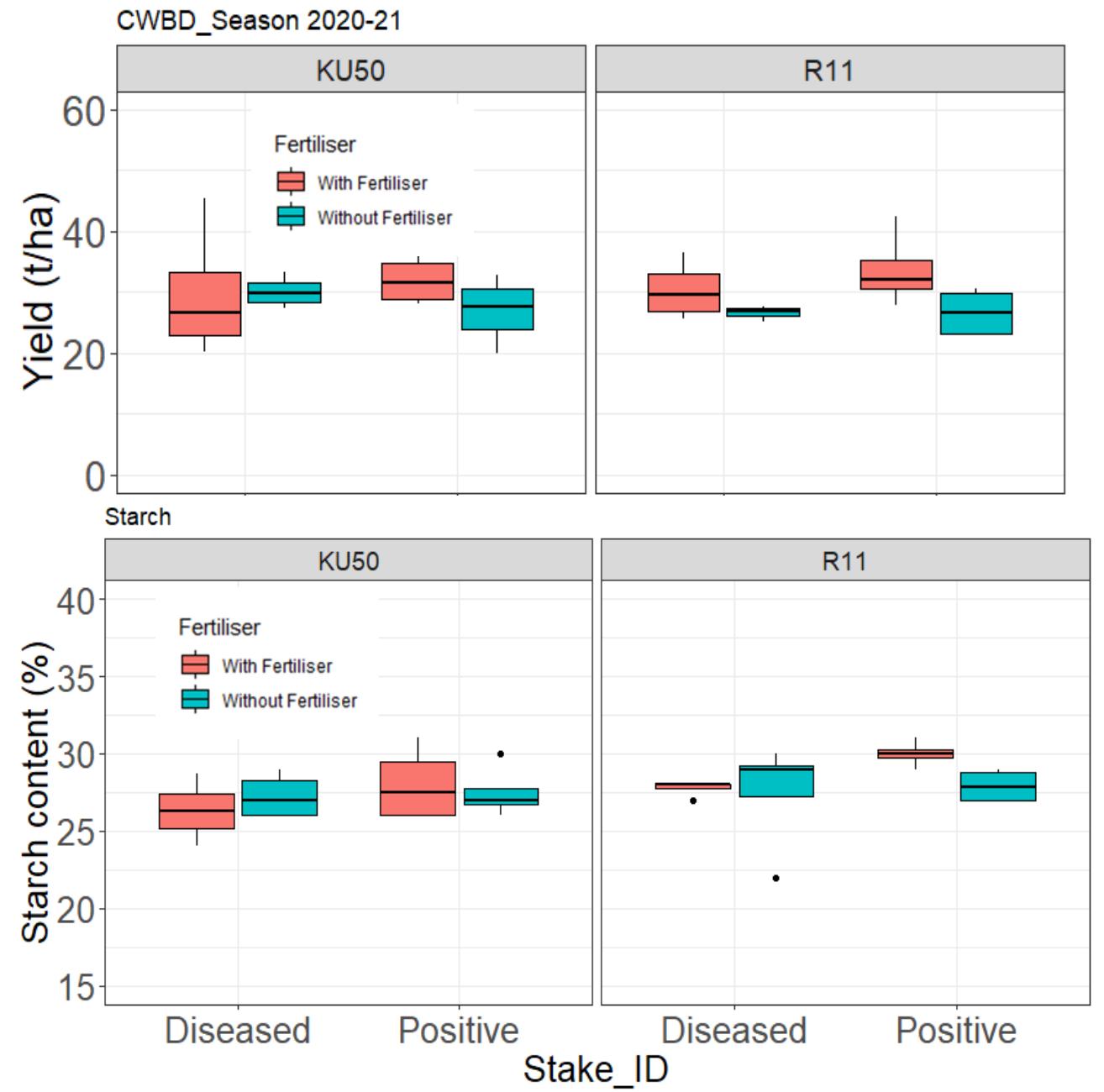
F= Fertiliser (300 Kg/ha)



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

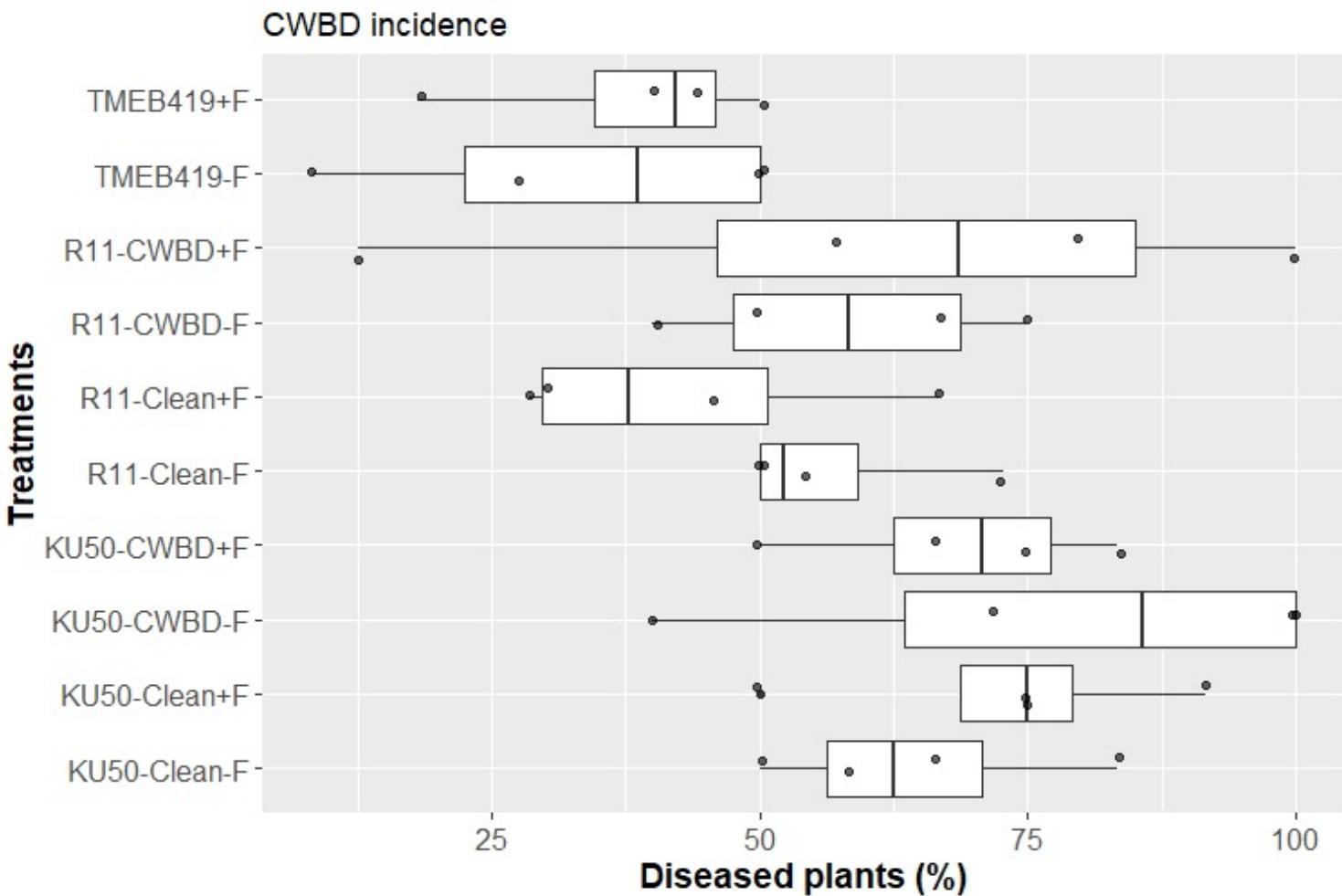


- KU50 showed more infection compared to Rayong11
- Fertiliser may have positive effect on infection ( less infection in fertilised plots)



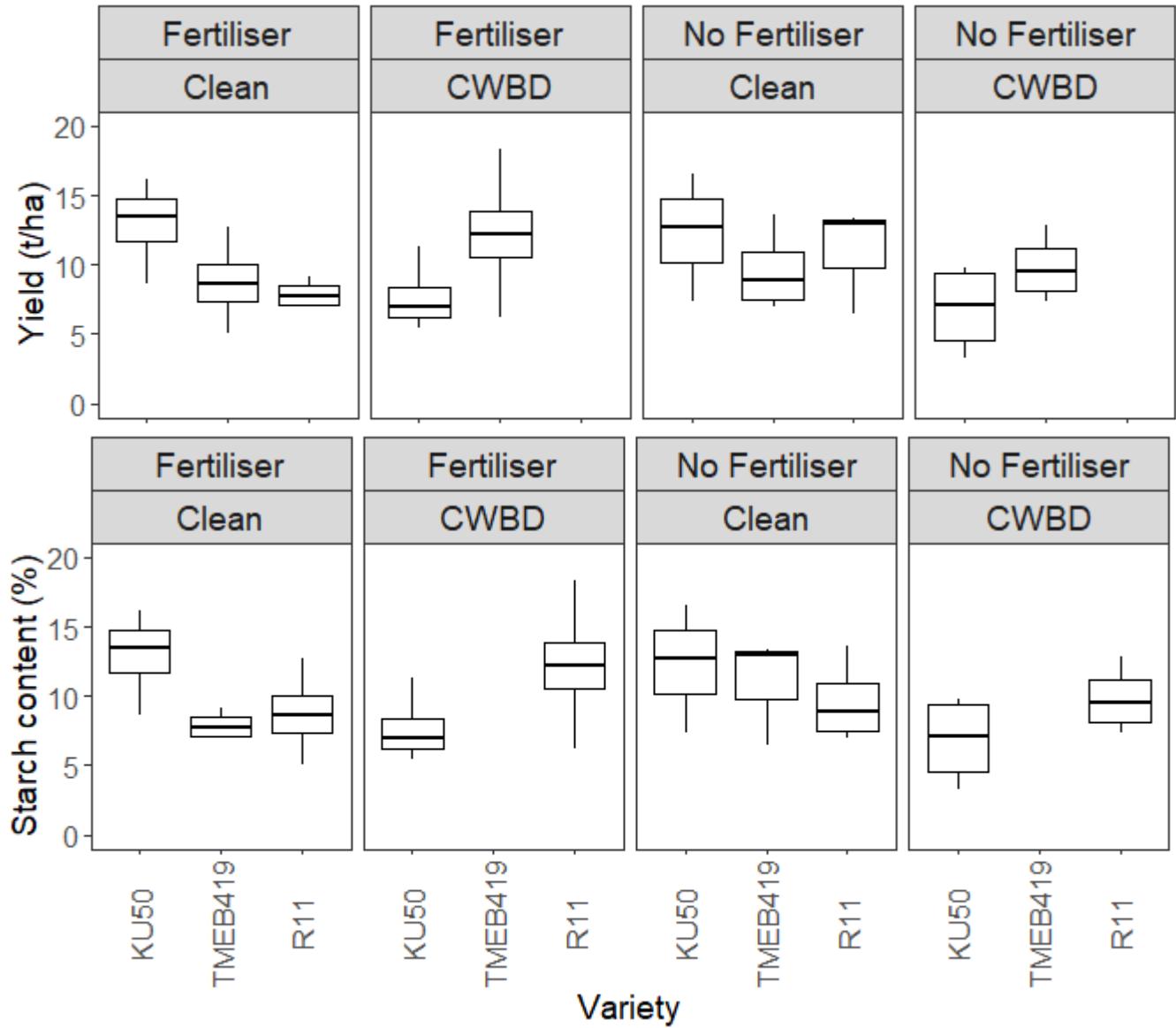
# Season 2022-23

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



# Season 2022-23

Low yield and starch content



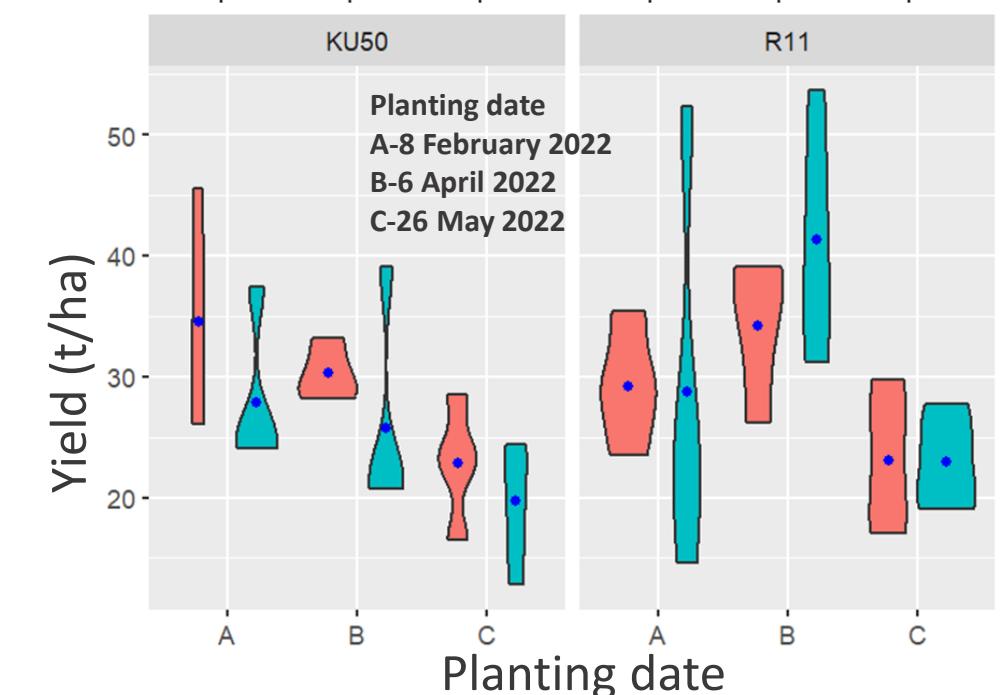
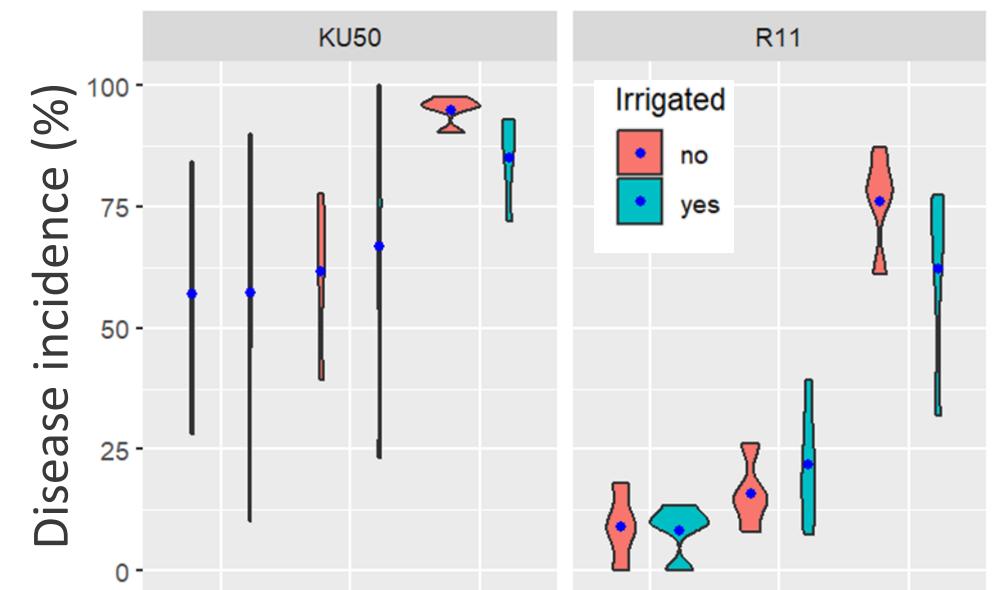
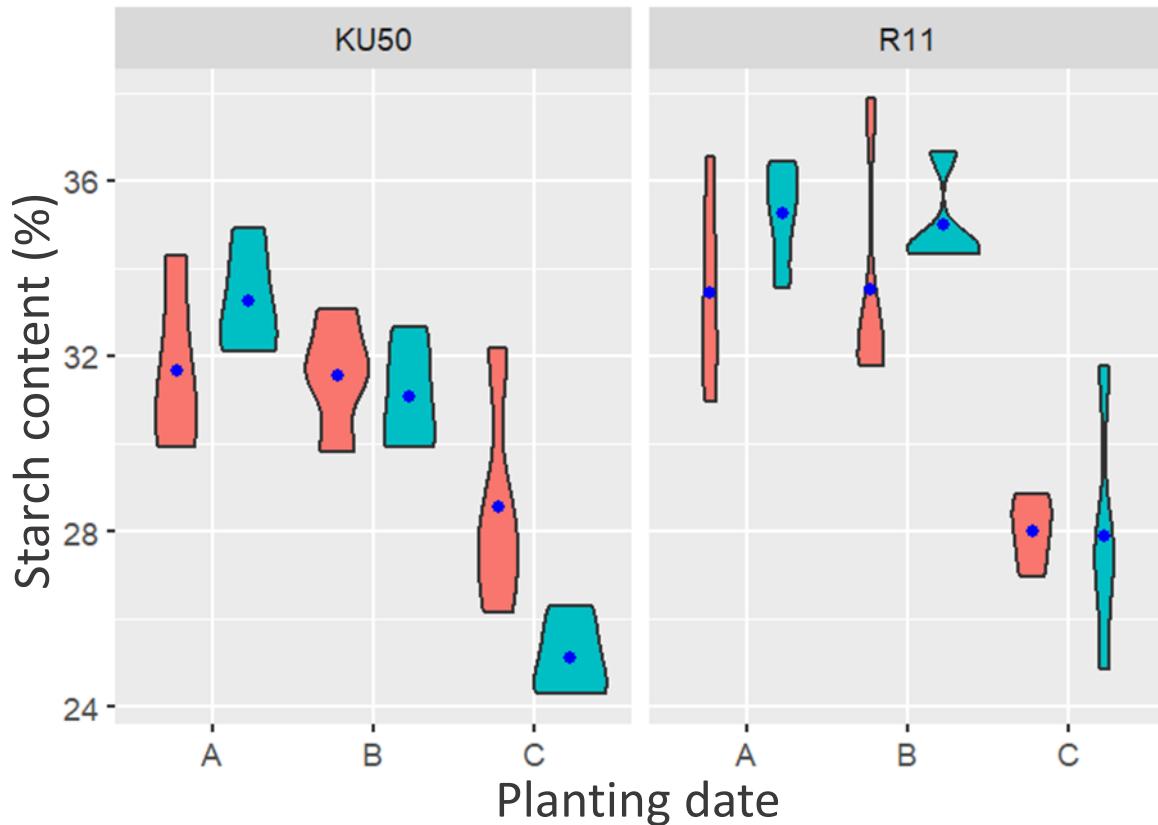
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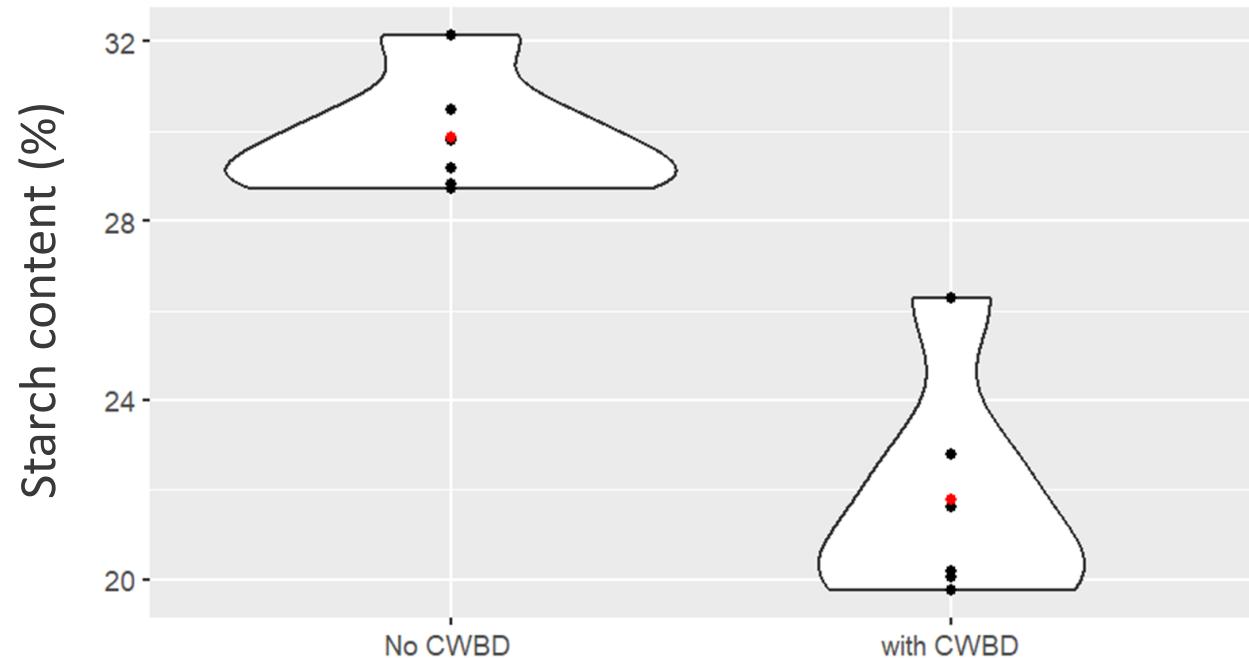
# Time of planting matters

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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