



Alliance



# Yield Impact of Cassava Mosaic disease and Cassava Witches Broom disease

Sok Sophearith

[s.sok@cgiar.org](mailto:s.sok@cgiar.org)

Cassava Program Coordinator - Cambodia



# Objective of the experiments:

- Provide short-term recommendation to farmers regarding what variety to plant ( this is 3rd year experiment)
- Economic justification for developing a clean seed system
- Other management practices that farmers can adopt to mitigate losses.
- To evaluate and compare yield penalty of cassava crop with infected planting material with and without symptoms.
- To evaluate the consequence of planting asymptomatic stem from a symptomatic plant.

# CMD experiment 2020-2021

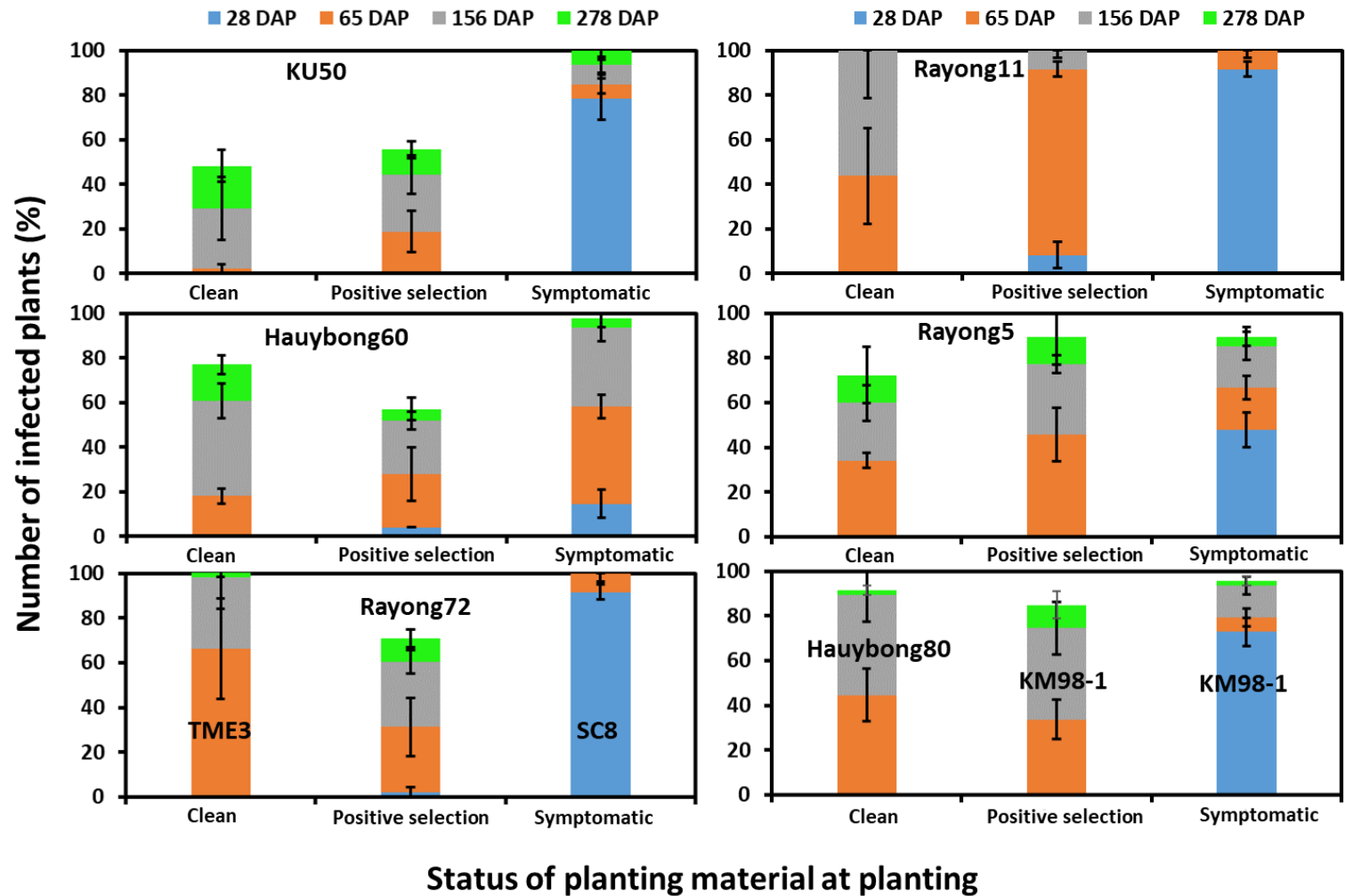
>> 6 varieties were tested with three types of stems and 4 rep

>> Harvested at 10 months after planting

Variety name	Type of stem
KU50	Clean, positive selection, symptomatic stem
Hauybong60	Clean, positive selection, symptomatic stem
Rayong11	Clean, positive selection, symptomatic stem
Rayong5	Clean, positive selection, symptomatic stem
KM98-1	Clean(Hauybong80), positive selection, symptomatic stem
SC8	Clean(TME3), positive selection(Rayong72), symptomatic stem



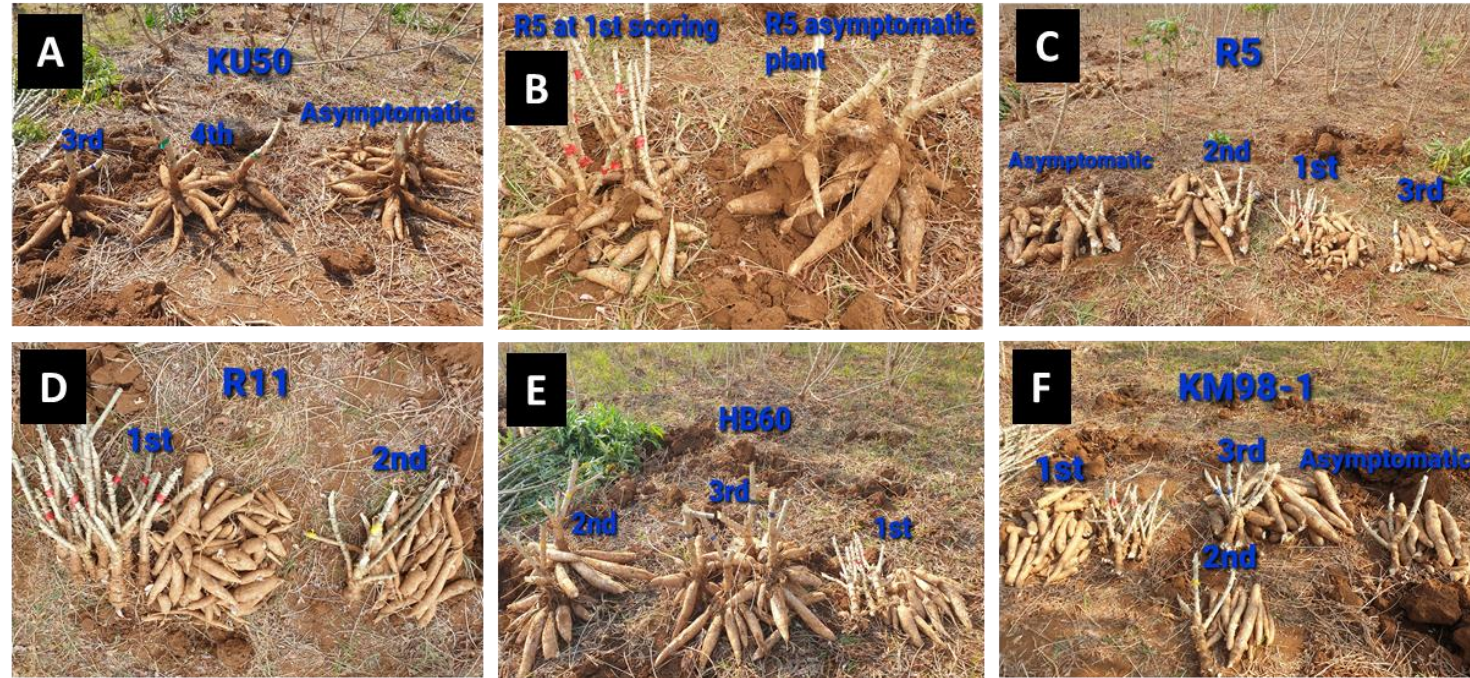
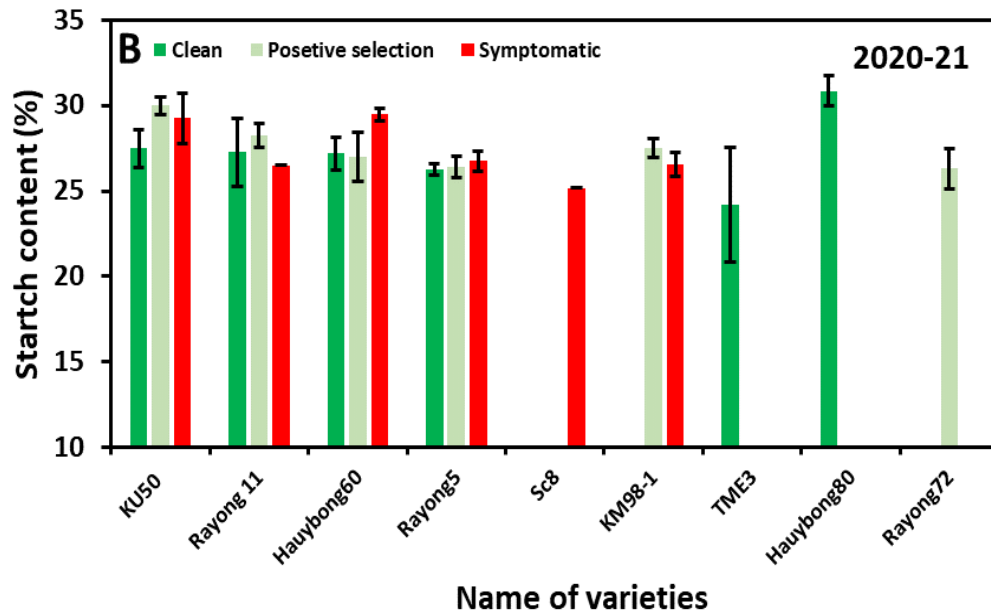
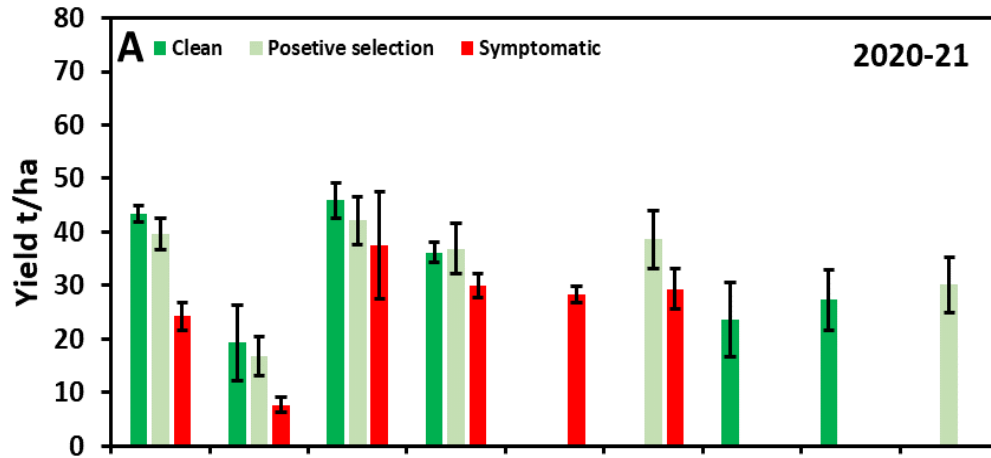
# Number of symptomatic plant(%)



The number of infected plants increased with time

>> Among varieties, SC8 and Rayong 11 had the most infection (i.e. 100%) and KU50 had the least for clean and positive selection planting material

# Fresh root yield(t/ha) and starch content(%)



>> On average plot yields were 1.2- to 2.7-fold higher in plants from clean and/or positive selection planting material than those from symptomatic planting material

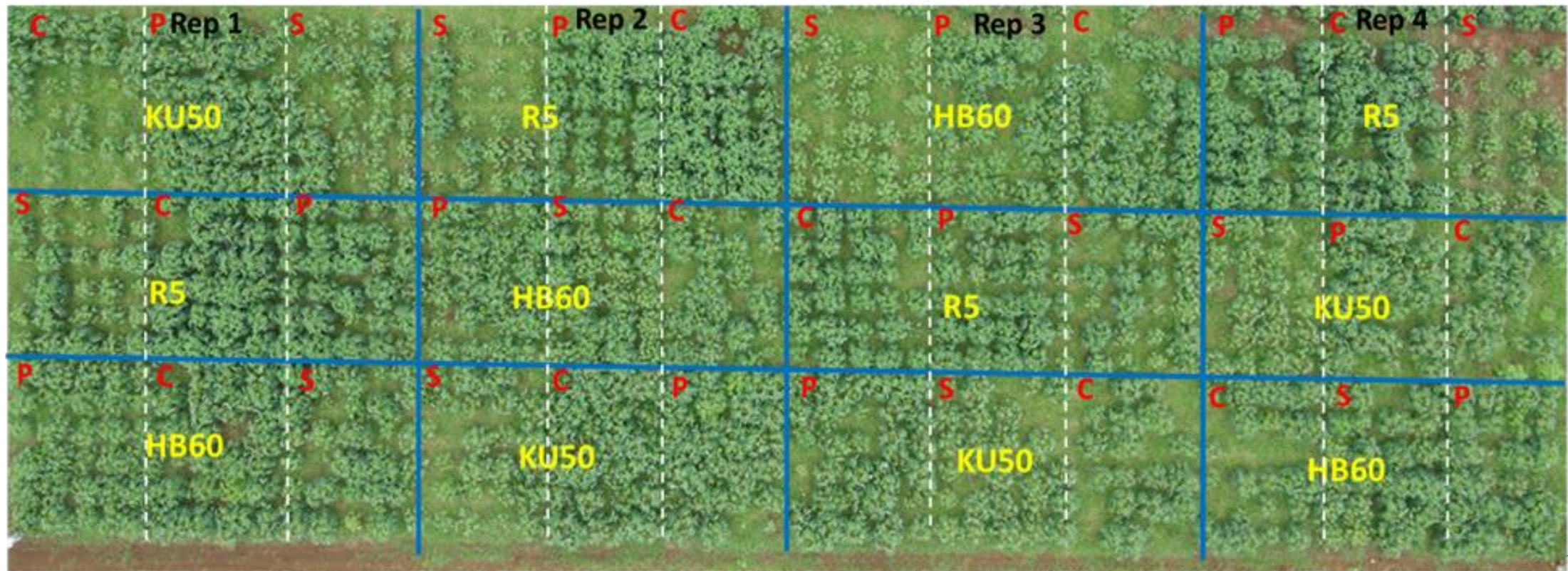
# Comparing of planting clean stem with asymptomatic and stem symptomatic from symptomatic plant, 2020-2021

## Varieties

KU50  
Huaybong60  
Rayong5

## Treatments

- Stake from positive selection (**Positive**)
- Stake from asymptomatic stem of symptomatic plan (**ASSP**)
- Stake from symptomatic stem of symptomatic plant (**SSSP**)

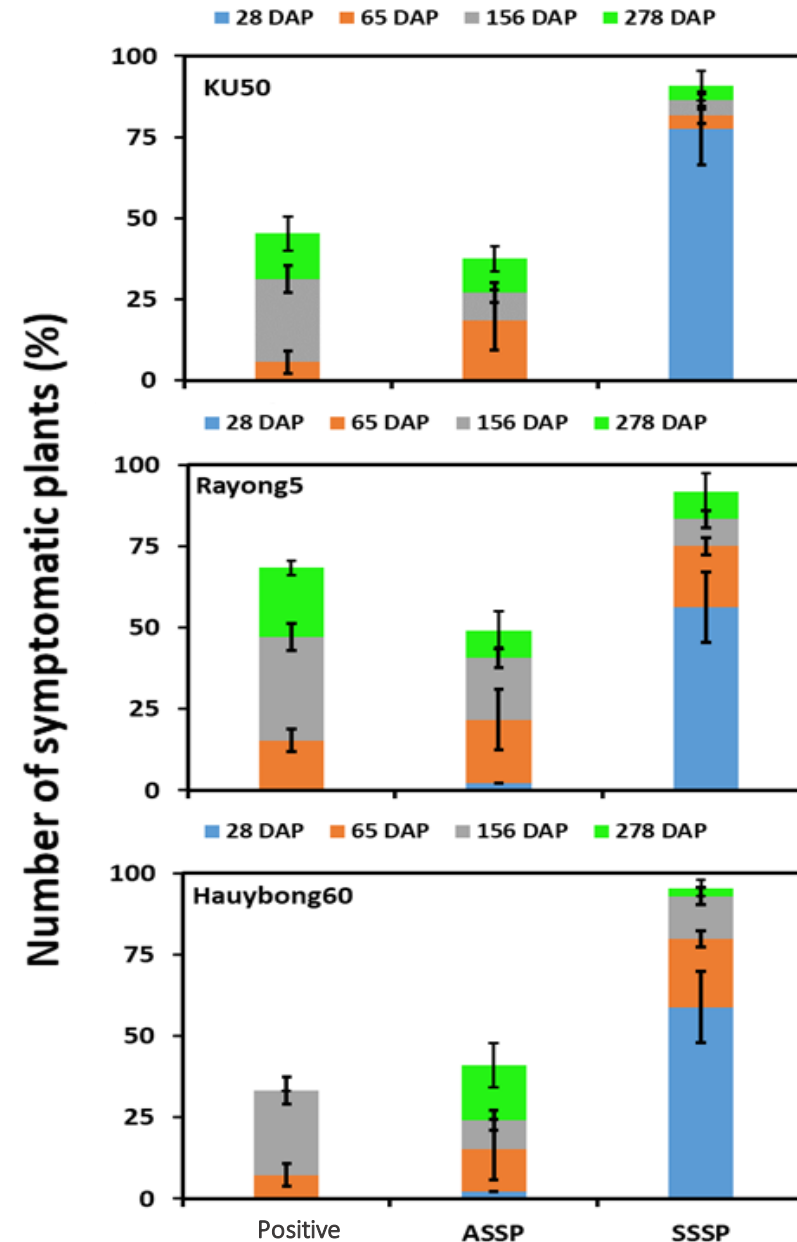


## Number of Symptomatic plant(%)

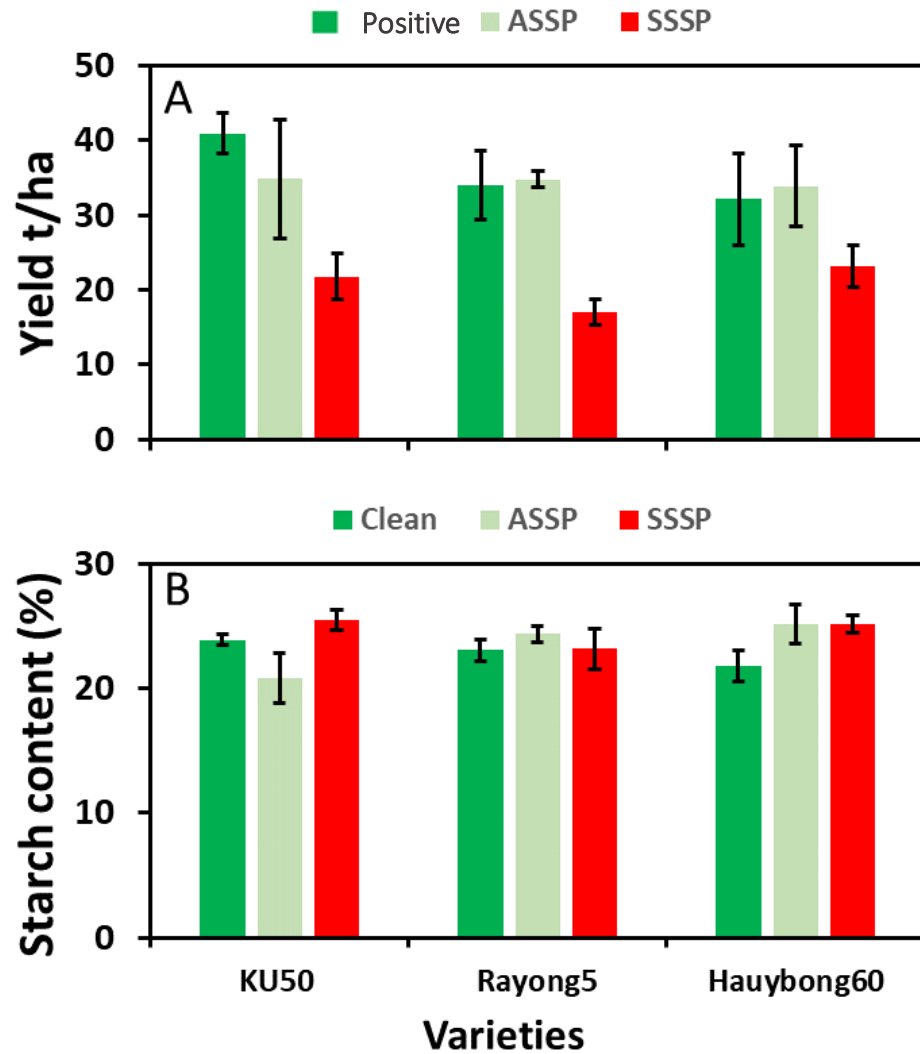
All three genotypes demonstrated close to 100% symptoms by end of the experiment for the plants from symptomatic stakes

>> By the end of the experiment, there was no significant difference in the number of symptomatic plants between ASSP and clean planting material

Symptomatic stems from symptomatic plants (SSSP)



# Fresh root yield(t/ha) and starch content(%)



>> In all three varieties, Symptomatic stems from symptomatic plants (SSSP) produced lowest yield

>> And there were no statistically significant differences in the yield between plots from positive stakes and Asymptomatic stem from symptomatic plants (ASSP).

>> Starch content, there was no noticeable effect of disease on starch content

>> These results suggest that in the absence of ‘clean seed’, if farmers cannot source enough planting material through positive selection from their own field, they could potentially use asymptomatic stems from symptomatic as the next best option.



# Cassava Witches Broom Disease



Cambodia

# Impacting yield, starch content and incomes

Kampong Cham, Cambodia, 2021

Healthy field



50.8t/ha @ 30.7 % starch content

Disease field



29.4t/ha @ 25.4 % starch content  
>>41% lose

# CMD + CWBD experiment in 2021

>> two varieties, three types of stem with 4 Reps  
>> There are 4 times of scoring of CMD and CWBD symptomatic plant at different duration(22, 66, 158 days and before harvesting)



Variety Name	Type of stem
KU50	Positive selection
KU50	CMD infected stem
KU50	CWB infected stem
Rayong 5	Positive selection
Rayong 5	CMD infected stem
Rayong 5	CWB infected stem

# Overview of Cassava Mosaic Vs Cassava Witches Broom experiment



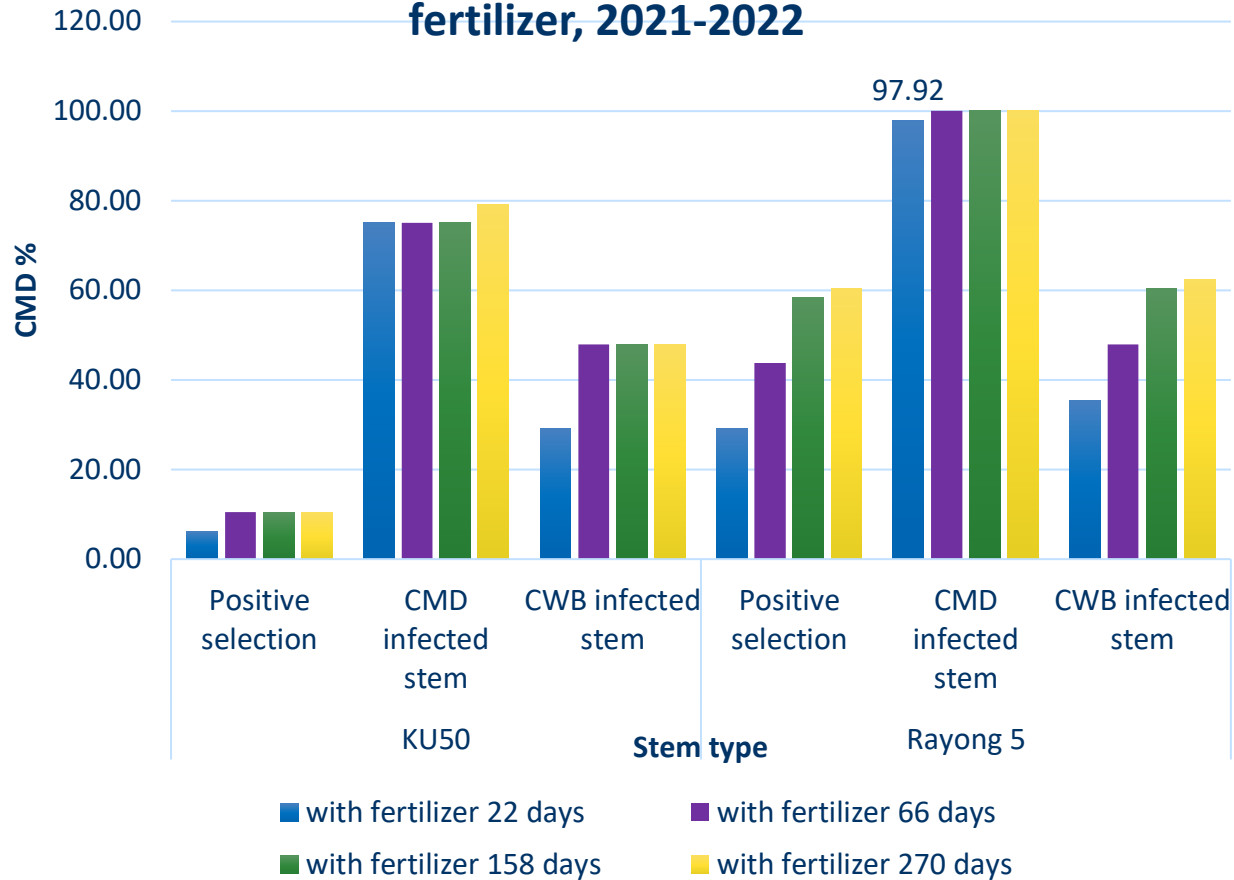
3 months after planting  
(Late September, 2021)



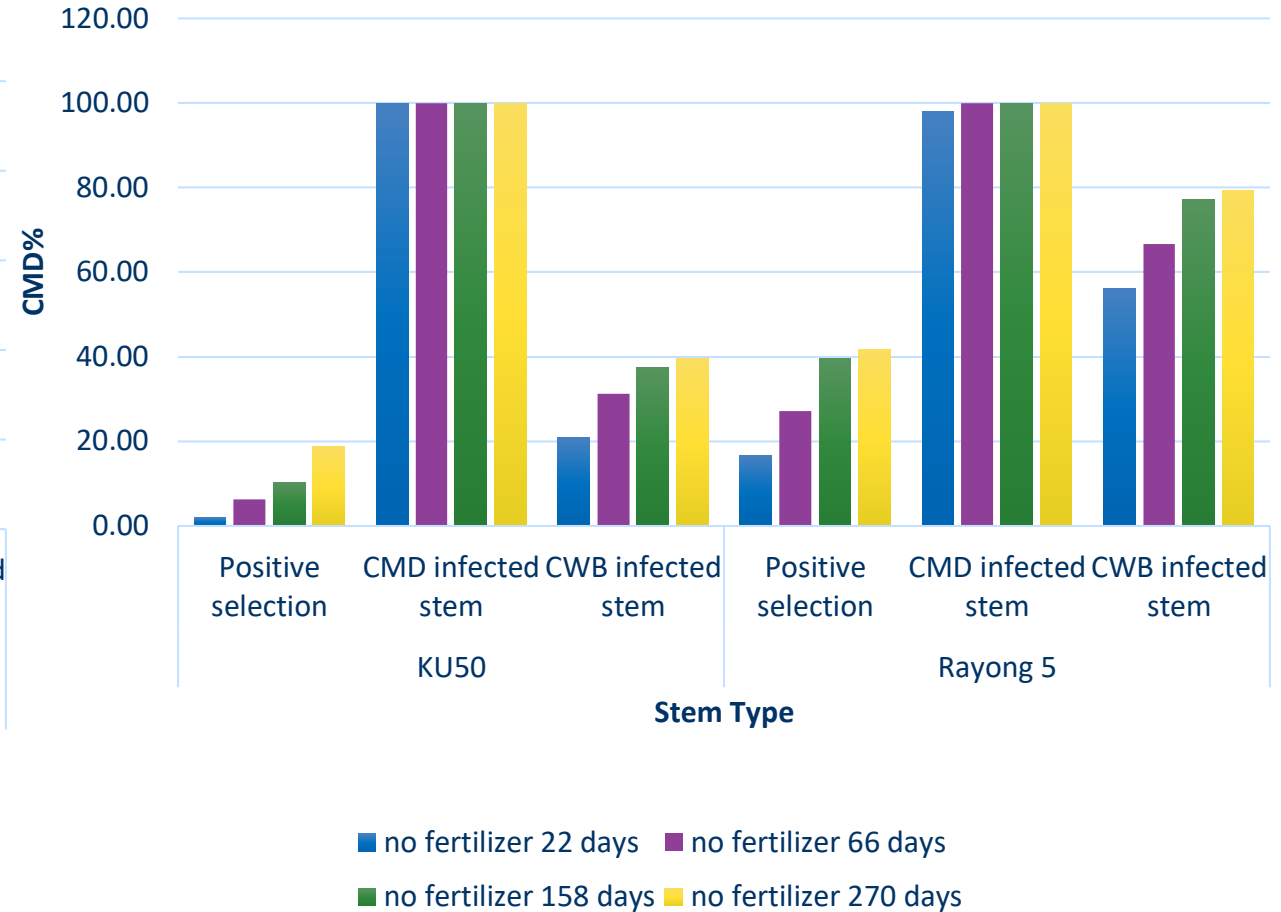
8 months after planting  
(Early February, 2022)

# CMD Symptomatic plant (%) at days after planting(2021-2022)

## Percentage of CMD symptomatic plant with fertilizer, 2021-2022

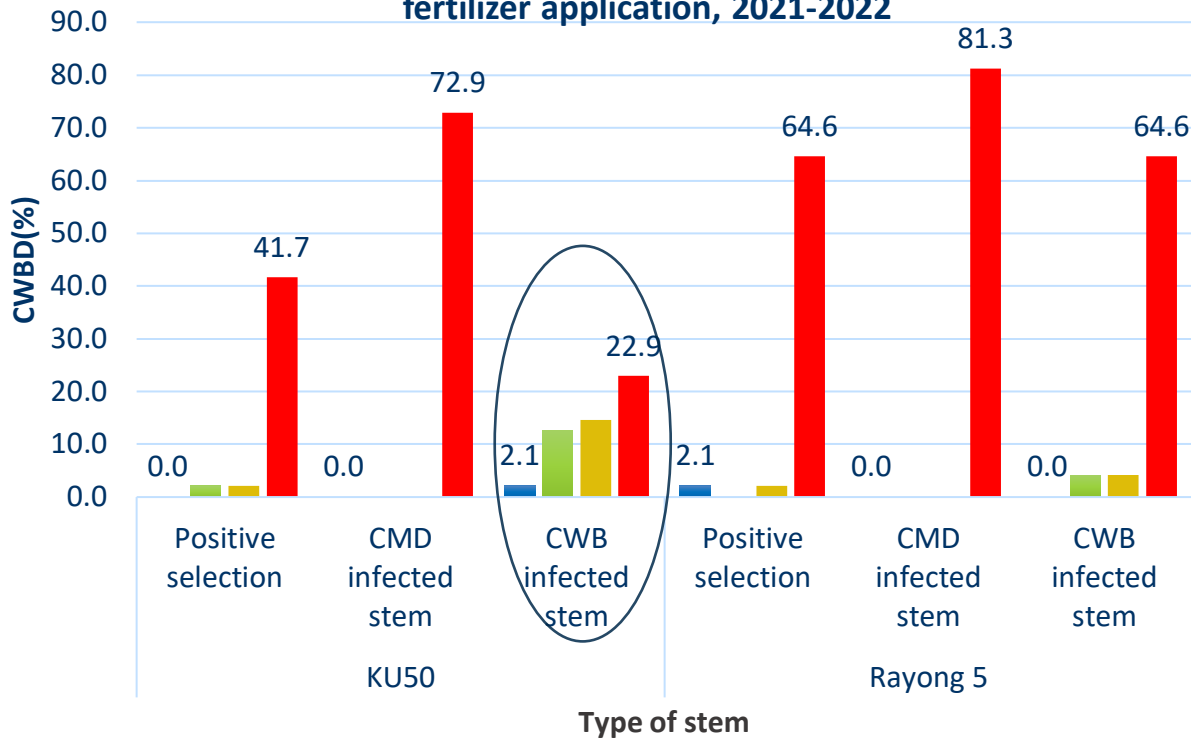


## Percentage of CMD symptomatic plant without fertilizer, 2021-2022

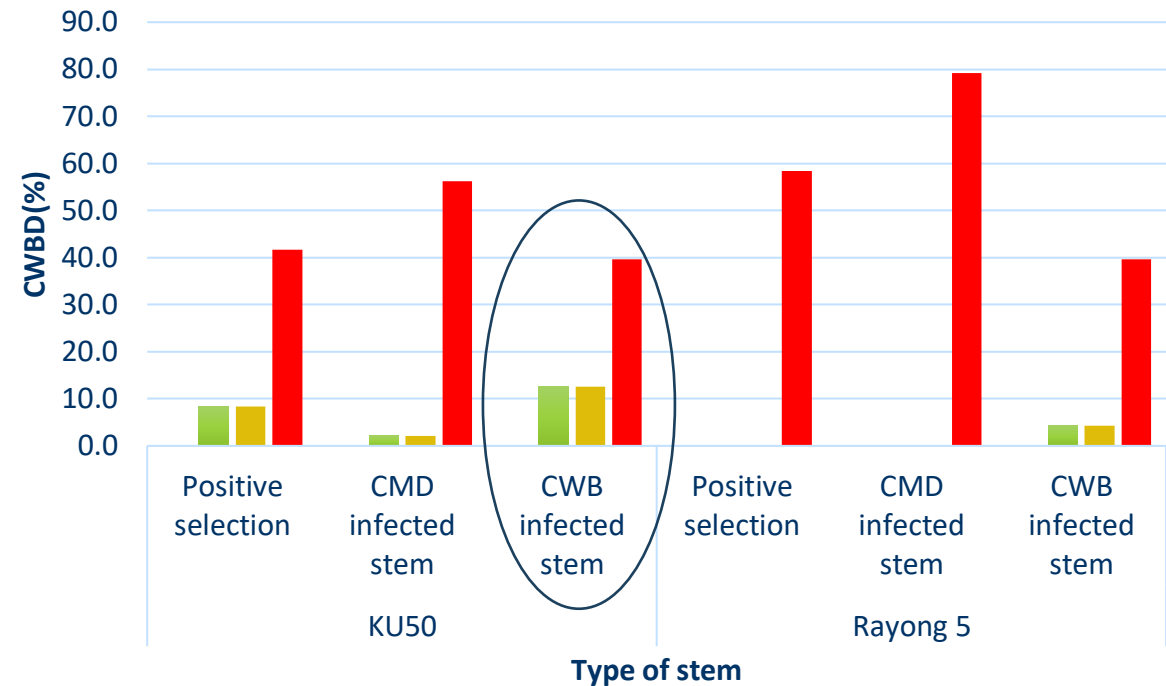


# CWBD Symptomatic plant (%) at days after planting(2021-2022)

Percentage of CWBD symptomatic plant at different scoring with fertilizer application, 2021-2022



Percentage of CWBD symptomatic plant at different time scoring without fertilizer application, 2021-2022

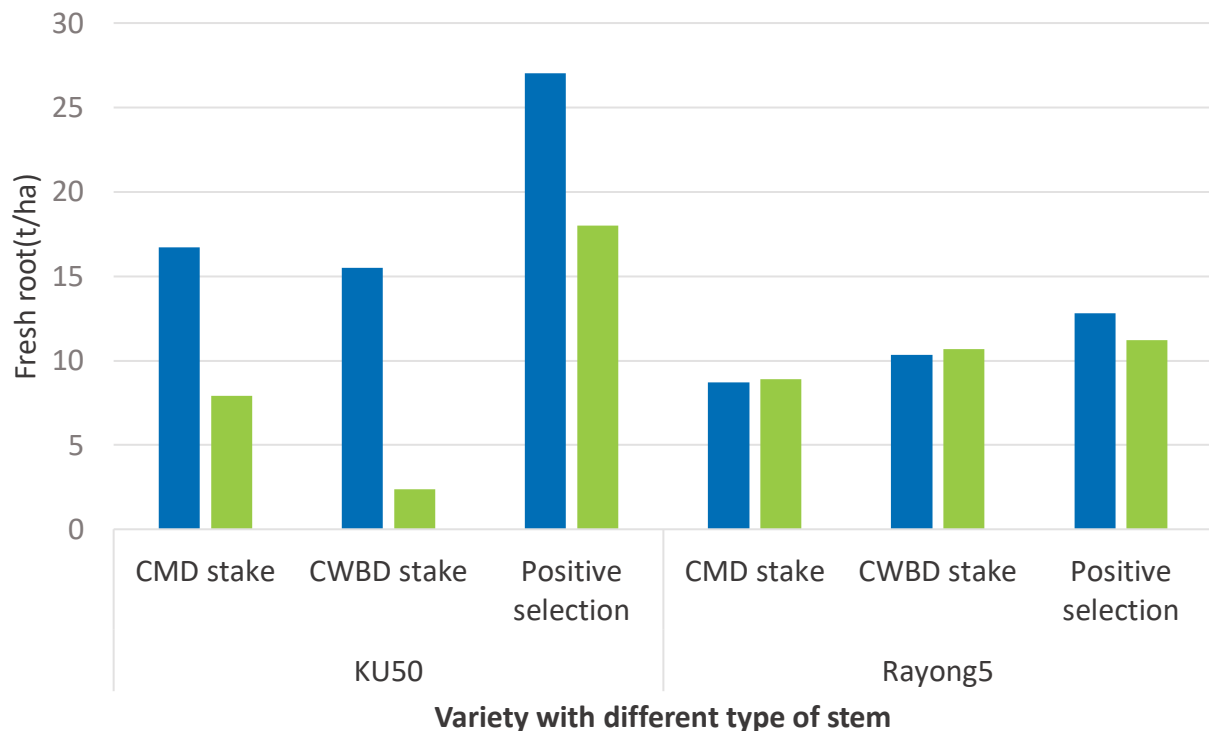


■ with fertilizer 22 days     ■ with fertilizer 66 days  
■ with fertilizer 158 days     ■ with fertilizer 270 days

■ no fertilizer 22 days     ■ no fertilizer 66 days  
■ no fertilizer 158 days     ■ no fertilizer 270 days

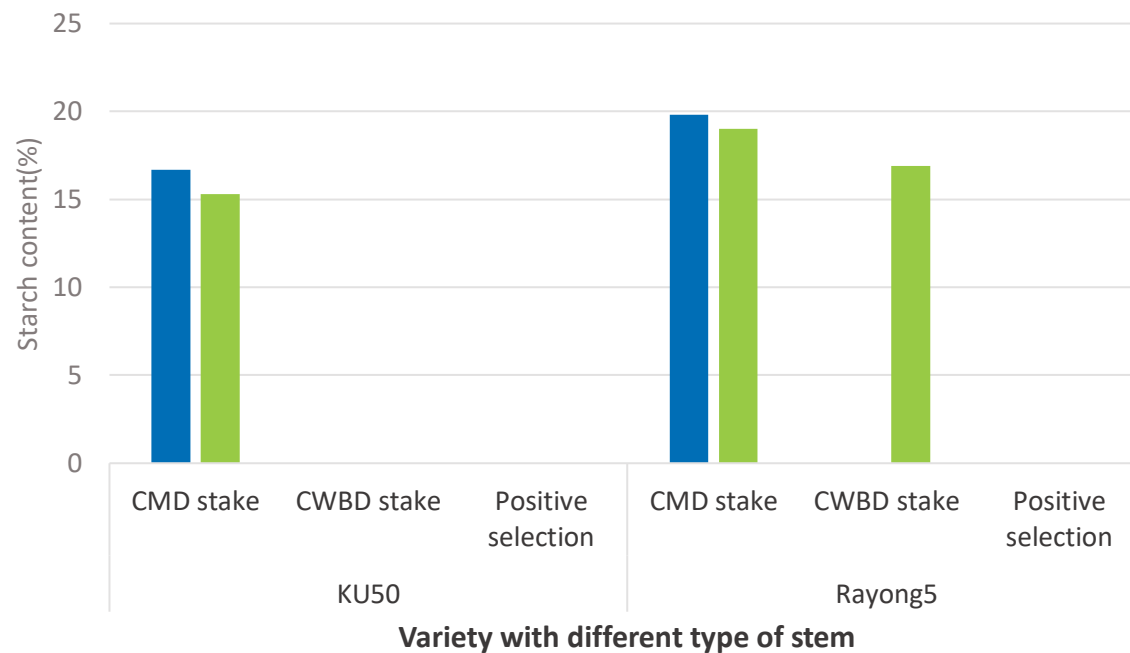
# Fresh root yield(t/ha) and starch content(%) of CMD with CWBD symptomatic plant(at 22d CMD+270d CWBD), 2021-2022

Fresh root yield(t/ha) of CMD and CWBD symptomatic plants(22 days CMD with 270 days CWBD),2021-2022



■ FRY at 22d CMD+ 270d CWBD with fertilizer  
 ■ FRY at 22d CMD+ 270d CWBD no fertilizer

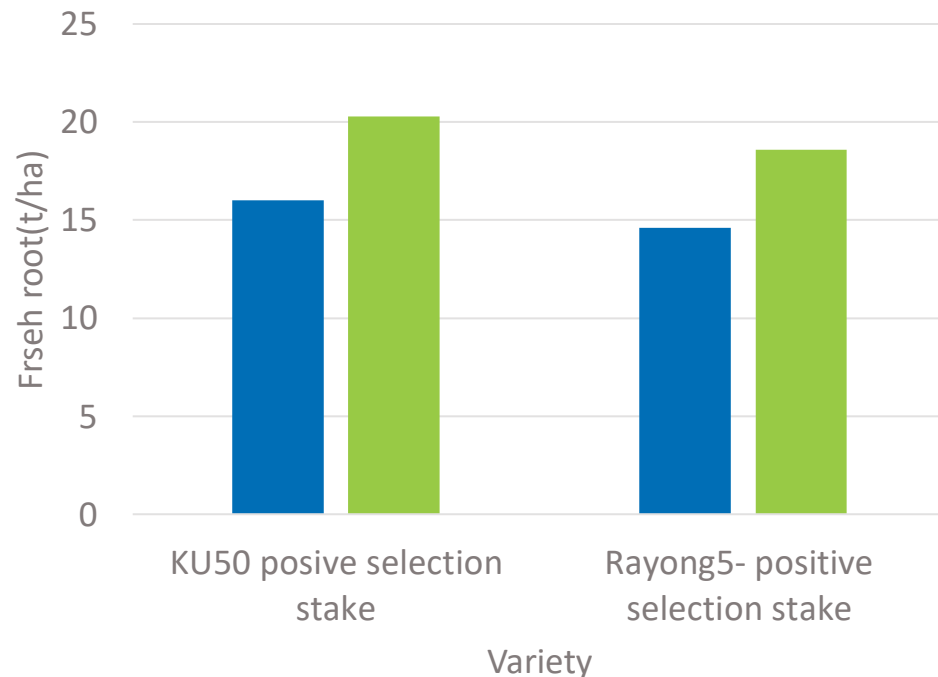
Starch content(%)



■ STC at 22d CMD+ 270d CWBD with fertilizer  
 ■ STC at 22d CMD+ 270d CWBD no fertilizer

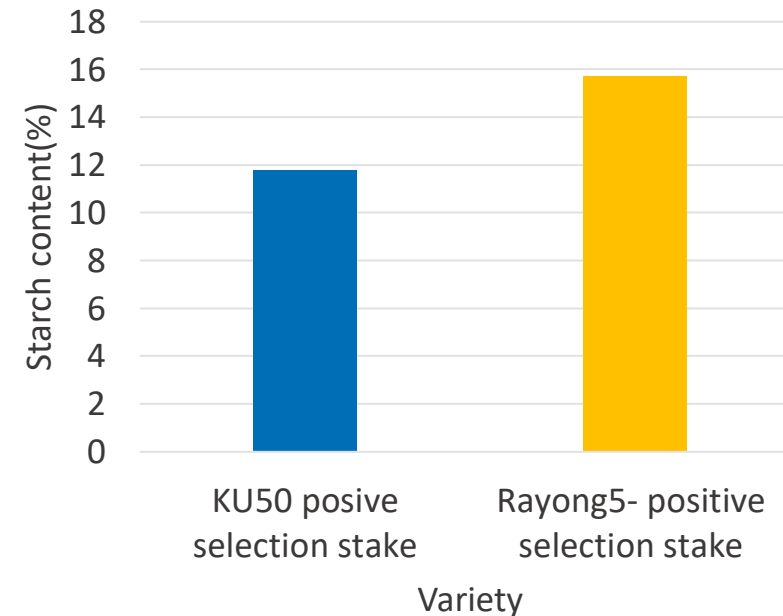
# Fresh root yield(t/ha) of CWBD symptomatic plant at 158d &270d and starch content(%) at 270d

Fresh root yield(t/ha) of CWBD symptomatic plant at 158 and 270 days



- 158d CWBD symptom with fertilizer
- 270d CWBD symptom with fertilizer

Starch content at 270d CWBD symptom





# CWBD symptom at 66 days after planting



# CMD + CWBD experiment in 2021-202



In front is Rayong 5, at the back is KU50



KU50 plot

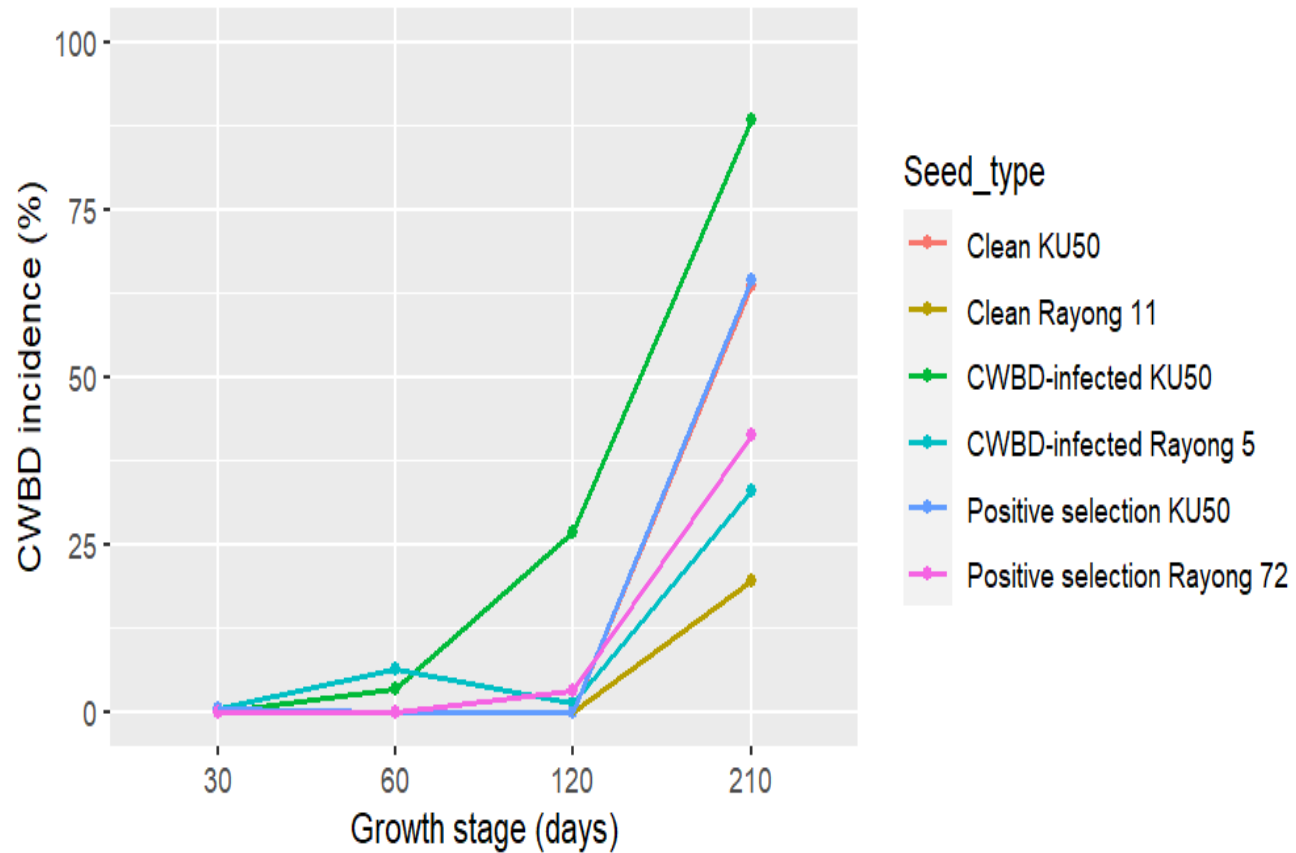
# Cassava Witches Broom Disease experiment,2022-2023

- >> With 2 varieties and 4 reps
- >> Experiment was planted on June 04, 2022
- >> Harvested on Feb 02, 2023

Variety	Type of stem
KU50	Clean stake
KU50	Positive selection
KU50	CWBD stake
Rayong 11	Clean stake
Rayong72	Positive selection
Rayong5	CWBD stake

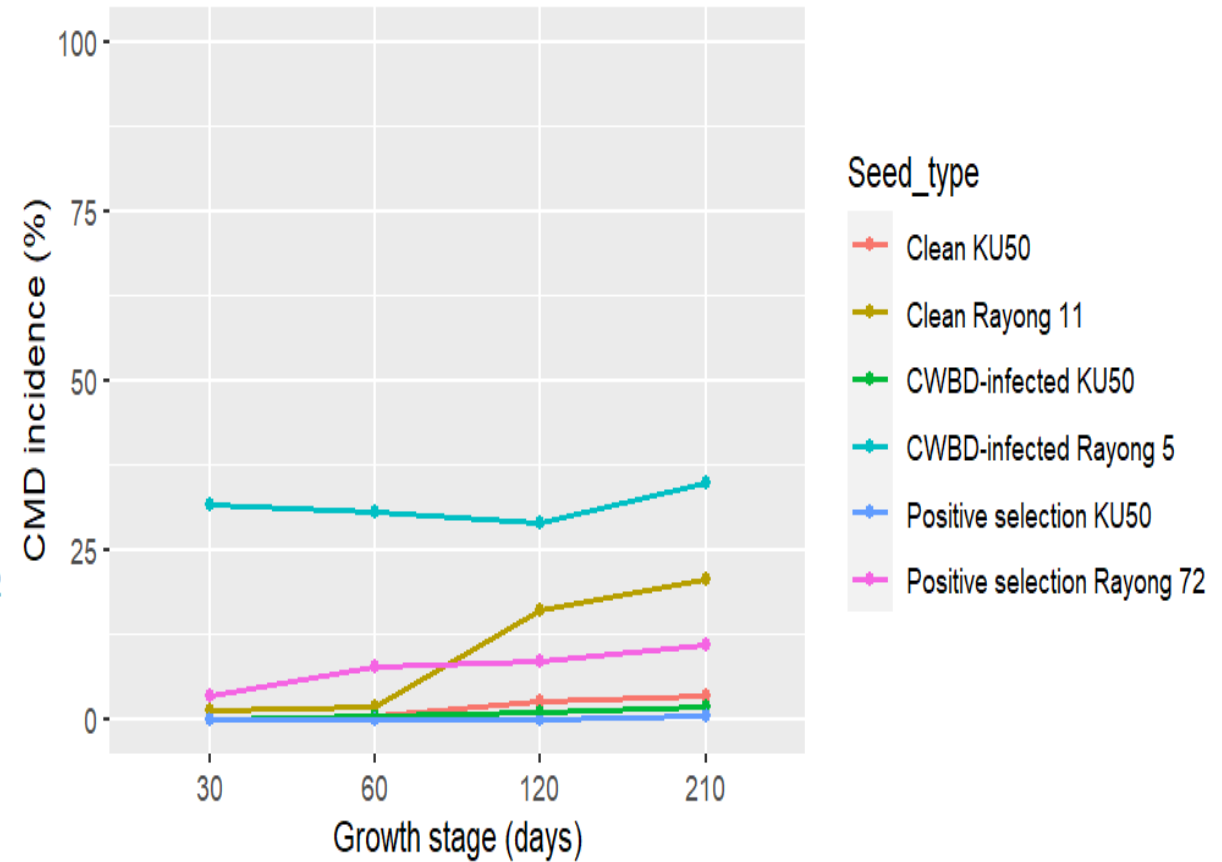


## Percentage of CWBD(%)



**Figure** The shape of CWBD pressure in different cassava seed types.

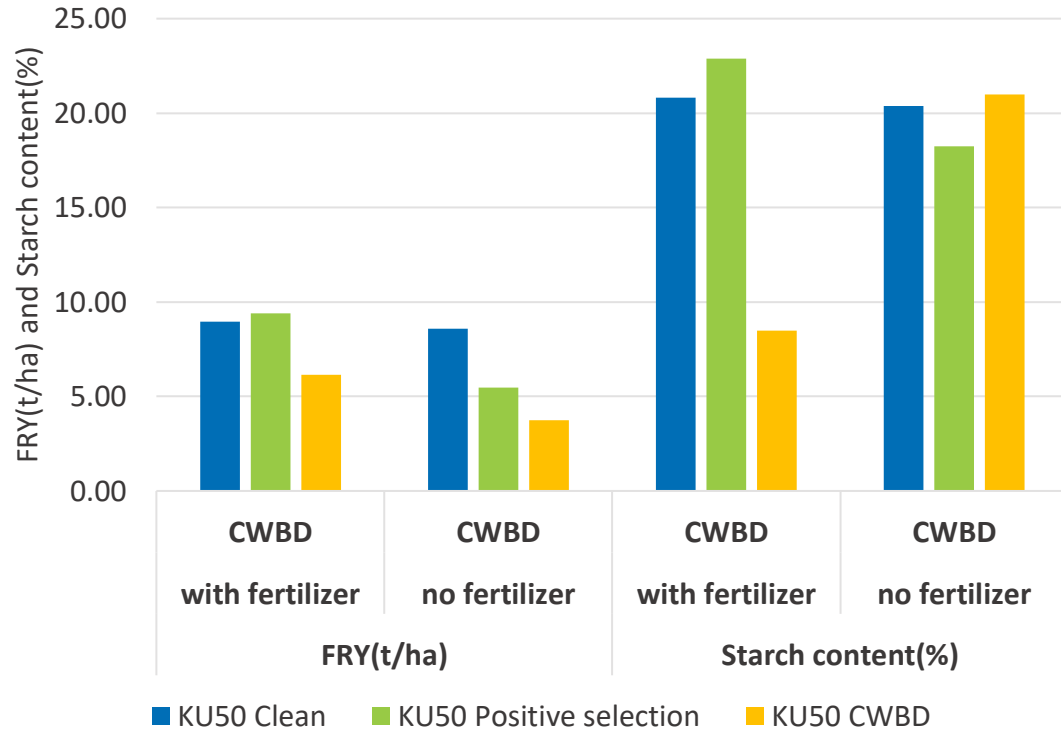
## Percentage of CMD(%)



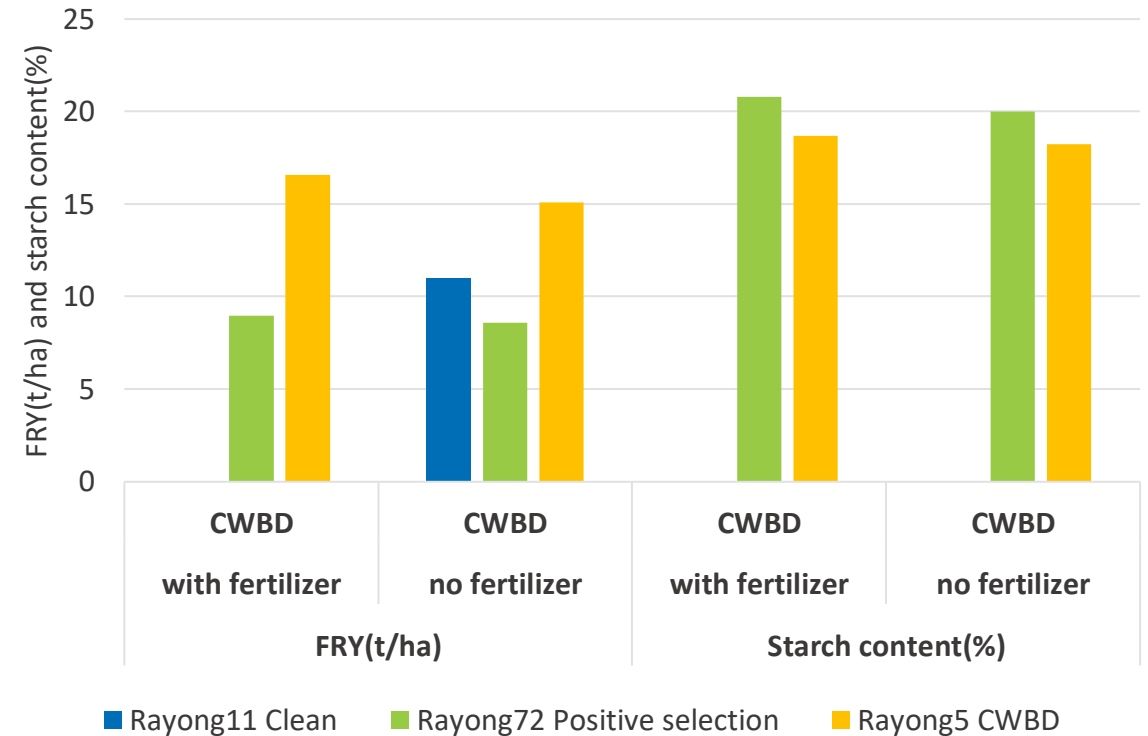
**Figure** Progression of cassava mosaic disease differs in six different seed types over the cassava growing season.

# Fresh root yield(t/ha) and starch content(%) at 210 days CWBD symptom, 2022-2023

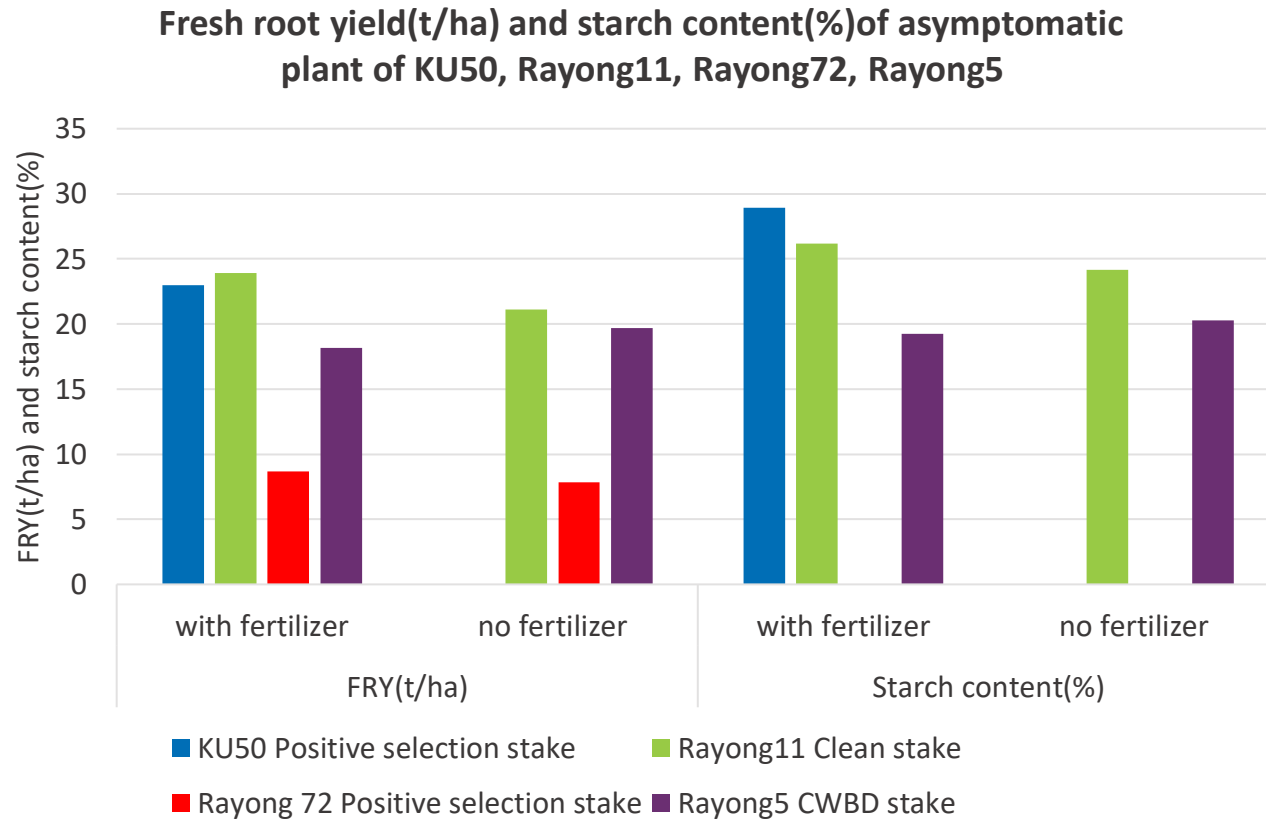
Fresh root yield(t/ha) and starch content(%) of KU50 at 210 days CWBD symptom



Fresh root yield(t/ha) and starch content(%) of Rayong 11, Rayong72 and Rayong5 at 210 days CWBD symptom



# Fresh root yield(t/ha) and Starch content(%) of asymptomatic plant



# CWBD experiment in 2022-2023



## Rayong 5, KU50 and Rayong11 during harvest



**R5 (CWBD)**



**KU50 (CWBD)**



**R11 (Asymptomatic plant)**





Alliance



International Center for Tropical Agriculture  
Since 1967 Science to cultivate change

# Thank you!

<https://cassavadiseasesolutionsasia.net/> -



Biodiversity International and the International Center for Tropical Agriculture (CIAT) are CGIAR Research Centers.  
CGIAR is a global research partnership for a food-secure future.