

Establishing sustainable solutions to cassava diseases in mainland Southeast Asia

Final Review Hung Loc Agricultural Research Center (HLARC)

Objective 4: Develop and evaluate economically sustainable cassava seed system models for the rapid dissemination of new varieties and clean planting material to farmers in different value chains and production contexts

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Objective 4 in HLARC

- ✓ **Activity 1: The effects of water availability on cassava yield and starch accumulation.**
- ✓ **Activity 2: Effects Planting Density on cassava yield and starch accumulation**
- ✓ **Activity 3: Susceptibility of Cassava Varieties to Cassava Mosaic Disease Trial**
- ✓ **Activity 4: Rapid multiplication by tunnel system**

Activity 3: Susceptibility of Cassava Varieties to Cassava Mosaic Disease Trial



OBJECTIVES

- The experiment aims to assess the susceptibility of cassava varieties infected with cassava mosaic disease.
- Comparing yield and starch content among different cassava varieties and various materials.
- Evaluating the quality of the varieties over repeated years of cultivation.

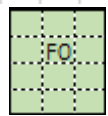
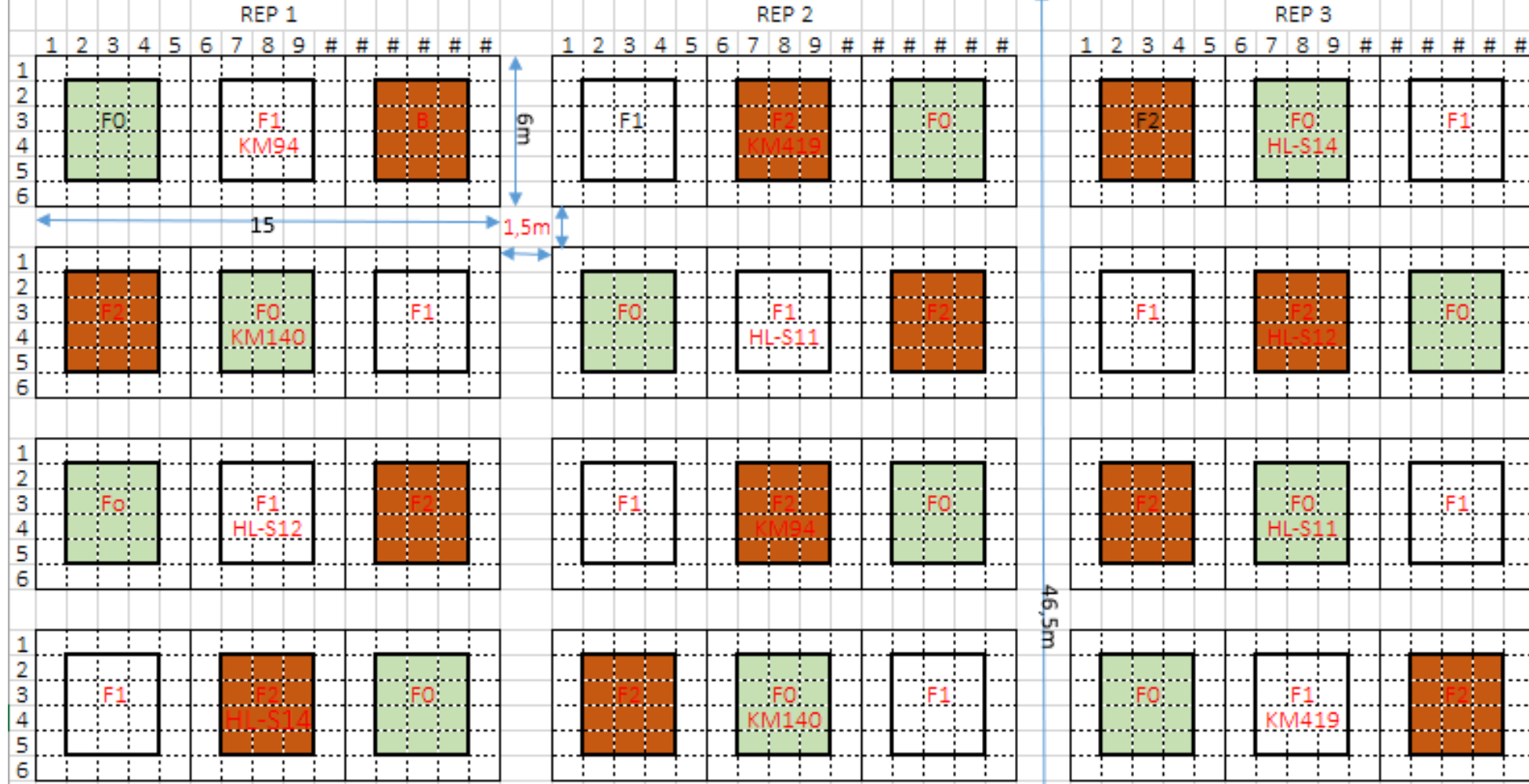


I. MATERIAL AND METHOD

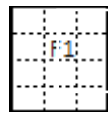
- Duration: 2020, 2021, and 2022.
- Location: Tan Chau district, Tây Ninh province.
- Cassava Varieties: KM94, KM140, KM419, HL-S11, HL-S12, HL-S14.

Each cassava variety was subjected to three types of materials:

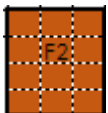
- Clean (F0)
- Positive (F1)
- Symptomatic (F2)
- Experimental design: Split-plots with 3 replications.
- Density: 1m x 0.8m (12,500 plants/ha).
- Recorded Indicators:
 - ✓ CMD score: 1, 3, 6, 9 months after planting (1-5)
 - ✓ The Fresh Tubers Yield (*Tons/ha*)
 - ✓ Starch Content (%)



Clean (F0)



Positive (F1)



Symptomatic (F2)

II. RESULT AND DISCUSSION

Number	Variety	CMD score (1-5)		
		2020	2021	2022
1	KM94 F0	4.19 ab	4.23 a	4.24 ab
2	KM94 F1	4.29 a	4.29 a	4.23 ab
3	KM94 F2	3.28 c	3.81 b	4.05 b
4	KM140 F0	4.14 ab	4.14 a	4.36 ab
5	KM140 F1	4.23 a	4.28 a	4.37 ab
6	KM140 F2	4.12 ab	4.12 a	4.36 ab
7	KM419 F0	4.13 ab	4.14 a	4.28 ab
8	KM419 F1	3.90 ab	4.20 a	4.49 a
9	KM419 F2	4.02 ab	4.35 a	4.29 ab
10	HL-S11 F0	4.16 ab	4.22 a	4.37 ab
11	HL-S11 F1	4.24 a	4.26 a	4.48 a
12	HL-S11 F2	4.28 a	4.30 a	4.36 ab
13	HL-S12 F0	3.81 b	4.27 a	4.33 ab
14	HL-S12 F1	4.08 ab	4.25 a	4.57 a
15	HL-S12 F2	4.27 a	4.42 a	4.56 a
16	HL-S14 F0	4.18 ab	4.34 a	4.41 ab
17	HL-S14 F1	4.23 a	4.27 a	4.51 a
18	HL-S14 F2	4.19 ab	4.26 a	4.53 a
19	CV%	4.22	4.24	4.22

Number	Variety	Yield/hecta (tons/hecta)		
		2020	2021	2022
1	KM94 F0	14.17 abc	10.69 ab	15.14 a
2	KM94 F1	11.94 abcd	10.56 ab	12.64 ab
3	KM94 F2	10.14 abcd	10.28 ab	11.81 abc
4	KM140 F0	16.11 a	11.39 ab	13.89 ab
5	KM140 F1	16.25 a	12.92 a	13.06 ab
6	KM140 F2	15.00 ab	12.78 a	14.72 a
7	KM419 F0	9.17 bcd	8.89 ab	8.33 de
8	KM419 F1	6.67 d	9.44 ab	7.50 de
9	KM419 F2	6.67 d	8.61 ab	6.11 e
10	HL-S11 F0	7.64 cd	10.00 ab	7.36 de
11	HL-S11 F1	6.81 d	7.22 b	6.72 e
12	HL-S11 F2	5.83 d	7.50 b	5.28 e
13	HL-S12 F0	8.61 bcd	9.17 ab	8.33 de
14	HL-S12 F1	7.78 cd	9.72 ab	7.64 de
15	HL-S12 F2	10.28 abcd	9.72 ab	5.69 e
16	HL-S14 F0	16.39 a	12.22 a	12.08 ab
17	HL-S14 F1	15.28 ab	12.50 a	10.69 bcd
18	HL-S14 F2	14.44 abc	10.83 ab	8.75 cde
19	CV%	32.42	23.23	18.46
20	LSD	5.95	3.93	2.99

Number	Variety	Starch content (%)		
		2020	2021	2022
1	KM94 F0	27.40 ab	15.14 a	29.33 a
2	KM94 F1	26.93 abcd	12.64 ab	28.10 bc
3	KM94 F2	28.50 a	11.81 abc	27.57 bcd
4	KM140 F0	25.13 bcd	13.89 ab	24.07 f
5	KM140 F1	26.23 abcd	13.06 ab	23.20 fg
6	KM140 F2	26.90 abcd	14.72 a	22.67 g
7	KM419 F0	27.00 abcd	8.33 de	27.67 bcd
8	KM419 F1	25.67 bcd	7.50 de	26.67 de
9	KM419 F2	26.63 abcd	6.11 e	26.03 e
10	HL-S11 F0	26.27 abcd	7.36 de	28.17 b
11	HL-S11 F1	27.27 abc	6.72 e	27.43 bcd
12	HL-S11 F2	27.00 abcd	5.28 e	27.00 cde
13	HL-S12 F0	21.17 e	8.33 de	23.97 f
14	HL-S12 F1	21.07 e	7.64 de	22.50 g
15	HL-S12 F2	21.07 e	5.69 e	22.13 g
16	HL-S14 F0	24.40 d	12.08 ab	24.30 f
17	HL-S14 F1	25.23 bcd	10.69 bcd	24.03 f
18	HL-S14 F2	24.50 dc	8.75 cde	22.77 g
19	CV%	5.62	18.46	2.45
20	LSD	2.38	2.99	1.03

Effect of using symptomatic planting material on cassava yield and starch accumulation.

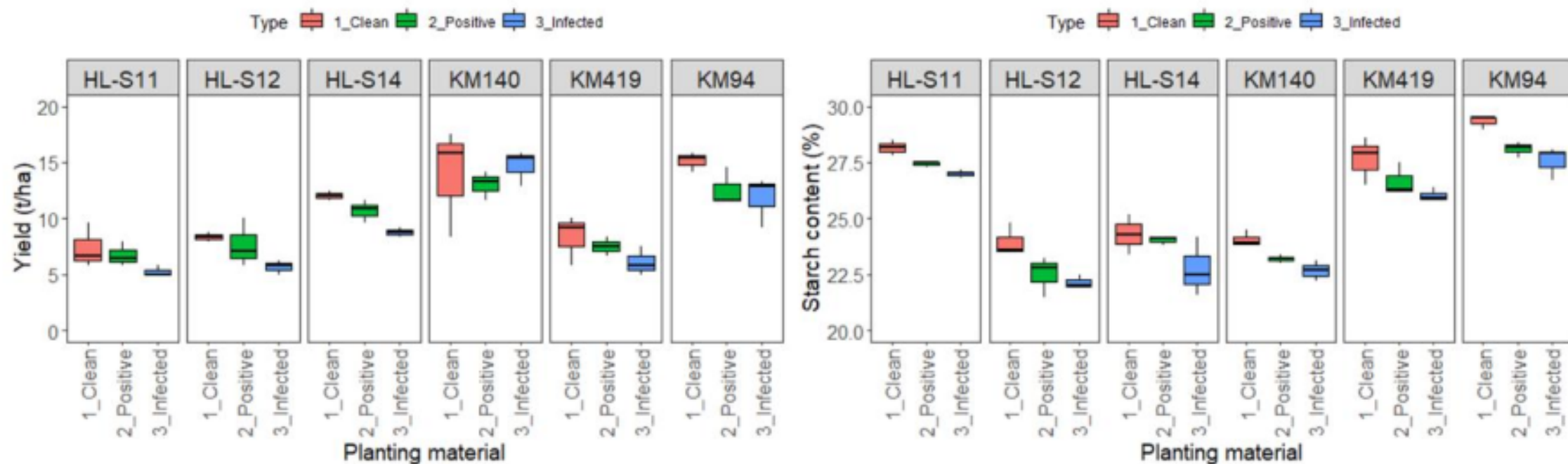


Figure 8: Fresh root yield (t ha^{-1}) (A) and Starch content (%) (B). There were six varieties, KM94 KM140 KM419 HL-S11 HL-S12 HL-S14 with three different kind of planting stakes; collected from disease free area (clean), collected from diseased area without any symptoms i.e., positive selected stems (positive) and symptomatic stems (Symptomatic) were planted. Values are the means ($n=3$). There was significant difference between different planting material in respect to yield and starch content ($P<0.05$). Clean planting material demonstrated highest yield and starch content for all the varieties tested and infected planting material demonstrate the lowest.

III. CONCLUSION & RECOMMENDATION

- ✓ Over the course of the three years of experimentation, the results consistently demonstrate that the KM94 cultivar excels in disease resistance, fresh tuber yield, and starch content. It remains more stable and superior in these aspects compared to the other five cultivars.
- ✓ Additionally, KM140 is another stable cultivar that can be considered alongside KM94.
- ✓ HL-S11 and KM419 are two cultivars with low fresh tuber yield and high susceptibility to CMD across all three years of testing.
- ✓ HL-S12 and HL-S14 are two cultivars with good yield potential, but they exhibit high disease susceptibility, low starch content, and notably, a lack of stability in various performance indicators over the three years of experimentation.

RECOMMENDATION

- ✓ After three years of experimentation, the recommendation is that in conditions where resistance to CMD is a concern, cultivars KM94 and KM140 can be used for production. It is advisable to avoid using cultivars HL-S11, KM419, HL-S12, and HL-S14.
- ✓ When utilizing KM94 and KM140 for production, it's important to selectively choose plants, seedling fields that exhibit low susceptibility to CMD, strong plant health, and narrow nodes.
- ✓ Another important recommendation is that we should use CMD-resistant varieties to replace old varieties, such as TMEB419 (HN1),...

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THANK YOU FOR YOUR ATTENTION!



R3

KM94





