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Application of Cut-stem Transplant Method to the High Yielding Non- Deep-Water Rice Varieties in Myanmar

ဒေါက်တာယုမွန်
ဦးစီးအရာရှိ

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Contents

- ✓Introduction
- ✓Materials and method
- ✓Results and discussion
- ✓Conclusion
- ✓Suggestion

Introduction

Rice cultivation

5 rice ecosystems

- Submerged and deep-water- 13.5%
- Sustainability is important

Type of rice varieties

- HYV in lowland area
- Local or deep-water (DWR) rice in submerged and deep-water area

Cultivation method

- Direct seeding (DSR)
- Transplant (TPR)
- Cut-stem transplant (CST) in deep-water area in Thanatpin

What is Cut-stem Transplant method (CST)?

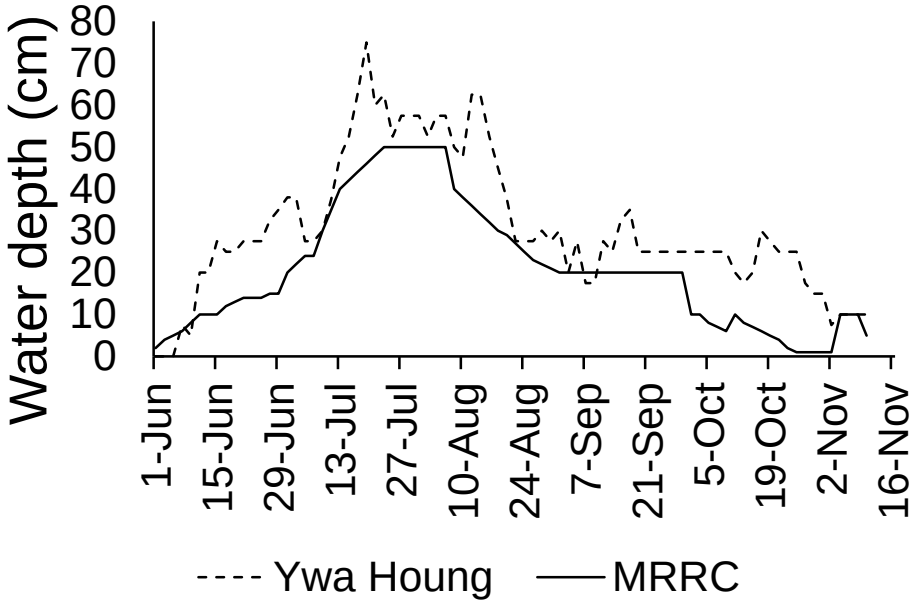
- Rice plant elongate when flooding
- Lodge after water recede
- The elongated stem are cut and transplanted in DWR

Yield of CST

- > DSR
- ≈ or > TPR in DWR (Mon et al., 2019 and b)

  At 40-60 cm depth at transplant

Flooding in rice field



Normal flooding

- Mid June to early August
- Rice at tillering stage
- replant

late flooding

- When the rice in PI or flowering
- Wait for next season crop

Byaw Htun in 2018 in Thanatpin

- Flowering in the nursery
- Yield of CST≈ DSR
- duration- 75 days longer (Mon et al., in press)

Rooting in elongated internodes of rice

Rooting in rice from the node

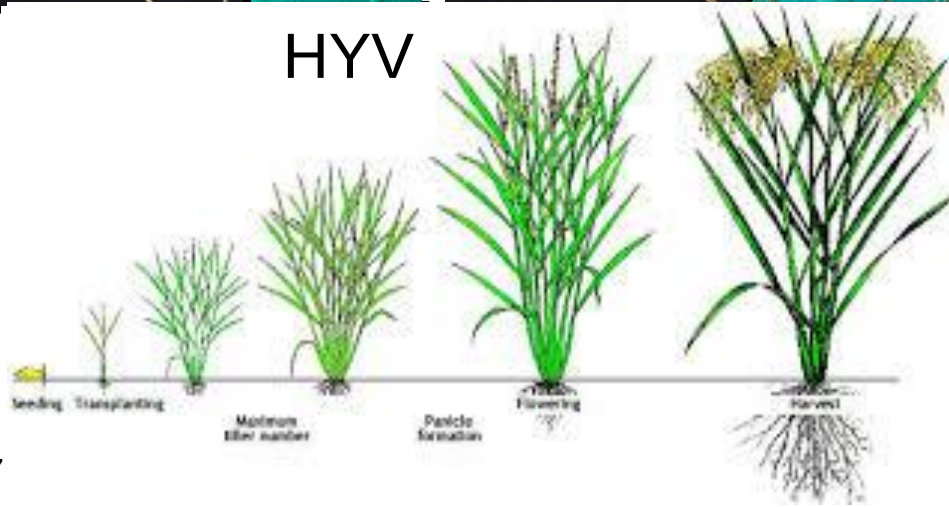
Elongated internodes (>5mm)

- DWR in tillering stage
- HYV after PI

- Roots from elongated internodes in HYV under submerged condition (Nitta et al., 1985)

- If HYV internodes can produce root
- CST in HYV for Late season flooding

HYV

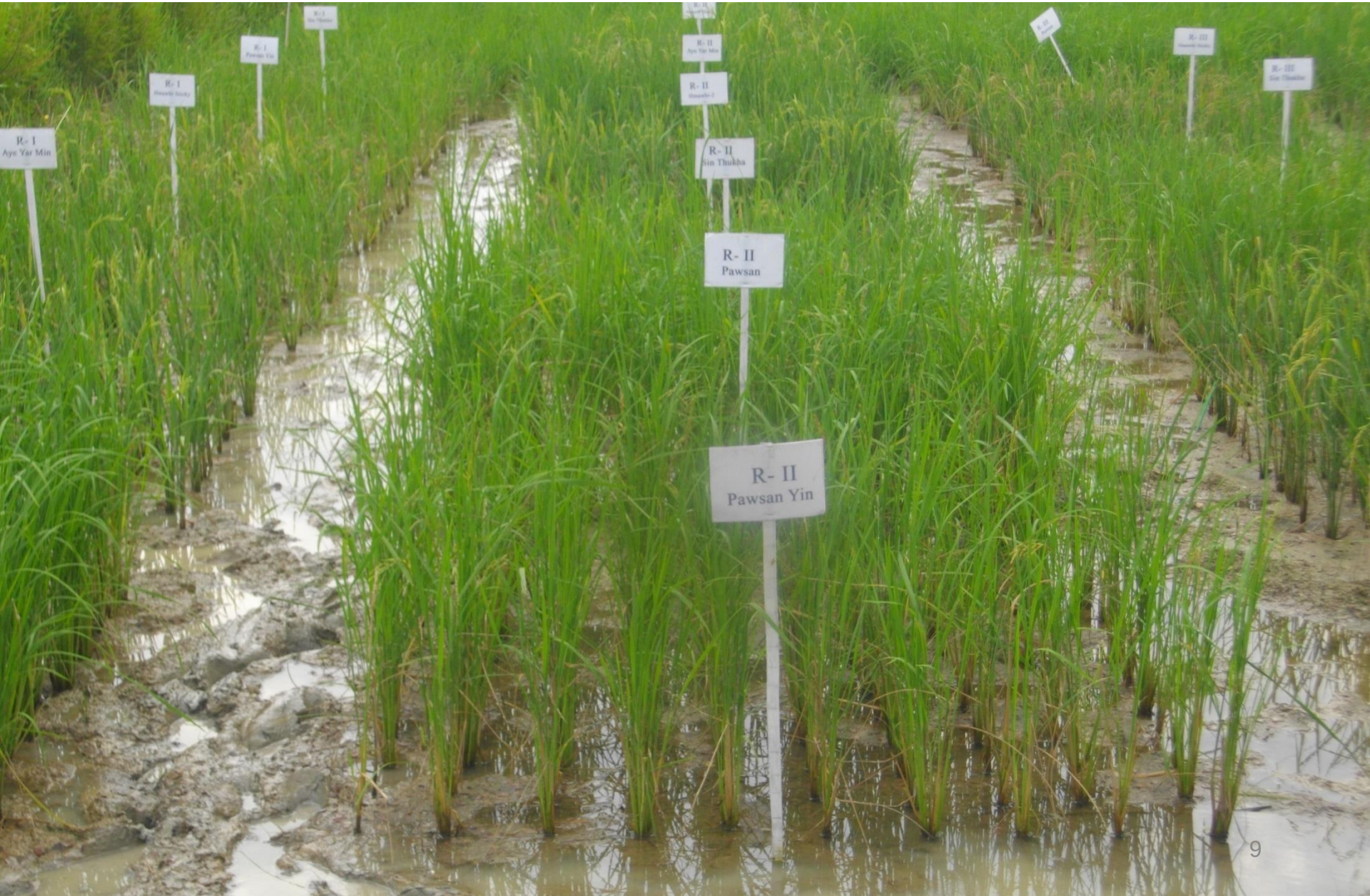


Objectives

(1) To clarify the adaptability of HYV to the CST method

(2) To understand the yield of HYV applied with the CST method

Materials and method



Experiment set up

- Location- Myanmar Rice Research Centre (MRRC) in Hmawbi TS
- September to December 2019
- RCB with 5 var, 4 rep-
- Plot size- 2m x 2m
- Spacing- 25cm x 25cm
- 1 seedling/ hill
- Plant population/m^2- 16

CST transplantation

- Water depth- 20cm

✓Pawsan- tillering stage

✓4 HYV- after PI

✓Plant height- 128.5 to 72.6cm

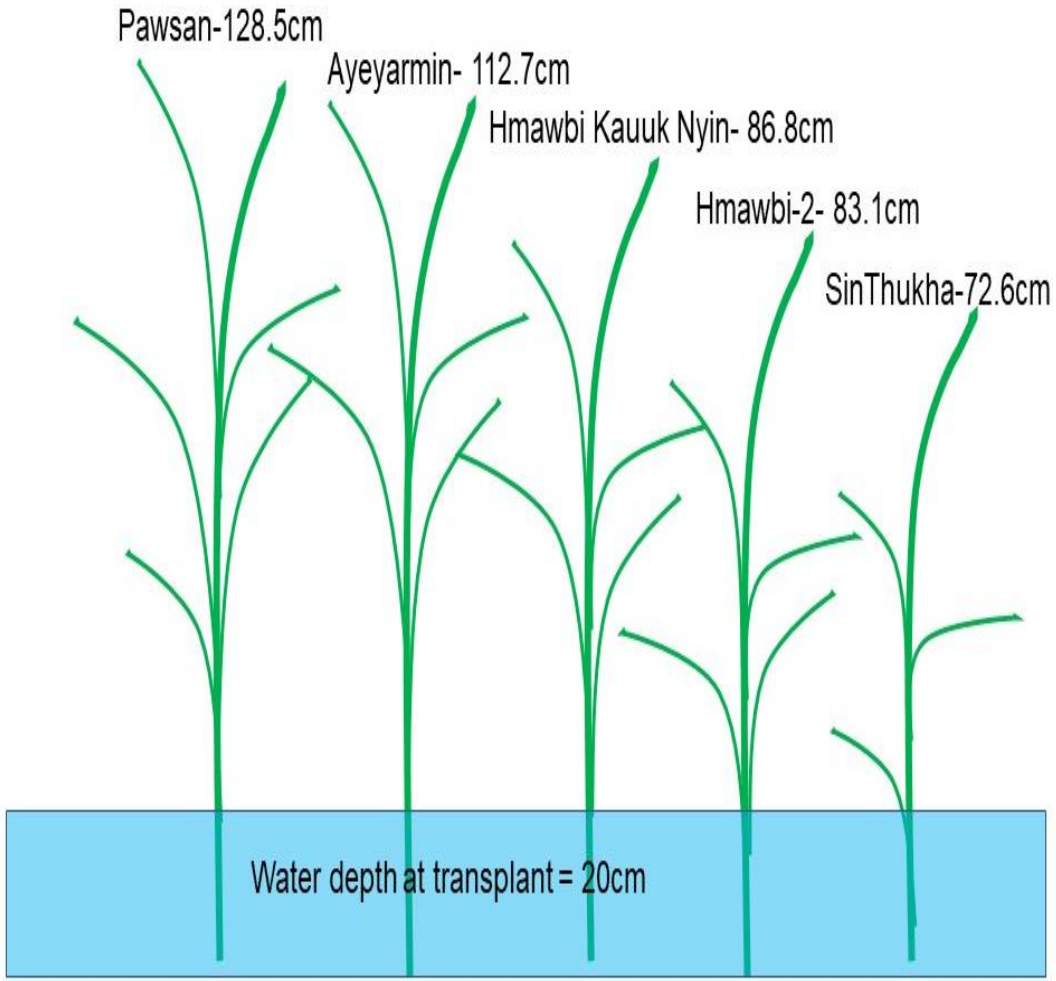


Fig.1 Seedling height (cm) and water depth at transplant

Data collection

Sampling

- 5hills/ plot for plant development (30DAT with 2 week intervals)

  plant height and no. of tillers

- 3hills/plot at harvest

  Growth and yield components

  Dig and clean the soil, hang for 1 week

- Harvest date of non-cut plant

Results and discussion

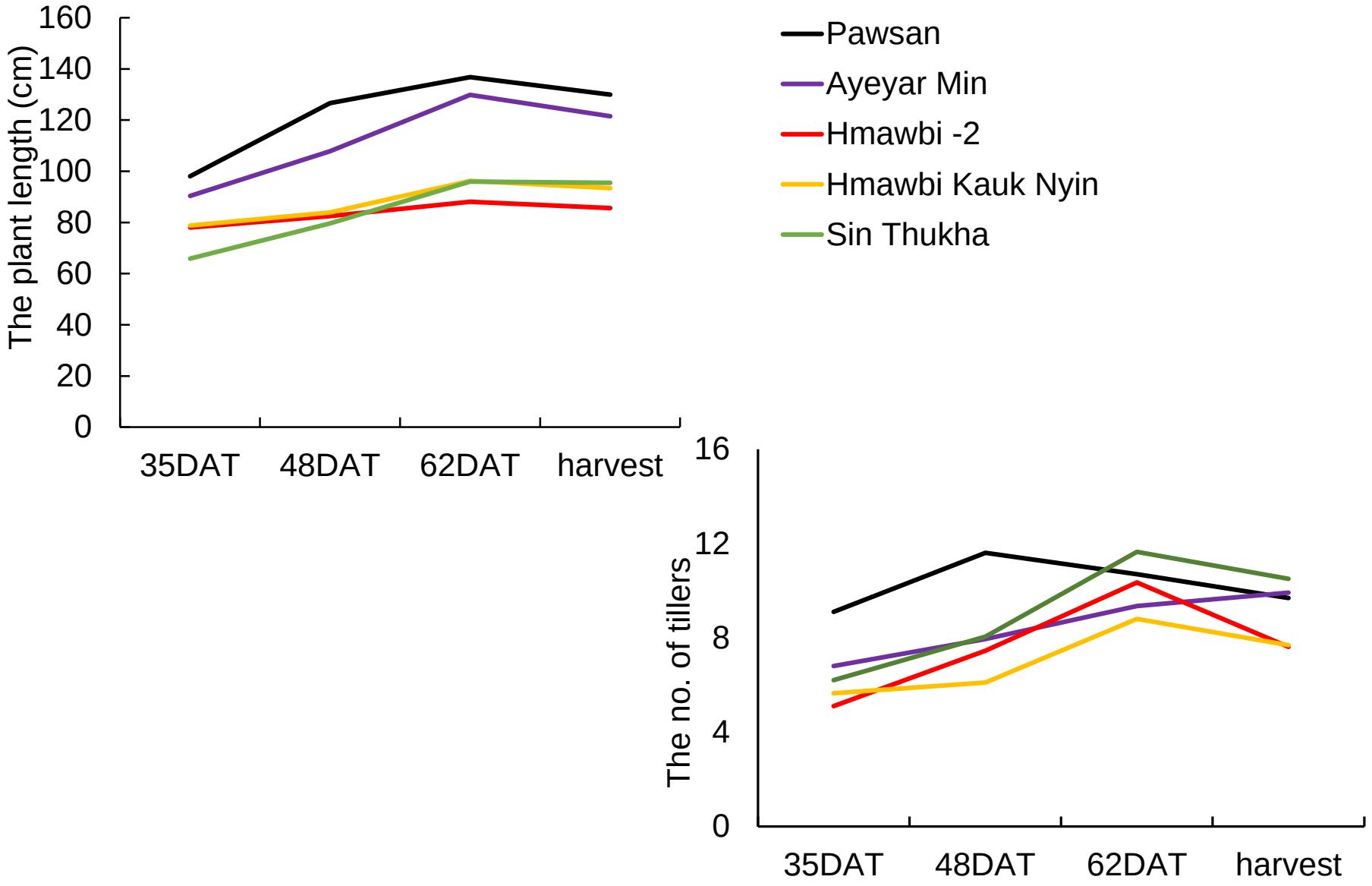
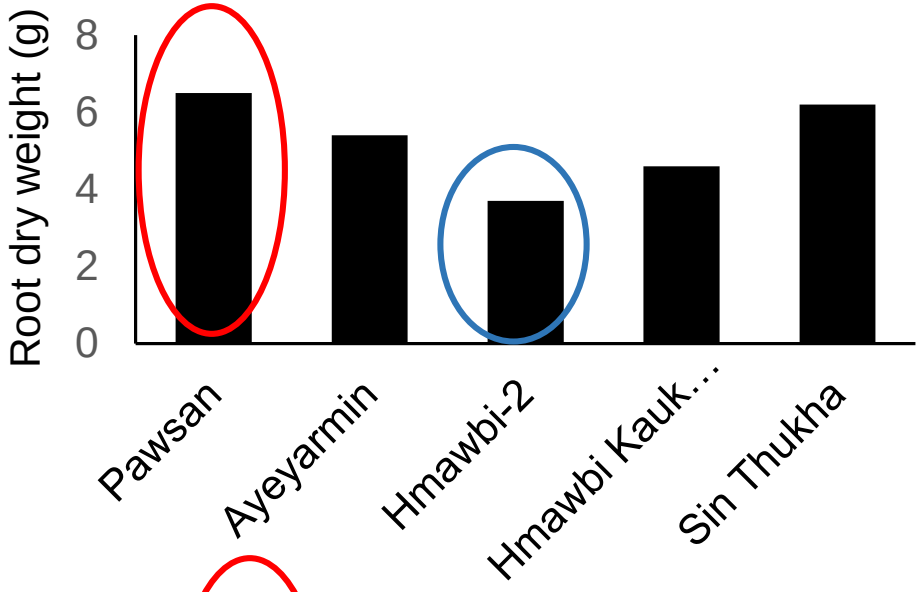
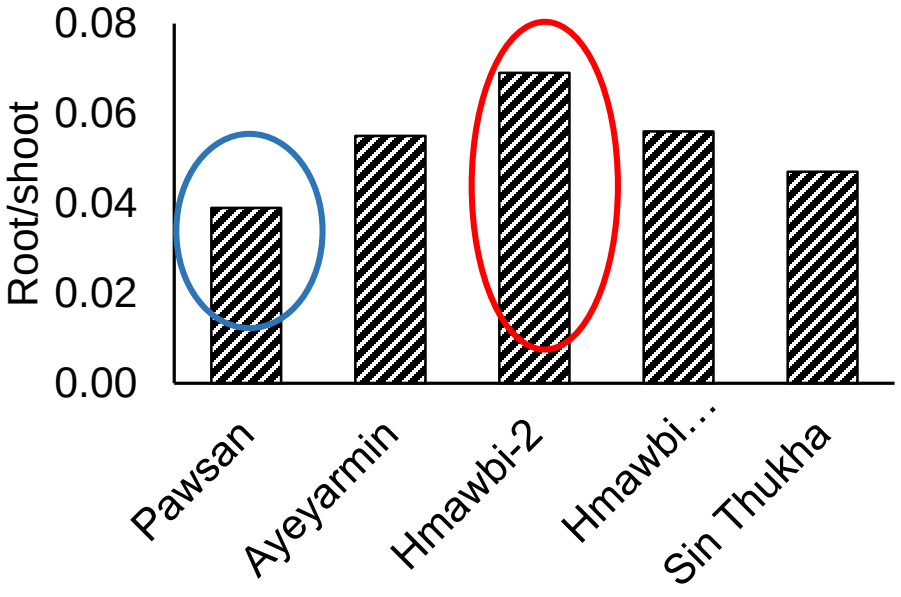


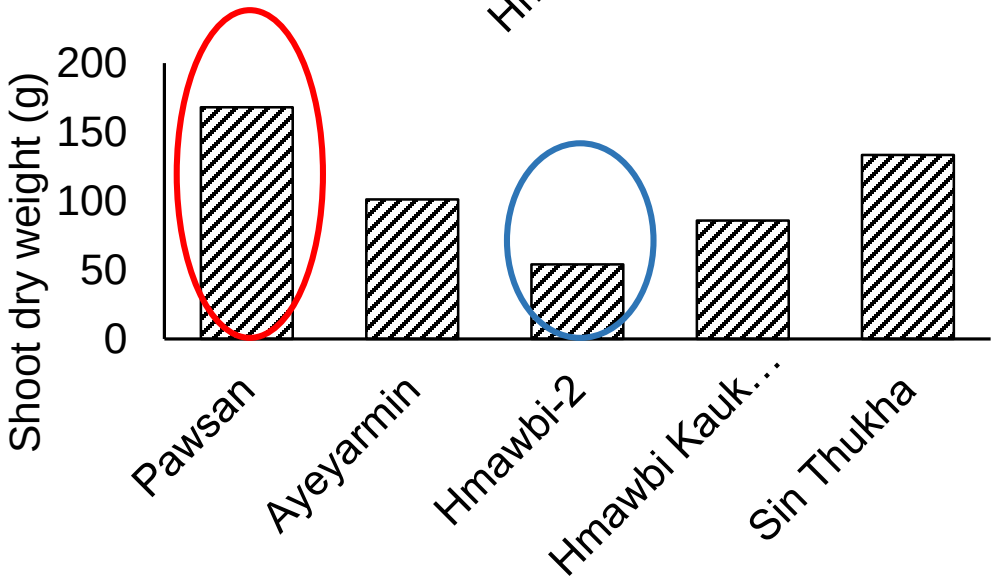
Fig.2 Changes in the plant length after CST transplantation.

Hmawbi-2 harvest at 15th Dec. while the others harvest at 26th Dec.

Root and shoot characters at harvest

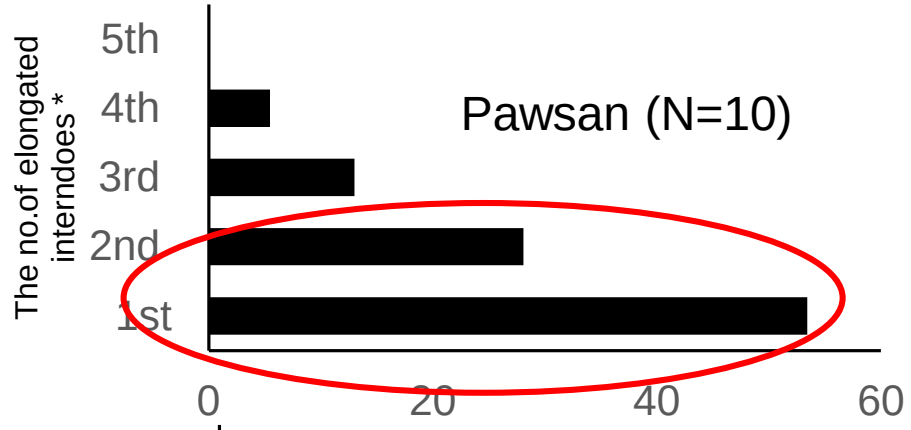


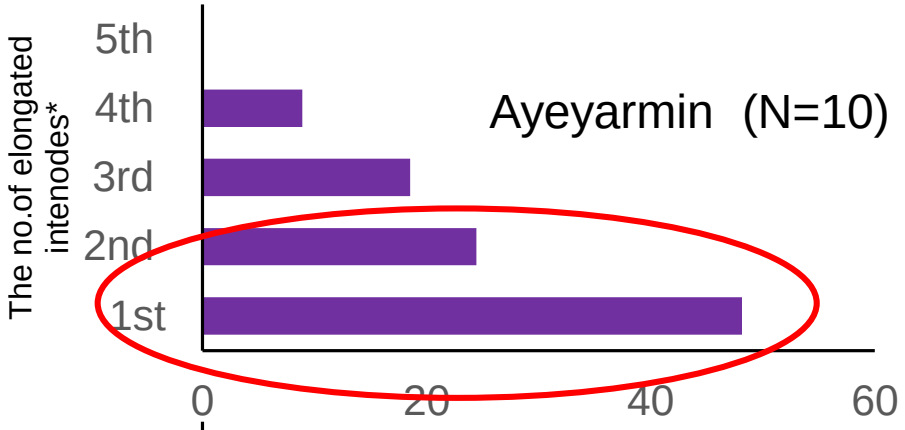


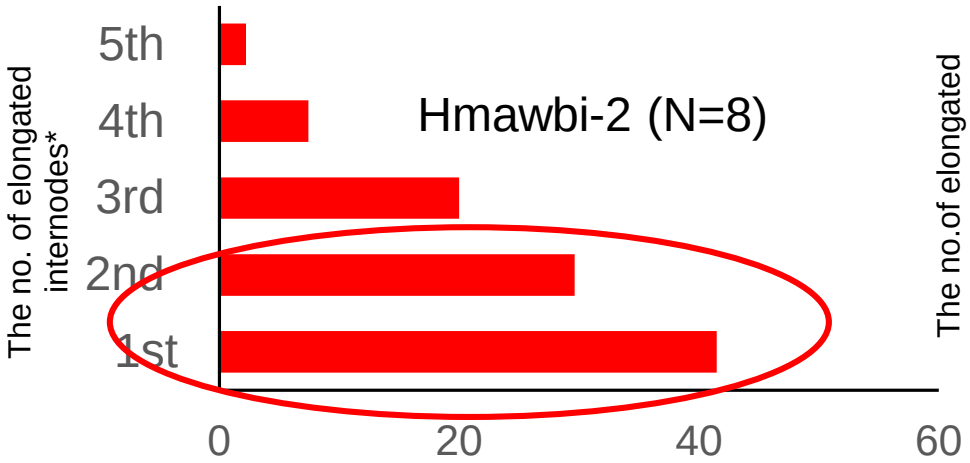


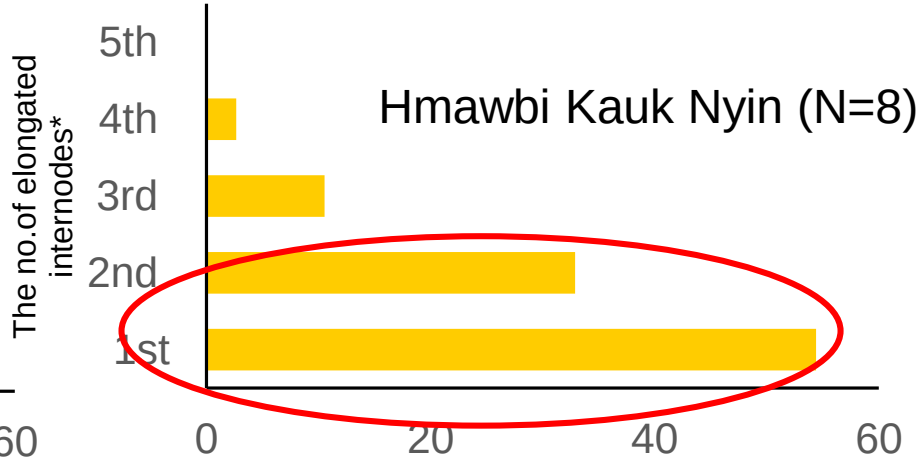
Root number/hill are not different between DWR or HYV

Fig. 3 Root dry weight (g),shoot dry weight (g) and root shoot ratio at harvest









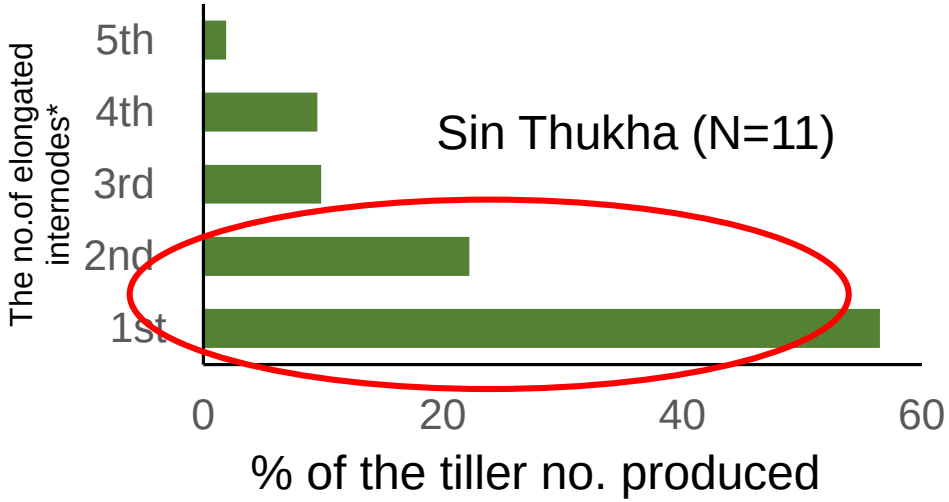


Fig.4 The no. of tillers produced from each elongated internodes
* Counting acropetally

Similar to the finding of Akita (1976)

Table 1 Yield and yield components

Varieties	Hill/m^2	The no. of panicles		The no. of spikelets		Filled grain (%)	100 grain weight (g)	Yield (g/m^2)
		(/plant)	(/m^2)	(/plant)	(/m^2)			
Pawsan	10.8ab	9.7a	104ab	82.22c	8489c	34.4c	3.21a	94.1c
Ayeyarmin	9.5b	9.9a	94bc	119.38a	11079b	67.8ab	1.92c	144.1b
Hmawbi-2	11.6a	7.6b	88c	85.33c	7468d	60.7b	2.86b	126.5bc
Hmawbi Kauk Nyin	11.1a	7.7b	85c	85.55c	7157d	59.2b	2.80b	123.44bc
Sin Thukha	10.5ab	10.5a	110a	107.92ab	1798a	74.4a	2.13c	186.9a
C.V	9.5	11.2	9.8	12.0	5	11.1	7.29	15.7
LSD	1.6	1.6	14	17.79	707	10.2	0.29	32.7

- ❖ Sin Thukha highest yield, Pawsan (DWR) lowest yield
- ❖ Pawsan due to lowest filled grain (%)
- ❖ yield lower than National average (3.92 ton/ha) (MOALI 2018)

Table 2. Survival rate of the varieties comparing with the plant density at transplantation

No.	Varieties	Plant density (/m^2)		survival rate % of hills (/m^2)	
		at transplant	at harvest		
1	Pawsan	16	10.8	67.18	ab
2	Ayeyarmin	16	9.5	59.37	b
3	Hmawbi-2	16	11.6	72.65	a
4	Hmawbi Kauk Nyin	16	11.1	69.53	ab
5	Sin Thukha	16	10.5	65.62	ab

No differences between DWR and HYV

Table 3 Harvest date differences between non- CST and CST

No.	Varieties	Rice type	Harvest date		
			non CST	CST	Different date
1	Pawsan	DWR	25-Dec	26-Dec	1
2	Ayeyarmin	HYV	30-Nov	26-Dec	26
3	Hmawbi-2	HYV	17-Nov	15-Dec	28
4	Hmawbi Kauk Nyin	HYV	1-Nov	26-Dec	55
5	Sin Thukha	HYV	15-Nov	26-Dec	41

Pawsan is photoperiod sensitive DWR
HYV is non-photoperiod sensitive, growth fixed

2 type of plant development after CST transplant

The main stem died, tillers from the remaining nodes

The main stem not died and tillers from the nodes

Similar pattern in YAU in DWR at 2cm depth

HYV- plant development reset from the tillering stage

Pawsan (DWR)- still in tillering stage

Conclusion

Yield of HYV> DWR

- >National average yield
- High cultivation cost (transplanting cost)
- Effective use of paddy field (eg. Second crop cultivation) due to longer growth duration
- Should not be applicable in HYV

Suggestion

- If the condition favorable for CST transplantation (eg. 40-60cm depth at transplantation)
- Yield of Sin Thukha and Ayeyarmin -250-300 g/m^2

CST will be applicable

- Late flooding after PI
- no plan for second crop (legume)

- to clarify the varietal differences of the seedling establishment (survival rate) of HYVs after the CST transplantation under deep water conditions.

Acknowledgement

- DOA for providing the budget
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Thank you for your kind attention