Effects of Cultivation Methods on Yield and Yield Components of Rice under Rainfed Condition

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Demonstrator

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Introduction

- rice, myanmar's staple food & one of highest rice consuming countries in Asean
- focus on increasing rice production to meet consumption & increase foreign exchange earnings as population grows
- main trading varieties of rice in domestic market - Manaw Thukha, Sin Thukha, Shwe Thwe Yin, Yadanar Toe, etc
- for export, such as Nga Sein, Paw San, Kauk Nyin, Ziya, Sin Thwe Latt & Ayar Min
- farmers need to follow cultivation methods
- to produce high quality rice in accordance with international standards for domestic & international market
- rice yield depends not only on genetic characteristics but also on agronomic practices (Zou et al., 2003)

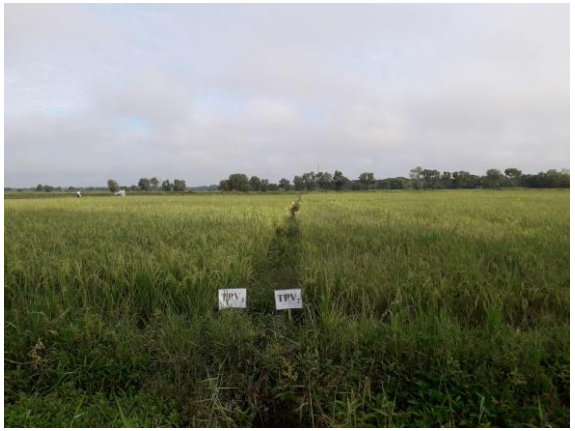
Objectives

- to develop cultivation methods that appropriate for local climate &
- to obtain suitable rice varieties for cultivation in combination with proper cultivation methods,
- to study effect of cultivation methods on yield & yield components of rice varieties

Problem Statement

- proportional use of appropriate, optimal farming methods, application of natural fertilizers, chemical fertilizers essential
- to ensure highest yields & maximum benefits for farmers in rice cultivation
- yield instability due to climate change, shortage of farm labor, scarcity of livestock, input constraints, due to wrong farming methods, profitability of rice cultivation declining
- appropriate farming methods needed to produce high yielding & quality rice varieties depending on water & soil conditions

Materials and Methods



- Experimental site - State Agricultural Institute, Tharyarwady Township, Bago Region
- Experimental period - June to November, 2021 (during rainy season 2021)
- Plot size - 15 m × 17 m
- Seed rate - 20.9 kg/ ac
- Experimental design - Split-plot design with 4 replications

Main plot (Methods)	Subplot (Varieties)
1. Direct-seeding (DS)	**1. Manaw Thukha**
2. Transplanting (TP)	**2. Sin Thukha**
	3. Sin Thwe Latt
	4. Yadanar Toe

Table 2. Results of soil analysis from experimental site in Tharyarwady

Characteristics	Unit	SAI Farm	
		Result	Rating
pH		5.07	Strongly acid
Total N	%	0.17	Low
Available P_2O_5	(ppm)	3.60	Low
Available K_2O	(mg/100gm)	1.82	Low
Humus	%	1.84	Low
Textural type		Silty Loam	

Source: Department of Agriculture (Land Use) Tharyarwady District

Table 3.Crop management factors of direct-seeding and transplanting methods of research farms

Factors	Direct-seeding	Transplanting
Fertilizer application	Urea (120kg/ha), T-super (90 kg/ha), Potash (90 kg/ha)	Urea (120kg/ha), T-super (90 kg/ha), Potash (90 kg/ha)
Weeding	3 times (20,40, 60 DAS)	1 time (60 DAS)
Application of insecticide	Tama used as a natural pesticide at early stage of seedlings Insects & diseases controlled as required to avoid yield loss same crop management practices, such as Profenofos insecticide at a rate of 200 cc per acre during dough stage	

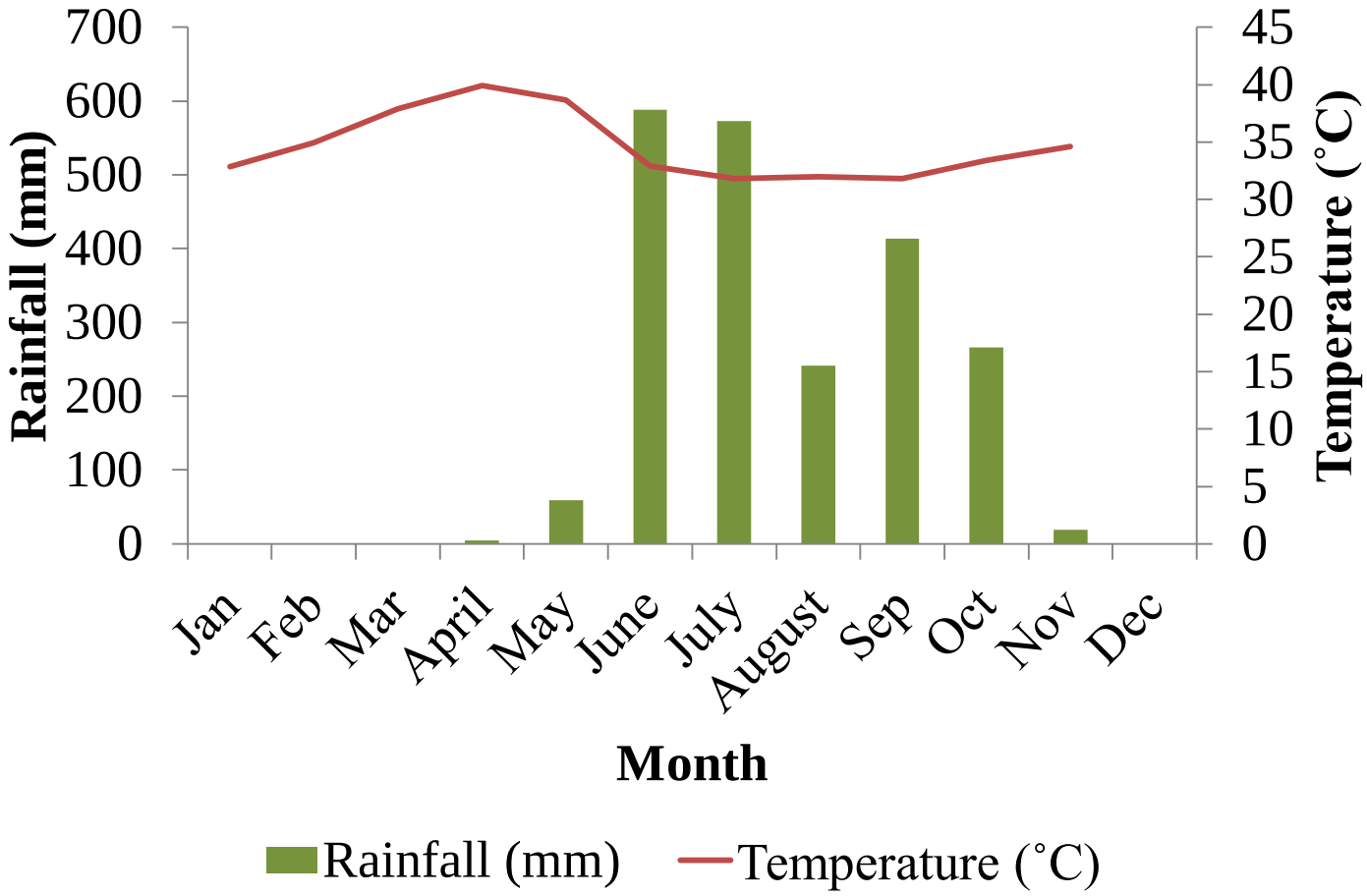


Fig.1 Temperature and amount of rainfall in experimental site in 2021

Data Collection

- number of effective tillers hill^{-1},
- number of panicles hill^{-1},
- number of spikelets panicle^{-1},
- filled grain percent,
- thousand grain weights (g),
- panicle length (cm) and
- grain yield (t ha^{-1})

Data Analysis

- Analysis of variance by using Statistix (Version - 8)
- Least Significant Difference (LSD) test at 5 % level

Results and Discussion

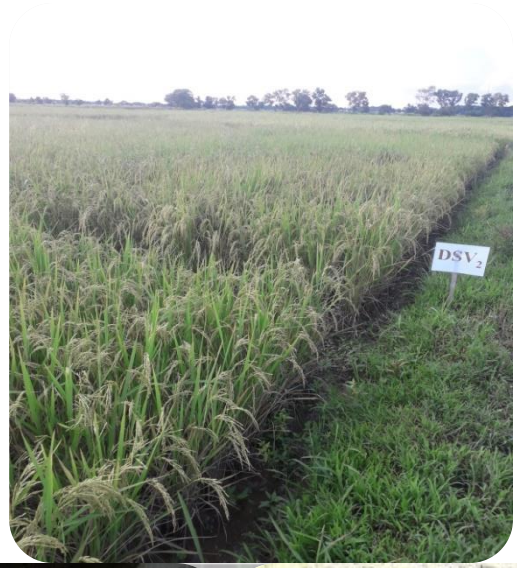


Table 4. Mean comparisons for agronomic performance of rice varieties affected by different cultivation methods in research farm

Treatments	No. of Effective tillers hill^{-1}	No. of Panicles hill^{-1}	Panicle length (cm)
Methods (A)			
DS	8.25	10.32	24.06 b
TP	8.28	10.38	25.07 a
$LSD_{0.05}$	0.79	0.06	0.62
$LSD_{0.05}$	1.05	0.08	0.96
Pr > F			
Method	0.985	0.949	0.013
Varieties	0.007	0.000	0.000
Method ×Variety	0.248	0.291	0.010
CV% (A)	8.57	0.50	2.25
CV% (B)	12.12	0.75	3.75

Ali et al. (2014) & Shiyam et al. (2014) reported that varieties which produced higher number of effective tillers hill^{-1} and higher number of grains panicle^{-1} showed higher grain yield ha^{-1}.

Means followed by the same letter within the column are not significantly different at 5% level

Table 5. Yield and yield components of rice varieties affected by different cultivation methods in research farm

Treatments	Grain Yield (t ha^{-1})	No. of Spikelets panicle^{-1}	Filled grain (%)	1000- grain weight (g)
Methods (A)				
DS	5.54 b	85.26 b	74.92	23.30
TP	5.76 a	85.88 a	74.80	23.23
$LSD_{0.05}$	0.13	0.63	0.98	0.31
Varieties (B)				
M				
S				
S				
Yadanar Toe	5.02 c	82.52 b	74.40 b	26.07 b
$LSD_{0.05}$	0.22	0.41	0.19	0.33
Pr > F				
M				
V				
M				
CV% (A)	2.11	0.66	1.16	1.21
CV% (B)	3.76	0.46	0.25	1.38

Yield can be varied due to not only the number of spikelets panicle^{-1} but also filled grain percent (Yoshida and Parao 1976).

Karim et al., (2004) showed that yield reduction due to weeds is more critical in direct seeded rice than in transplanted rice.

Means followed by same letter within the column are not significantly different at 5% level

Conclusion

- The two cultivation methods showed significantly differences in yield, yield components and some agronomic characters of rice in study area.
- The higher mean values of grain yield were achieved from transplanted rice and the highest grain yield was observed from Manaw Thukha variety which was significantly different from other varieties in study area.
- The higher grain yield of this variety may be due to a greater number of effective tiller hill^{-1}, number of spikelets panicles^{-1} and filled grain percent.

Recommendation

- ❖ According to the result of this study, two varieties of Yadanar Toe and Sin Thwe Latt are not suitable for cultivation in rainy areas as they are not resistant to plant lodging.
- ❖ It should be planted only as summer paddy.
- ❖ Plant lodging can affect yield and seed quality.
- ❖ Selection of varieties with good yield, pest and disease resistance, resistance to plant lodging, good quality of consumption, local climate and market suitability need to be considered.
- ❖ The results of this research can help alleviate the hardships that farmers face as a result of climate change, and that farmers can benefit from higher yields by cultivating method and varieties that are suitable for their land and water.

- Therefore, the results suggested that the productivity and profitability of rice can be enhanced by accepting the improved agronomic practices in study area.
- Furthermore, it is necessary to encourage rice farmers to adopt improved agricultural practices for increasing production and income as well.
- The proper strategy will be necessary to eliminate the limitations of rice crop management factors by upgrading the research and extension activities.



Thank You

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