

The Effect of the Application of Compost and Chemical Fertilizer on the Growth and Yield of Rice (*Oryza sativa* L.)

Theingi Win*, Swe Swe Mar*, Kyi Kyi Shwe*, Win Yu Hlaing*, Hsu Myat Thwin*, Kyaw Ngwe*, Toru Sakai**

*Dept. of Soil and Water Science, Yezin Agricultural University, Myanmar

**Japan International Research Center For Agricultural Sciences (JIRCAS)

ABSTRACT Turnover of compost to the soil can increase the efficiency of chemical fertilizers, improve the plant growth and sustain the environment. The field experiment was conducted at Yezin Agricultural University Farm, Yezin, Nay Pyi Taw, during wet season from July to November, 2020 to support the sustainable rice production with optimum productivity for farmers. The experiment was arranged in randomized complete block (RCB) design with four replications. The treatments were contained as T1 (control) (no fertilizer), T2 (100-16-66-12 kg N, P, K, S) ha⁻¹, T3 (4ton ha⁻¹) (Compost), T4 (4ton ha⁻¹) (Compost) + (50-8-33-6 kg N, P, K, S) ha⁻¹. The Urea, Triple super phosphate, Muriate of potash and Gypsum were used as N, P, K and S sources and the tested rice variety was Sinthukha. The plant growth characters were collected at biweekly interval and yield and yield components were recorded at harvest time. Based on the results, yield and yield components of all treatments were responded to different application materials. T4 produced number of panicles hill⁻¹, number of spikelets panicle⁻¹, filled grain percent, and harvest index and was superior than other treatments. T4 achieved the more grain yield (7.93 ton ha⁻¹) and the lowest grain yield (5.71 ton ha⁻¹) was observed in T1. The maximum grain yield higher over T1 was obtained in the treatments followed by (7.03 ton ha⁻¹) T2 and (6.36 ton ha⁻¹) T3 treatments. According to the result of this study, the application of compost reduced the numbers of empty grain per tiller compared to control. Therefore, it was necessary to apply organic materials such as compost which is easy to reduce cost than chemical fertilizers and use for recovering of soil nutrients. Application of composts increased the rice grain up to 11-39 % compared to control.

Keywords Rice, Chemical Fertilizer, Compost, Yield

INTRODUCTION

Rice production is critical for the economic livelihood and food security of the population in Myanmar. Rice is grown throughout the country by resource poor rural farmers and landless agricultural laborers on small farms averaging only in size of 2.3 ha (Okamoto 2004). Therefore, the efficient rice production way which is sustainable and reduced cost of inputs is important for the farmers.

OBJECTIVES

(1) to determine the effects of compost and chemical fertilizer application on the growth and yield of rice crop and (2) to support the sustainable rice production with optimum productivity for farmers.

RESULTS

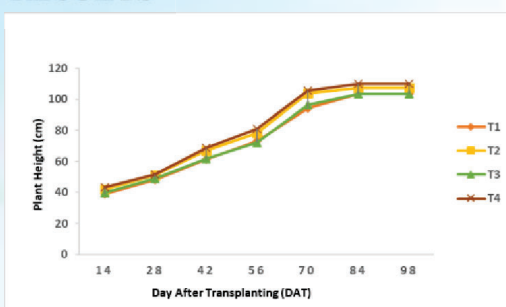


Figure 1. Plant height (cm) as affected by compost and chemical fertilizer application

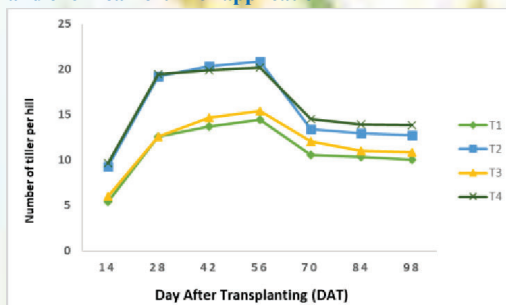


Figure 2. Number of tillers hill⁻¹ as affected by compost and chemical fertilizer application

CONCLUSION

According to this study, the integrated application of compost and chemical fertilizer is the good way to get optimum growth and yield of rice and reduced cost for the farmers than the single application treatment.

METHODOLOGY

Experimental site

At Yezin Agricultural University Farm, Yezin, Nay Pyi Taw. (July to November, 2020)

Experimental design

(RCB) design with four replications and use Sinthukha as tested variety

Treatments

T1 = Control

T2 = 100-16-66-12 kg N, P, K, S ha⁻¹

T3 = 4ton ha⁻¹ (Compost)

T4 = 4ton ha⁻¹ (Compost) + (50-8-33-6 kg N, P, K, S) ha⁻¹

DISCUSSION

In Figure 1, The lowest plant height (103.25) was observed in T1. The highest plant height (109.88) was produced by T4 and then followed by (107.53) in T2. Number of tillers ranged from 10.05 to 13.85 and the maximum value was observed in T4 and

minimum value in control (Figure 2). In Figure 3, T4 achieved the more grain yield (7.93 ton ha⁻¹) and the lowest grain yield (5.71 ton ha⁻¹) was observed in T1. The maximum grain yield higher over T1 was obtained in the treatments followed by (7.03 ton ha⁻¹) T2 and (6.36 ton ha⁻¹) T3 treatments. T4 produced number of panicles hill⁻¹, number of spikelets panicle⁻¹, filled grain percent, and harvest index and it was superior than other treatments. (Table 1).

Table 1. Effect of Compost and Chemical Fertilizer Applications on Yield and Yield Components Parameters of Rice

Treatment	Number of panicle hill ⁻¹	Number of spikelet panicle ⁻¹	1000 grain weight (g)	Filled grain (%)	Panicle length (cm)	Harvest Index
T1	9.65 d	149.65	20.48 b	70.75	22.50 b	0.40
T2	12.50 b	161.85	21.11 ab	76.75	23.19 a	0.42
T3	10.80 c	154.15	20.47 b	76.50	22.96 ab	0.41
T4	13.70 a	165.55	22.01 a	83.00	23.31 a	0.43
LSD _{0.05}	0.93	14.19	1.18	18.46	0.58	0.09
pr>F	**	ns	*	ns	*	ns
CV%	4.97	5.62	3.52	15.03	1.58	14.12

**p<0.01; *p<0.05; ns: no significant

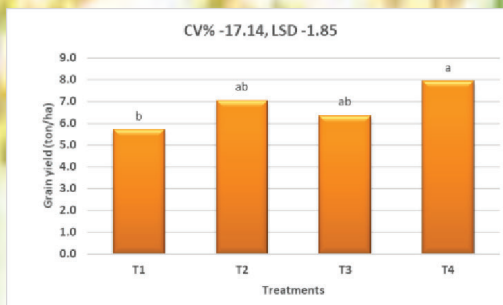


Figure 3. Plant height (cm) as affected by compost and chemical fertilizer application