

Effect of Seedling Age and Variety on Yield and Yield Parameters of Rice

Dev Kumar Saphi¹, Dil Raj Yadav²

^{1,2}National Rice Research Program, Hardinath, Dhanusha, Nepal

Abstract: Field experiments were conducted at the experimental block of National Rice Research Program, Hardinath, Dhanusha in rainy seasons of 2015 and 2016 with the objective of finding out the effects of age of seedling on growth, yield and yield attributes of rice. The experiments were laid out in split plot design with three replications in both years. Three rice genotypes, IR96319-6-3, NR1893 and Swarna Sub1 and four levels of four levels of age of seedlings (24, 36, 48 and 60 days old) were assigned to main and sub plots, respectively. The statistical analysis showed that the age of seedling had significant effect on days to heading and grain yield of tested rice varieties. Significantly earlier heading and higher grain yield was recorded with 60 and 24 days old seedlings, respectively. Most of the yield contributes parameters were found better with the earlier age of seedlings. Our study reflected that yield and yield contributes parameters were superior with the younger seedlings as compared to older seedlings. The variety and seed rate interaction was found non-significant for grain yield and its contributing parameters. This study showed that the 24 days old seedlings was found the best for high grain yield irrespective of varieties However, 48 days old seedlings could be used without significant reduction in grain yield under the climatic condition of Dhanusha.

Keywords: Age of seedling, rice, variety, yield and yield attributes

1. Introduction

In Nepal, rice is a major cereal crop and contributes about 22% and 7% in agricultural gross domestic product (AGDP), gross domestic product (GDP) of the country, respectively. It is grown in about 1.34 million hectares with an average productivity of 3.35 t/ha [1]. In Nepal, rice is predominantly grown by transplanting seedlings into puddle soil and kept flooded for most part of the growing season. About 10% area of total rice growing acreage was found under submerged conditions for 2 to 10 days or even more days. Different technologies and approaches are being used to increase the productivity of rice but desired yield has not been obtained yet. Moreover, since the last few years, the occurrence of monsoon is uncertain which compel the farmers to do late planting. The yield and yield parameters like number of tillers/hill, grains per panicle, 1000 grains weight and sterility of different rice varieties are affected by transplanting dates [2]. Of the various factors affecting grain yield under under rainfed conditions, age of seedling, method of sowing, seed rate and cultivars are the major factors influence the grain yield [3]. Under delayed transplanting conditions, re-raising of rice seedlings and re-transplanting might not favor for optimum production. Therefore, the current research was carried with the objective of finding the appropriate age of seedlings and variety for maximization of rice yield.

2. Materials and Methods

Field experiments were carried out at the research block of National Rice Research Program, Dhanusha, Nepal in 2015 and 2016 rainy season. The experimental site is located at the latitude of 26°49' E and longitude of 86°01' N with an altitude of 93 m from mean sea level.

The experiment was laid out in a split design with three replications. Two factors viz., three varieties (IR96319-6-3,

NR1893 and Swarna Sub1) as main plot and four age of seedlings (24, 36, 48 and 60 days) as sub plot were taken as treatments. Each individual plot size for the experiment was 5 m x 2 m and row to spacing was 20 cm x 20 cm. The crop was managed following the standard recommended practices for rice in Nepal. Fertilizers were applied @ 100:40:30 N:P₂O₅:K₂O kg/ha.

Data on yield and yield attributes were recorded and compiled. Data were subjected to analysis of variance using CropStat V.07 [4]. Means were separated using Least Significant Difference (LSD) test at $P \leq 0.05$.

3. Results and Discussion

Data on effects of age of seedlings and varieties on growth, yield attributes and yield of rice is presented in Table 1 & 2. The age of seedlings had significant effect on days to heading, and grain yield in both years. The 60 days old seedling headed earlier as compared to other age of seedling. Significantly higher yield was recorded at 24 days old seedling as compared to other treatments. The declining trend of number of tillers/m² was found as the age of seedling increased and the highest number of tillers/m² (409) was recorded at 24 days old seedlings in 2015. However, it was non-significant in year 2016. Our results are in agreement with the previous research findings [5, 6, 7 and 8]. In both years, the effect of variety was found non-significant for most of the measured traits except number of tiller/m², panicle length. However, comparatively higher yield (4.1 t/ha) was recorded in NR1893 in 2015 (Table 1).

The physiological limitation of aged seedlings produced limited effective tillers/hill [9]. In our study, the highest grain yield with 24 days old seedling might be due to earlier heading and better yield contributing characters especially more number of effective tillers/m².

Table 1: Effect of age of seedlings and varieties on growth, yield attributes and yield of rice in 2015 at NRRP, Dhanusha, Nepal

Treatment	Days to heading	Plant height (cm)	Panicle length (cm)	No. of tillers/m ²	No. of filled grains/panicle	1000-grains weight (g)	Grain yield (t/ha)
Variety							
IR96319-6-3	102	102	25	374	103	26.2	3.8
Swarna Sub1	104	101	23	365	136	23.3	3.9
NR1893	106.5	103	24	317	135	22.6	4.1
F test	ns	ns	ns	*	*	ns	ns
LSD _{0.05}	-	-	-	34.2	18.4	-	-
Age of seedlings (days)							
24	102	98	24	409	144	24	4.5
36	75	95	24	385	130	24	4.2
48	62	94	24	335	122	23	3.9
60	50	92	24	279	102	23	3.2
F test	**	ns	ns	**	ns	ns	**
LSD _{0.05}	11.7	-	-	17.35	-	-	0.27
CV%	3.1	6.8	4	4.3	6.4	6.6	11.2

* and ** = Significant at 1 and 5%, respectively, CV = Coefficient of variation

Table 2: Effect of age of seedlings and varieties on growth, yield attributes and yield of rice in 2015 at NRRP, Dhanusha, Nepal

Treatment	Days to heading	Plant height (cm)	Panicle length (cm)	No. of tillers/m ²	No. of filled grains/panicle	1000-grains weight (g)	Grain yield (t/ha)
Variety							
IR96319-6-3	103	105.8	24.5	363	106	23.8	3
Swarna Sub1	105	104.6	25.3	346	126	24.7	3
NR1893	104	106.7	24.7	309	113	24.9	3
F test	ns	ns	ns	*	*	ns	ns
LSD _{0.05}	-	-	-	21.64	11.4	-	-
Age of seedling (days)							
24	105	105.8	24.6	242	114	24.9	3.5
36	78	105.2	25.0	242	104	24.6	3.3
48	59	106.3	25.0	232	121	23.8	3.1
60	51	105.5	24.7	236	120	23.1	2.9
F test	**	ns	ns	ns	ns	ns	**
LSD _{0.05}	7.3	-	-	-	-	1.82	0.14
CV%	3.12	2.1	3.1	10.6	19.6	7.5	9.4

* and ** = Significant at 1 and 5%, respectively, CV = Coefficient of variation

4. Conclusion

Considering the overall performance of all varieties with different seedling age used in the experiment, it can be concluded that 24-day old seedling was better than those of relatively older seedlings.

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