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Evaluation of radish (*Raphanus sativus* L.) genotypes in Eastern mid-hills condition of Nepal

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ABSTRACT

The study was carried out to evaluate the performance of five different radish varieties (HRD RAD 001, HRD RAD 002, HRD RAD 003, HRD RAD 004 and HRD RAD 005) for growth and yield performance. The experiment was set up in a Randomized Complete Block Design (RCBD), with four replications at 30 cm X 15 cm of spacing, with a plot size of 3.15 m² at Agricultural Research Station (ARS), Pakhribas, Dhankuta, during 2014 and 2015. The average performance of both years revealed that the radish genotypes HRD RAD 002 (37.91 t/ha), followed by HRD RAD 004 (28.91t/ha) were found as promising - with better adoptability, higher root weight, root length and yield. Hence, HRD RAD 002 and HRD RAD 004 could successfully be grown in the conditions found in the Eastern mid-hills area.

Keywords: evaluate, performance, promising, radish, *Raphanus sativus*

1. INTRODUCTION

Radish (*Raphanus sativus* L.) belongs to the family Brassicaceae. It is a popular root vegetable in both tropical and temperate regions. It is grown for its young tender tuberous root which is consumed either cooked or raw. It is a good source of vitamin C (ascorbic acid) and minerals like calcium, potassium and phosphorus. It has got refreshing and diuretic properties. The roots are also useful in urinary complaints and piles.

Radish is predominantly a cool season vegetable crop. But, Asiatic types can tolerate higher temperature than European varieties. Being a cool season crop, it is sown during winter from September to January. However, it can be grown almost all the year round.

It is popular among the farmers due to the wider adaptability, easy for cultivating and multi-uses. It is an annual or biennial depending upon the type for the purpose it is grown. Area under radish was about 18,190 ha and total production was 2,72,152 tons with an average productivity of 15.0 t/ha in Nepal.

The growth and yield of radish greatly depends on soil and climatic conditions. Different varieties have different soil and climatic requirements for their optimum performance. Nepal having varied agro-climatic regions viz., temperate, subtropical and tropical, a single variety may not be suitable for all the agro-climatic regions. Moreover, the reason for low production of radish in farmers' field is lack of knowledge on suitable varieties. Hence, different varieties have to be identified for specific regions. Under normal agro-climatic conditions, the variety which is most suitable is the major factors which influence yield and quality of radish [1-10].

2. MATERIALS AND METHODS

The present experiment was conducted at the Horticultural farm of Agricultural Research Station Pakhribas, Dhankuta. Five different varieties were evaluated and compared in RCBD with four replications during the summer for two consecutive years 2014 and 2015. Five different varieties namely: HRD RAD 001, HRD RAD 002, HRD RAD 003, HRD RAD 004 and HRD RAD 005 were evaluated for both the years. The plot size was assigned 3.15 m² (3 m × 1.5 m) where the seeds were seeded 30 cm × 15 cm spacing. Different yield contributing data have been recorded from the mean of five harvested plants which was selected at random of each unit plot. The data obtained for different parameters were statistically analyzed to find out the significance difference of varieties on yield and yield contributing characters of radish.

3. RESULTS AND DISCUSSION

3.1. Growth parameters

Statistical analysis depicted that radish genotypes showed significant differences on number of leaves per plant. The number of leaves ranged from 10.03 (HRD RAD 003) to 16.98 (HRD RAD 002) followed by HRD RAD 005 with 15.88 (Table 1). The results are in conformity with the findings of Lingaiah et al. (1992) in respect of number of leaves per plant.

The plant spreading among the genotypes showed non-significant difference. Though the result showed non-significant, maximum plant spreading 40.71 cm in HRD RAD 005 while, the least in HRD RAD 002 with 36.74 cm. The genotypes showed significant difference in length of the roots during the year 2015 and non-significant during the year 2014 (Table 1).

The root length was maximum from the genotype HRD RAD 002 with 21.48 cm followed by HRD RAD 005 with 20.86 cm and the minimum from the genotype HRD RAD 001 with 16.38 cm. This observation is in agreement with the findings of Gautam and Khatiwada, 1997.

Table 1. Performance of different varieties of radish at ARS, Pakhribas during (2014 and 2015)

Genotypes	No of leaves/pant			Plant spreading (cm)			Root length (cm)		
	2014	2015	Mean	2014	2015	Mean	2014	2015	Mean
HRD RAD 001	17.5	11.45	14.48	43.0	36.2	39.58	16.4	16.3	16.38
HRD RAD 002	17.8	16.10	16.98	38.8	34.7	36.75	15.1	27.8	21.48
HRD RAD 003	7.6	12.45	10.03	43.5	35.6	39.51	18.4	16.1	17.27
HRD RAD 004	12.0	14.55	13.30	40.1	39.3	39.67	18.4	23.3	20.01
HRD RAD 005	16.8	14.90	15.88	39.5	42.0	40.71	16.7	23.3	20.86
Mean	14.3	13.89	14.13	41	37.5	39.25	17.03	21.4	19.20
F-test	**	**	**	NS	NS	NS	NS	**	*
LSD	2.2	1.22	1.36	7.4	8.75	5.13	5.0	5.8	3.26
CV%	10.1	5.7	6.2	11.8	15.1	8.5	19.2	17.6	11.0

3. 2. Yield parameters

The data on root diameter per plant varied significantly between the varieties during the both seasons. The genotype HRD RAD 002 records significantly the highest root diameter (4.72 cm) followed by HRD RAD 004 with (4.07 cm) while the lowest root diameter recorded from the genotype HRD RAD 001 with (3.48 cm). The data on total fresh weight per plant was significant between the varieties in both the seasons.

The highest total fresh weight per plant (293.7 g) from the genotype HRD RAD 002 followed by HRD RAD 005 with 262 g while the lowest was recorded in HRD RAD 001 with 133 g (Table 2). Similar to the total fresh weight, the data on yield was significant between the varieties in both the seasons. Significantly highest yield (37.91 t/ha) was recorded in HRD RAD 002 followed by HRD RAD 004 with (28.91 t/ha) and the lowest yield (10.96 t/ha) from HRD RAD 003 (Table 2).

The results were in accordance to Chapagain et al. 2000 who reported difference in the root yield of the varieties tested with maximum of 27.15 t/ha from Tokinashi in the farmer's field condition. Similar kinds of observations maximum 59.53 t/ha root yield from Mino Early and 50.64 t/ha from Forty Days were noted.

Table 2. Performance of different varieties of radish on the yield components at ARS, Pakhribas during (2014 and 2015)

Genotypes	Root diameter (cm)			Root weight (g)			Yield (t/ha)		
	2014	2015	Mean	2014	2015	Mean	2014	2015	Mean
HRD RAD 001	3.4	3.5	3.48	156	110.5	133	21.43	13.10	17.26
HRD RAD 002	4.5	4.9	4.72	265	322.5	293.7	35.71	40.12	37.91
HRD RAD 003	4.7	3.4	4.04	198	104	150.7	11.11	10.82	10.96
HRD RAD 004	4.2	4.0	4.07	282	272.5	224.4	31.35	26.47	28.91
HRD RAD 005	3.7	4.3	4.05	176	241.5	262	20.71	24.88	22.80
Mean	4.14	4.0	4.07	215	210.2	212.8	24.06	23.07	23.57
F-test	**	**	**	*	**	**	**	**	**
LSD	0.5	0.3	0.25	94.9	56.67	63.60	4.61	10.03	6.07
CV%	8.8	5.2	4.1	17.6	17.5	19.4	12.5	28.2	16.7

4. CONCLUSION

On the basis of overall performance during the both the years HRD RAD 002 (37.91 t/ha) and HRD RAD 004 (28.91 t/ha) had been selected and recommended due to their better adaptability and higher yield for cultivation in the eastern mid hills condition.

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