MedCrave
Step into the World of Research

Horticulture International Journal

Research Article

Open Access

CrossMark

Evaluation of radish genotypes with special study on sowing geometry at agricultural research institute, Tarnab, Peshawar

Abstract

The research was carried out on the "Evaluation of Radish genotypes with special study on sowing geometry at Agricultural Research Institute, Tarnab Peshawar". The experiment was laid out in randomized complete block design having three replications. The experiment comprised with two factors, one was sowing dates(19th Oct., 4th., Nov., and 19th Nov) and the other was different genotypes (Mino, Local Red and Local White). The data were recorded on Days to germination, Germination (%), Days to edible maturity, Number of leaves plant-1, Leaf length plant-1 (cm), Root length plant-1 (cm), Root diameter plant-1 (cm), root fresh weight (g), Plot weight (kg) and yield (t ha^{-1}). Sowing dates significantly affected all yield parameters. Sowing of radish on 19th October has more number of Leaves (17.44 leaves) plant-1, Leaf length plant(22.611 cm), root length plant-1(24.058 cm), root diameter plant-1(3.12 cm) fresh root weight (503.95g), the maximum plot weight (50.90 kg plot-1) and higher yield (62.36t ha^{-1}) was observed whereas the crop sown on 19th November showed the minimum days to germination (8.88 days), germination percentage (96.88%) and minimum days to maturity (53 days). Among genotypes Mino take minimum days to germinate(8.22 days), maximum germination percentage (99.22), minimum days to maturity (52.778), maximum number of leaves (19.44 leaves), leaf length (23.422 cm), greater root length (24.588 cm), maximum root diameter (3.53 cm), higher root fresh weight (536.62g), higher weight per plot (52.22 kg) and maximum yield (63.54t ha^{-1}). The results emphasized that the suitable time of sowing for Mino genotype is 19th October for Peshawar.

Keywords: raphanus sativus, local red, mino, local white and sowing time

Volume 6 Issue 1 - 2022

Shah Masaud Khan,[1] Abid Ali,[1] Ijaz Hussain,[1] Muhammad Saeed,[3] Izhar Hussain,[1] Sardar Ali,[1] Sher Aslam Khan,[1] Naushad Ali,[2] Muhammad Affan Khan,[1] Irshad Ahmad Khan[1]

[1]Department of Agricultural Sciences, University of Haripur, Pakistan
[2]Agriculture Research Institute (ARI) Tarnab, Peshawar, Pakistan
[3]Department of Agricultural Sciences, University of Swabi, Pakistan

Correspondence: Shah Masaud Khan, Department of Agricultural Sciences, University of Haripur, Pakistan, Email shahmasaudkhan@gmail.com

Received: July 12, 2021 | **Published:** January 07, 2022

Introduction

Radish *(Raphanus sativus)* belongs to family Cruciferae. It is a cool-season crop that matures soon and grows easily.[1] Radish is a native of Europe and Asia.[2] It is a cross-pollinated crop that contains eighteen haploid numbers of chromosomes. Leaves and green pods of radish are used as a vegetable. It is an important crop of many countries; it is grown in China, Japan, Korea and South Asia for nutritional contents and high yields.[3] It contains some important nutrients both in roots and leaves which play an important role in that human's body. The nutrients which are found in roots are Protein (0.7gm), Fats (0.1gm), Minerals (0.6gm), Carbohydrates (3.4gm), Vitamin-A 5I.U., Vitamin-C15.0gm, Riboflavin 0.02mg, Fiber 0.8 gm, Potassium 138.0 mg, Sodium 33.0 mg, Iron 0.4 mg, Calcium 50.0 mg, Nicotinic acid 0.5 mg.[4] The nutrients which are present in the leaves are Vitamin-A 8 I.U., Vitamin-B 21.0 gm, Vitamin-C 21.0 gm, Carbohydrates 4.1 gm, Protein 3.9 gm, Calcium 0.31 gm, Phosphorus 0.06 gm, and Nicotinic acid 1.4 gm. It is also used for the treatment of many diseases like Piles, Lever trouble, Enlarged spleen and Jaundice.[5] In Pakistan radish is cultivated on an area of 14729 acres with the production of 111753 tons.[6]

Radish can be grown on all types of soils but sandy to sandy loam soils are best suited, the crop is sensitive to salinity soil.[7] Radish is a cool-season crop that shows the best results with a temperature of 10-15C0. The crop is cultivated as annual and biennial for annual crop, it is cultivated in the spring and summer season, while in the winter season, it is cultivated for both annual and biennial crops. Many types of vegetables are grown in different urban areas of Pakistan like Peshawar, Lahore, and Karachi. However, the areas of the production of radish are Sheikhupura, RaheemYar Khan, Okara and Sahewal.[8] Pakistan is an agricultural country that contains fertile soil having the best canal system for irrigation and suitable environmental condition,[9] which are the basic items for a good cropping system, but with these opportunities, Pakistanis facing many problems in the supply of food and grains. On the vegetable side, in Punjab province, only 2% of the total cropped area is under the cultivation of vegetables,[9] which is less than Taiwan. In Taiwan, 15% of the total cropped area is under the cultivation of different vegetables.[10] The average annual per capita vegetable consumption was 45.6 Kg in Pakistan.[11] The average yield of radish in Pakistan is less as compared their potentials. The production of radish was 15.57 t/ha in 2004-2005, while in 2005-2006 a silent increase of 15.91 t/ha was noted which is still very low as compare to other countries.[12] There are many factors that play an important role in the growth and development of any crop and one of these important factors is the sowing time. The sowing time depends on the genotypes and environmental conditions. The selections of right genotypes at proper sowing time play an important role in increasing the yield of radish. Growers tend to multiply the sowing time for the bitter growth, development and higher yield. The present study was undertaken with the objectives to identify the best performing radish genotypes for Peshawar valley and find out the best sowing time for radish genotypes.

Material and methods

The experiment was conducted on the "Evaluation of radish genotypes with special study on the sowing geometry in the experimental site of Agricultural Research Institute (ARI) Tarnab Peshawar during 2012-2013 cropping season. The experiment was of

two factorial; one was the different sowing dates and the other was various genotypes. The three different genotypes Local Red, Mino and Local White were sown on three sowing dates (19th October, 4th November and 19th November). The experiment was laid out in randomized complete block design (RCBD) having three replications. Before the sowing of the seed, the field was thoroughly ploughed by rotavator and then ridges were formed two feet apart from each other with the help of the ridger machine. The field was irrigated after the formation the ridges for each sowing date and then after one week, the field reached its field capacity condition. Seeds of each variety were sown in their respective plots at the one bottom side of each ridge. The plot size was 15 x 6 square feet. The seed was germinated after four to fifth days of sowing. Each plot was irrigated after fourteen days of sowing each plot. Thinning out practice was also done after twenty days of emergence. Nitrogen was applied at the rate of 50 kg ha1 with 1st irrigation. Urea was used as a source of nitrogen, whereas phosphorus in the form of SSP was applied at a rate of 50 kg ha^{-1}at the time of sowing. The cultural practices like weeding, harrowing, irrigation and thinning out practice was also done during the experiment for all treatments in all replication. The different parameters which were studied in the experiments were number of days to germination, germination percentage, number of leaves per plant, leaf length per plant (cm), root length per plant (cm), root diameter per plant (cm), number of days to edible maturity, fresh weight (cm), total weight plot-1(kg) and root yield (T ha^{-1}).

Results and discussion

Days to germination

Statistical analysis of the data indicated that there was a significant difference in various genotypes. Among genotypes, Mino germinate early taking8.22 days the local white genotype take maximum time (9.44 days) to maturity. The number of days to germination are influenced by moisture contents, depth of the seed, rest period of the seed and temperature. When there are dry conditions, the seed takes more time to germinate, and if the seed is sown deep in the soil, it will germinate in more time.[13]

Germination percentage

Statistical analysis of data revealed that sowing dates, genotypes and their interactions significantly affected the germination percentage. Higher germination (96.89%) was recorded in plots sown on 19th November the lowest (95.67%) germination was recorded in plots sown on 4th November. Among the genotypes Mino germination was 99.22%, the lowest germination percentage (92.00%) was found in the Local White genotype.

Days to edible maturity

Data indicated that there was a significant difference in sowing dates, genotypes and interaction. The genotypes which were sown on 19th November showed the earlier maturity (53 days), the crop sown on 4th November matured in 59.44 days. In comparison among the genotypes, Mino matured earlier 52.78 days the lowest days to maturity was observed in the Local White (59.78 days). The results are in positive relation to[14] who stated that photosynthesis for a long period of time delay the reproductive phase of the plants and based on photosynthesis, plants firstly prepare their food and complete their vegetative growth after the completion of vegetative growth the reproductive phase is started.

Number of leaves plant-1

Statistical analysis of the data indicated that the numbers of leaves were significantly influenced by different sowing dates, genotypes and interactions. Genotypes, sown on 19th October had higher number of leaves plant-1 (17.44). Lesser number of leaves was recorded in genotypes, sown on 19th November (16.11). Among genotypes, Mino produced the maximum number of leaves 19.44 that was followed by Local Red having 16.33 leaves. Lesser leaves were produced by Local White having 14.44 numbers of leaves. These results are also observed by[15] who stated that leaves are the food manufacturing factory that form food for plants (or the crop) which is sown early will produce more leaves.

Leaf length plant-1(cm)

Statistical data revealed that there is significant difference among genotypes, sowing dates but interactions are non-significant. The mean value showed that the highest leaf length was recorded in the crop sown on 19th October (22.611 cm) while the lowest leaf length was noted on 19th November (21.066 cm). Amongst genotypes, Mino showed the highest (23.442 cm)leaf length while the lowest leaf length(20.700 cm) in the Local White. The results are in line with[16] who stated that October sown crop produces the longest leaves because of photosynthetic and environmental conditions.

Root length plant-1 (cm)

Data revealed that the root length is significantly affected by genotypes, but not affected by sowing dates and interaction. Mean value indicated that the root length of the genotypes, sown on19th October showed the extreme length of 24.058cm, lesser root length was recorded in genotypes, sown on 4th November which was 23.844cm. In comparison between different genotypes, Mino showed the longest root length that was noted (24.588cm) the lowest root length (23.003 cm)was observed in the Local White. The results are in line with[17] who stated that root length is directly related to a number of leaves.

Root diameter plant-1 (cm)

Data of the various radish genotypes in relation to root diameter is given in Table 1. Statistical analysis of the data revealed that root diameter of radish was significantly affected by sowing dates and genotypes. The highest root diameter (3.12 cm) was recorded in genotypes sown on 19th October that was followed by genotypes sown on 19th November having 2.81 cm root diameter. The lowest root diameter (2.70 cm) was investigated in genotypes sown on 4th November. Among genotypes, Mino showed the highest root diameter that was 3.53 cm which was followed by Local Red and Local White having 2.71 cm and 2.38 cm root diameter respectively. The interaction among genotypes and sowing dates revealed that the highest root diameter (3.63 cm)was produced by Mino genotype, sown on 19th October that was followed by the same genotype sown on 19th November. The lowest root diameter (2.23 cm) was observed in the Local White genotype sown on 19th November. The results are in the same line with[18] who stated that root diameter is related to initial vegetative growth of the plant, photosynthesis, climatic condition.

Root fresh weight (g)

Data of different radish genotypes with respect to fresh weight of root is shown in Table 2. Statistical analysis of data revealed that there was non-significant difference among sowing dates, but there was a significant difference between genotypes. The interaction between genotypes and sowing dates was also significant. The mean value of the data indicated that genotypes which were sown on 19th October showed the highest root fresh weight 503.95g followed by the genotypes sown on 19th November with 503.72g whereas the lesser value was recorded in genotypes sown on 4th November having 501.13g root fresh weight. Among the genotypes, Mino

showed the highest root fresh weight of 536.62g that was followed by Local Red and Local White with the production of 531.07g and 441.10g respectively. Interaction amongst genotypes and sowing dates revealed Mino genotype showed 537.83g that was followed by same genotype sown on 19th November having root fresh weight of 536.67g. The lowest root fresh weight 433.57g was observed in the Local White genotype sown on 4th November followed by same genotype on 19th October having fresh weight of 447.80 g. The root weight is directly related to the number of leaves, diameter of root and agro-ecological conditions.

Table 1 Days to germination, Germination %, Days to maturity, No. of leaves and Leaf length in different Radish genotypes and sowing dates

Sowing dates	Days to germination	Germination %	Days to maturity	No. of leaves	Leaf length (cm)
19th Oct	8.55	96.55	58.77 a	17.44a	22.61a
4th Nov	9.11	95.66	59.44 a	17.22a	21.21b
19th Nov	8..88	96.88	53.00 b	16.11b	21.07b
LSD	NS	NS	2.29	0.63	1.03
Genotypes					
Local Red	8.88 ab	97.88 b	58.67 a	16.89 b	20.77 b
Mino	8.22 b	99.22 a	52.78 b	19.44 a	23.42 a
Local White	9.44 a	92.00 c	59.78 a	14.44 c	20.70 b
LSD	0.77	1.1	2.29	0.63	1.03
Interaction	NS	*	*	*	NS

Table 2 Root length, Root diameter, Root fresh weight, Plot weight, Yield tonha^{-1} in different Radish genotypes and sowing dates

Sowing Dates	Root length (cm)	Root diameter (cm)	Root fresh wt. (g)	Plot wt. (kg)	Yield t ha-1
19th Oct	24.06	3.12 a	503.95	50.90 a	62.36 a
4th Nov	23.32	2.70 b	501.13	50.02 b	59.79 b
19th Nov	23.84	2.81 b	503.72	49.64 b	60.14 b
LSD	NS	0.2	NS	0.83	2.01
Genotypes					
Local Red	23.63 b	2.71 b	531.07 b	50.87 b	60.94 b
Mino	24.59 a	3.53 a	536.62 a	52.22 a	63.54 a
Local White	23.00 b	2.38 c	441.10 c	47.46 c	57.81c
LSD	0.94	0.2	3.07	0.83	2.01
Interaction	NS	NS	*	*	NS

Root yield plot-1(kg)

The statistical analysis of the data indicated that there was a significant difference among the radish genotypes. Sowing dates and Interaction were also found significant. The mean data among the genotypes indicated that Mino genotype produced highest (52.22 kg plot^{-1}) whereas the lowest (47.46 kg plot-1) production was found in the Local White. Among sowing dates the maximum plot weight (50.90 kg plot-1) was recorded in crop sown on 19th October, the lowest plot weight (49.644 kg plot-1) was noted in crop sown on 19th November. The results are same in comparison to[19] who stated that the plot weight is directly related to the root fresh weight.

Radish yield (T ha^{-1})

Statistical analysis of data revealed that there is significant difference in genotypes and sowing dates whereas the interaction was found non-significant. The mean value among genotypes showed that the maximum root yield (62.36 T ha^{-1}) was calculated in crop sown on 19th October followed by the crop sown on 19th November with the production of 60.14 t ha^{-1} the lowest root yield was produced by the crop sown on 4th November having production of 59.79 t ha-1. Between genotypes Mino produced highest yield of 63.54 t ha^{-1} fallowed by Local Red having 60.94 t ha-1while the lowest root yield was recorded by Local White which was 57.81 t ha-1. The higher root yield is due to Bitter plant survival and favorable agro-ecological conditions and plot weight.[19]

Conclusion

Among genotypes Mino take minimum days to germinate (8.22 days), the maximum germination percentage (99.22), minimum days to maturity (52.778), maximum number of leaves (19.44 leaves), leaf length (23.422 cm), greater root length (24.588 cm), the maximum root diameter (3.53 cm), higher root fresh weight (536.62g), higher weight per plot (52.22 kg) and maximum yield (63.54t ha^{-1}). The results emphasized that the suitable time of sowing for Mino genotype is 19th October for Peshawar.

Acknowledgments

None.

Citation: Khan SM, Ali A, Hussain I, et al. Evaluation of radish genotypes with special study on sowing geometry at agricultural research institute, Tarnab, Peshawar. *Horticult Int J.* 2022;6(1):1–4. DOI: 10.15406/hij.2022.06.00233

References

1. Decateau RD. *Vegetable Crops*. New Jersey. 2000. p. 464.
2. Thompson HC, Kelly WC. *Vegetable crops*. New Delhi: Tata McGraw Hill Publishing Co. Ltd; 1957.
3. Wang LZ, He QW. *Chinese radish*. Beijing: Sci Tech Doc Pub House; 2005;322–370.
4. Choudhury B. *Vegetables*. New Delhi: National Book Trust India; 1990.
5. Baloch AF. *Vegetable Crops*. Horticulture. In: Elena Bashir, et al., editors. National Book foundation, Islamabad: Pakistan; 1994.
6. Government of Punjab. Directorate of Agriculture. Crop Reporting Service. Punjab. Lahore. Pakistan. 2002.
7. Malcolom CV, Smith ST. Growing plants with salty water. *J Agric West Aust*. 1971;12:3–6.
8. Chaudhry MG, Ahmad B. Dynamics of Vegetable Production, Distribution and Consumption in Pakistan. *Pak J Agri Sci*. 2000;43:3–4
9. Government of Punjab. Punjab Development Statistics. *Bureau of Statistics*. Lahore: Pakistan; 2000.
10. Ali M. Dynamics of vegetable production, distribution and consumption in Asia. *AVRDC publication*. 2000;470–498.
11. Government of Pakistan. *Agricultural Statistics of Pakistan. Ministry of Food, Agriculture, Livestock, Food, Agriculture and Livestock Division (Economic Wing)*. Islamabad. 2001.
12. Jilani MS, Barki T, Waseem K. Effect of nitrogen on growth and yield of radish. *J Agric Res*. 2010;48(2).
13. Shrivastava BK, Singh MP, Jain SK. Effect of spacing and nitrogen levels on growth, yield and quality of seed crops of radish. *Seed Res*. 1992;20:85–7.
14. Aziz-Ur-Rehman, Ali N. Effect of plant spacing and sowing time on yield in turnip (Brassica campestris Cv. Purple Top) crop. *Sarhad J Agri*. 2000;16(6):575–579.
15. Verma TS, Dayal S, Chard R. Environmental interaction on radish cultivars. *Veg Sci*. 1989;16(1):14–20.
16. Alam M, Farooque AM, Nuruzzaman M, et al. Effect of sowing time on growth and yield of three radishes (Raphanus sativus L.) varieties. *Bang Res Pub J*. 2010;3(3):998–1006.
17. Park KW, Lee JM, Munchen TU, et al. A study of correlation between pithiness in petilole and root of radish. *Korean Soc Hor Sci*. 1989;7(1):36–37.
18. Deolate AB, Belorkar PV, NG Badvaik, et al. Performance of some radish (Raphanus sativus L.) cultivars under Nagpur conditions. *Ind J Soil and Crops*. 1994;4(2):120–121.
19. Mengistu T, Yamoah C. Effect of sowing dates and planting density on Seed Production of carrot (DaucuscarotaVar.sativa) in Ethiopia. *Afr J Plant Science*. 2010;4(8):270–279.

Citation: Khan SM, Ali A, Hussain I, et al. Evaluation of radish genotypes with special study on sowing geometry at agricultural research institute, Tarnab, Peshawar. *Horticult Int J.* 2022;6(1):1–4. DOI: 10.15406/hij.2022.06.00233