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Performance of different varieties of Broccoli under agro-climatic conditions of Doda.

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Abstract

Broccoli is known as the "crown jewel of nutrition" because it is rich in vitamins and minerals. It contains vitamins A, B1 and B2 and is a good source of potassium, iron and fiber. It contains Sulforaphane which block growth of tumour and reduce the risk of cancer. Broccoli (*Brassica oleracea* var. italica L.) is a cool season cole crop from the family cruciferae. Cultivation of broccoli in our country is confined to a very limited area with a minimum production. A number of superior broccoli varieties have been released by different universities and ICAR Institutes but not much studies are available with respect to suitability of specific variety for a particular region. Keeping in view its nutritive value and less risk to failure due to biotic and abiotic factors, on farm trials were conducted in the district Doda of Union territory of Jammu and Kashmir on evaluation of five varieties viz. Palam Kanchan (T1), Pusa Broccoli KTS-1 (T2), Palam vachitra (T3), Palam Samridhi (T4) and Palam Haritika (T5). Palam Kanchan (T1) performed better than other varieties in respect of plant height (57.30 cm), number of leaves (23.39), plant spread (60.30 cm), head weight (438.68 g), head diameter(17.27 cm) and head yield (263.20 q/ha). However, minimum number of days taken to head initiation and first head harvesting were recorded in Pusa Broccoli KTS-1(T2). Therefore, Palam Kanchan (T1) emerged as superior over all other varieties in respect of growth and yield characters except late in maturity. As far earliness is concerned Pusa broccoli KTS-1 was found to be the best under sub temperate climatic conditions of district Doda

Keywords; Broccoli, growth, yield and variety

Introduction

Broccoli (*Brassica oleracea* var. italica L.) is an important and highly nutritive exotic vegetable. It is also known as winter broccoli or heading broccoli or Italian broccoli in the USA or Italian calabrese in Italy and is a member of cruciferae or brassicaceae family. *Brassica* vegetables contain high concentrations of carotenoids which are believed to be chemo preventive and associated with a decreased risk for various human cancer. It has about 130 times more vitamin A content than cauliflower and 22 times more than cabbage. It contains Sulforaphane, which block growth of tumour and reduce the risk of cancer. Broccoli is a cool season crop. The young plants are susceptible to cold injury and warm weather is disadvantageous, since the bud cluster loose quickly. In India, its cultivation is negligible but now it is gaining popularity among Indian growers from last few years due to its high nutritive value and increased tourist influx. It is mostly cultivated in the hilly areas of Himachal Pradesh and northern plains of India. In India, cauliflower and broccoli is cultivated in an area of 3.69 lakh ha-1 with an annual production of 67.45 tonnes and productivity of 18.27 t ha-1 (FAO, 2015). Broccoli has large flower head composed of differentiated flower bud rather than curd. Due to its wider environmental adaptability and higher nutritive value, there is enough scope for its promotional efforts. Its popularity in the urban areas is increasing day by day in our country. Several public and private sector organizations have developed broccoli varieties of white, green and purple colour with improved quality and production but research on these varieties as per specific location has been very meagre. Lack of awareness among people about its importance and lack of available information about its production technology are the reasons behind its limited cultivation. So, there is a need of research to evaluate the available varieties as per specific locations and generate some recommendations for the benefit of farming

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community. Keeping in view all the above factors, an onfarm trial was conducted in district Doda under the aegis of KVK Doda in the Union territory of Jammu and Kashmir. Elevation of district Doda ranges from 1100 m to 1800 m above the mean sea level.

Materials and Methods

The present experiment was carried out at farmer's fields in the years 2017 and 2018. The experiment was laid out in a Randomised block design with five treatments and three replications in the midhills of district Doda. The experiment was carried out with five varieties viz. Palam Kanchan (T1), Pusa Broccoli KTS-1 (T2), Palam Vachitra (T3), Palam Samridhi (T4) and Palam Haritika (T5). Recommended package of practices was followed to raise the crop. The nursery was sown on 30th of June 2016 and 2017 and seedlings were transplanted on 28th of July. The performance of different varieties of broccoli was studied and data recorded on plant height, number of leaves, plant spread, days taken to head initiation, days taken to first head harvest, head weight, head diameter, yield per plant and yield per hectare. The pooled data of two years was subjected to statistical analysis following analysis of variance technique (Panse and Sukhatme, 1985).

Results and Discussion

Table 1; Performance of different varieties with respect to Plant height, number of leaves and plant spread

Treatments	Plant height (cm)	No. of leaves	Plant spread (cm)
T1- Palam Kanchan	57.30	23.39	60.30
T2- Pusa broccoli KTS-1	52.52	18.55	52.52
T3- Palam Vachitra	55.35	23.27	56.35
T4- Palam Samridhi	53.61	20.32	51.61
T5- Palam Hritika	54.78	22.79	60.78
C.D at 5%	1.67	0.10	1.86
SE(m)	0.50	0.03	0.56
C.V	1.60	0.24	1.72

Five different varieties of broccoli varied significantly as shown in the Table no. 1. The significantly maximum plant height (57.30 cm) was obtained with the treatment T1 (Palam Kanchan) and the minimum plant height (52.52 cm) was recorded with treatment T2 (Pusa broccoli KTS-1). The number of leaves per plant is an important character that might influence the yield. The significantly maximum number of leaves (23.39) per plant was observed with treatment T1 (Palam Kanchan) and the minimum number of leaves at harvest (18.55) was observed with treatment T2 (Pusa broccoli KTS-1). In this investigation variation in plant height and number of leaves per plant under different varieties might be due to differences in their genotypic characteristics and suitability under this climate. Similarly significant difference was found in the plant spread of different varieties as shown in Table no. 1. The significantly maximum plant spread (60.30 cm) was recorded with treatment T1 (Palam Kanchan). The treatment T1 was found statistically at par with treatment T3 (Palam Vichitra) and the minimum plant spread (51.61) was recorded with treatment T4 (Palam Samridhi). The variation in different varieties with respect to plant spread may be due to their inherent genetic make up and suitability under this climate. These findings are in accordance with the findings of Nigulle and Biswas (2014) and Tejaswini *et.al.* (2018)

Table 2; Performance of different varieties with respect to days taken to head initiation, days taken to first head harvest and head weight

Treatments	Days taken to head initiation	Days taken to first Head harvest	Head weight (g)
T1- Palam Kanchan	92.34	110.42	438.68
T2- Pusa broccoli KTS-1	69.46	89.46	326.46
T3- Palam Vachitra	96.33	108.20	412.62
T4- Palam Samridhi	71.34	92.00	320.41

T5-Palam Hritika	76.55	98.70	436.42
C.D at 5%	2.03	2.25	0.86
SE(m)	0.61	0.68	0.26
C.V	1.31	1.18	1.11

The data as shown in Table no. 2 revealed that the significantly minimum number of days taken to head initiation (69.46) were recorded with treatment T2 (Pusa broccoli KTS-1). The maximum number of days taken to head initiation (96.33) were observed in treatment T4 (Palam Vachitra). This similarity and dissimilarity among the varieties in number of days taken for head initiation may be attributed to the variability in their genetic configuration and variability with respect to suitability of climate of that particular region. The performance of different varieties on number of days taken to first head harvest varied significantly (Table 2). The significantly minimum number of days taken to first head harvest (89.46) were recorded with treatment T2 (Pusa broccoli KTS-1). The earliness in edible maturity might be due to genetical difference among the different varieties. The maximum number of days taken for first head harvest (110.42) were observed with treatment T1 (Palam Kanchan). The results are in conformity with those of Singh *et al.,* (2017) and Patel *et al.* (2019) in broccoli. The performance of different varieties with respect to head weight was found to be significant (Table 2). The significantly maximum head weight (438.68 g) was obtained with treatment T1 (Palam Kanchan). The minimum head weight (320.41 g) was obtained with treatment T4 (Palam Samridhi). The difference in number of days to first head harvest and weight of head might be due to inherent genetical differences and the prevailing climatic conditions of the specific region. Similar findings have been recorded by Singh *et al.* (2014) and Thakur *et.al*. (2016)

Table 3; Performance of different varieties with respect to head diameter, Peduncle length and yield q/ha

Treatments	Head diameter (cm)	Peduncle length (cm)	Yield (q/ha)
T1- Palam Kanchan	17.27	4.42	263.20
T2- Pusa broccoli KTS-1	13.25	4.39	195.86
T3- Palam Vachitra	14.43	4.42	247.59
T4- Palam Samridhi	11.14	4.41	192.24
T5- Palam Hritika	15.85	4.43	261.85
C.D at 5%	1.54	0.01	2.03
SE(m)	0.46	0.00	0.61
C.V	5.61	0.20	0.46

The performance of different varieties with respect to head diameter was found to be significant (Table 3). The significantly maximum head diameter (17.27 cm) was obtained with treatment T1 (Palam Kanchan) followed by Palam Hritika (T5). The minimum head diameter (11.14 cm) was obtained with treatment T4 (Palam Samridhi). Similarly the highest peduncle length (4.43) was found in Palam Haritika (T5) and lowest (4.39) in the Pusa Broccoli KTS-1. As far yield per hectare is concerned, Palam Kanchan (T1) recorded the highest yield (263.20) and lowest yield (192.24) was observed in Palam Samridhi. The difference in head diameter, peduncle length and yield (q/ha) might be due to genetic make up of different varieties and adaptability to soil and climatic conditions of this region. These findings are in accordance with the finding of Thakur *et.al.* (2016) and Tejaswini *et al.* (2018) in broccoli.

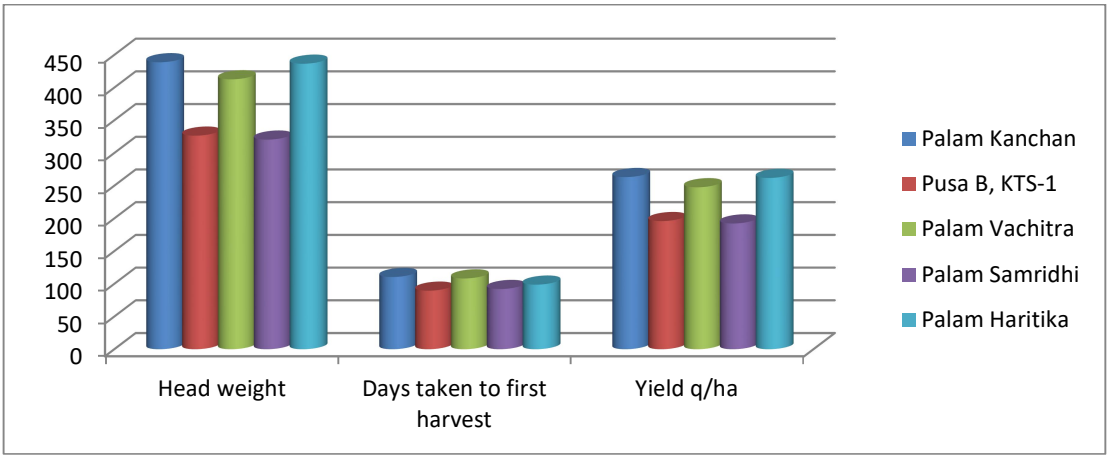

Fig 1; Performance of different varieties of Broccoli under agro-climatic conditions of Doda

Conclusion

The experimental results obtained during the present investigation, Palam Kanchan emerged as superior over all other varieties in respect of growth and yield characters except late in maturity followed by Palam Haritika. As far earliness is concerned Pusa broccoli KTS-1 was found to be the best under sub-temperate climatic conditions of district Doda. However studies in different blocks of district may also be conducted to substantiate the results.

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