

Varietal Evaluation Of Broccoli (*Brassica Oleraceae* Var. *Italica*)

Bhavana Srivastava And Devi Singh

Student. Associate Professor

M.Sc(horticulture) Vegetable science Department Of Horticulture, Naini Agriculture Institute,
Sam Higginbottom University Of Agriculture, Technology And Sciences. Prayagraj -211007(U.P.)

Abstract

The present investigation entitled “**Varietal evaluation of Broccoli “(*Brassica Oleraceae* var. *Italica*)”** was carried out at the Horticulture Research Farm, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, during winter (Rabi) season of 2023-2024, to find out the best treatment for better growth, yield and quality of broccoli for this region. The field trial was laid out in Randomized Block Design 11 different varieties viz., Fiesta, Green Magic, Green giant, Local Broccoli, Lucky F1, Broccoli Hybrid, Green Star F1, Broccoli Captain-488, Green Fairy, Punjab Broccoli and Palam Haritika each replicated three times. The allocation of treatments to the individual plots was done using random numbers in each replication. The results revealed that the genotype “Green Magic” had the best over all performance than the other evaluated varieties of Broccoli as revealed from the data of the growth, yield and quality parameters of broccoli. The result showed that there were significant differences found among all the varieties. Among the varieties V_2 (Green Magic) had taken earliest days to germination (3.07). Variety V_2 (Green Magic) significantly produced the highest plant height (cm), number of leaves per plant and plant spread (cm). The variety V_2 (Green Magic) had taken earliest days to curd initiation (63.74days) and days to harvest (87.80days). Variety V_2 (Green Magic) significantly produced the highest Curd weight (g) (507.50), Curd yield plot (Kg) (4.57), Curd yield per ha (t/ha) (16.92), Total soluble solid °Brix (8.25), Vitamin C content (87.53) and Shelf life (days) content (6.5). The maximum benefit cost ratio (1:5.66) was found in variety V_2 (Green Magic).

Keywords:- Broccoli, growth, yield, quality, varieties.

Date of Submission: 24-05-2024

Date of Acceptance: 04-06-2024

I. Introduction

Broccoli (*Brassica oleracea* var. *italica* L.) belongs to the family Brassicaceae, originated from Western Europe, and is considered a coolseason crop, which has now been distributed to both tropical and subtropical areas. Cauliflower, cabbage, and kale are also members of the same family **Guo et al., (2001)**. Broccoli (*Brassica oleracea*) belongs to the genus Brassica, and family Brassicaceae which includes a wide range of crop plants derived from the Mediterranean Sea cabbage and modified over the years by selection and breeding (**Decoteau, 2000**). Broccoli is one of the most important and popular vegetable crops in many countries of the world because of its good organoleptic properties and high nutritive value (**Dhillon et al., 2005**). Broccoli is a rich source of folic acid, vitamin-C, vitamin-A and a compound, Sulphoraphane which is associated with reducing the risk of cancer (**Guo et al., 2001**). In India, the cultivation of sprouting broccoli is gaining popularity among the growers for the last few years obviously due to increasing demand in cosmopolitan cities and awareness of its high nutritive values. Sprouting broccoli is occupying an important place as cool season vegetable. In Himachal Pradesh, it is an important vegetable crop and farmers are getting lucrative returns by selling their produce in nearby markets. In recent years its cultivation has gained momentum in India. It is grown in an area of 3,776 acre with annual production of 26,612(000 lbs) and productivity of 7.04000 lbs per acre **Singh and Deepanshu (2023)**.

II. Materials And Methods

The present investigation entitled “**Varietal evaluation of Broccoli “(*Brassica Oleraceae* var. *Italica*)”** was carried out at the Horticulture Research Farm, Department of Horticulture. Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during the winter (Rabi) season of 2023-2024. The area of Prayagraj district comes under subtropical belt in the South east of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 32°C – 34°C and seldom falls as low as 4°C – 5°C. The relative humidity ranged between 20 to 94 per cent. The average

rainfalls in this area is around 1013.4 mm annually. The experiment was laid in Randomized Block Design with 11 varieties, each replicated three times, thus making a total of 33 plots. The unit plot size was 2 x 2 m². The plants were spaced at 45cm between the rows and 60 cm between the plants. There were total of 10 plants in each plot. Observations were recorded on three randomly selected plants of each treatment to assess the effect of treatments on growth, yield and quality of the broccoli in the following characters viz., days of germination, plant height (cm), no. of leaves per plant, plant spread (cm), days of curd initiation, days to harvest, curd diameter (cm), curd weight (g), curd yield plot (kg), curd yield per ha (t/ha), total soluble solid °brix, vitamin c content and shelf life. The data recorded during the course of investigation on growth, yield and quality components were subjected to two way classification analysis of variance (ANOVA) as outlined by **Panse and Sukhatme (1985)**.

III. Results And Discussion

The result of the investigation based on the various observations viz., Plant growth, Yield and quality of different varieties of Broccoli (*Brassica oleracea* var. *italica*) are presented in table 1 and to determine best performing variety of broccoli in terms of growth, yield, and quality. The minimum days to germination was recorded (3.07 days) in V₂ (Green Magic). Whereas the maximum days to germination was found (5.54) in V₁₁ (Palam Haritika). However, Lucky F1, Fiesta, Broccoli Hybrid, Green Star F1, Broccoli Captain-488, Green Fairy and Punjab Broccoli are found statistically at par to V₂ Green Magic. The variation on days taken for germination may be due to genetic makeup of individual variety. These results are in accordance with the findings of in cluster bean, **Thakor (2008)** in vegetable pea and **Gogoi et al., (2016)** in broccoli. These findings are in accordance with the findings reported by **Changkiri et al., (2022)**. The maximum plant height (cm) have been recorded with the treatment V₂ (Green Magic) was 64.31. Followed by Green giant, Lucky F1, Punjab broccoli, Green Fairy and Broccoli Captain-488. Where as the minimum recorded plant height was (51.47) with the treatment V₄ (Local). The highest plant height observed in some varieties might be due to its inherent genotypic characteristics or because of variations in agro climatic conditions. These findings are in close conformity with that of **Hafiz et al., (2015)** in broccoli. These findings are in accordance with the findings reported by **Changkiri et al., (2022)**. The maximum number of leaves per plant have been recorded with the treatment V₂ (Green Magic) was 35.87. Followed by Broccoli Hybrid, Broccoli Captain-488, Palam haritika, Green giant and Fiesta. Where as the minimum recorded number of leaves per plant was (19.43) with the treatment V₁₀ (Punjab broccoli). In this investigation variation in number of leaves per plant under different varieties, might be due to differences in their genetic inherent capacity, and suitability under this climate. The lower number of leaves in some cultivars was probably due to slow rate in leaf initiation. These findings are in close accordance with the findings of **El-Magdetal. (2006), ElMagdetal., (2013), Thapa and Rai (2013)** in broccoli. These findings are in accordance with the findings reported by **Changkiri et al., (2022)**. The maximum plant spread (cm) have been recorded with the treatment V₂ (Green Magic) was 63.03. Followed by Green Star F1, Broccoli Captain-488 and Green Fairy. Where as the minimum recorded plant spread (cm) was (43.20) with the treatment V₄ (Local). The variation in different varieties with respect to plant spread [E-W and N-S] may be due to their inherent genetic makeup, number of days taken for head harvesting and suitability under this climate. These findings are in accordance with the findings of **El Bassiony et al.,(2014), Singh et al.,(2014), Hafiz et al.,(2015) and Thakur et al., (2016)** in broccoli. These findings are in accordance with the findings reported by **Changkiri et al., (2022)**. The minimum days to curd initiation was recorded (63.74days) in V₂ (Green Magic). Followed by Broccoli Captain-488, Palam Haritika and Green giant. Whereas the maximum days to curd initiation was found (74.75) in V₆ (Broccoli Hybrid). The earliness in edible maturity might be due to genetically difference among the different varieties. These results are collaborating with the findings of **Thapa and Rai (2013) Gogoi et al.,(2016), and Thakur et al., (2016)** in broccoli. These findings are in accordance with the findings reported by **Changkiri et al., (2022)**. The minimum days to harvest was recorded (87.80days) in V₂ (Green Magic). Followed by Broccoli Captain-488, Fiesta, Green Star F1, Green giant and Palam Haritika. Whereas the maximum days to harvest was found (97.54) in V₁₀ (Punjab Broccoli). The maximum curd diameter (cm) was recorded (16.31) in V₂ (Green Magic). Whereas the minimum curd diameter (cm) was found (13.42) in V₆ (Broccoli Hybrid). However, Broccoli Captain-488 are found statistically at par to V₂ (Green Magic). The maximum Curd weight (g) was recorded (507.50) in V₂ (Green Magic). Followed by Fiesta, Lucky F1, Broccoli Captain-488, Punjab Broccoli and Palam Haritika. Whereas the minimum Curd weight (g) was found (304.46) in V₄ (Local Broccoli). The maximum Curd yield plot (Kg) was recorded (4.57) in V₂ (Green Magic). Followed by Broccoli Captain-488, Lucky F1, Fiesta, Punjab Broccoli and Palam Haritika. Whereas the minimum Curd yield plot (Kg) was found (2.74) in V₄ (Local Broccoli). The maximum Curd yield per ha (t/ha) was recorded (16.92) in V₂ (Green Magic). Followed by Fiesta, Lucky F1, Broccoli Captain-488, Punjab Broccoli, Palam Haritika and Green Star F1. Whereas the minimum Curd yield per ha (t/ha) was found (10.15) in V₄ (Local Broccoli). These significant differences with respect to fresh weight of head, head yield per plot and head yield

per hectare among different varieties may be due to their own-genetic makeup and the suitability of varieties to the weather conditions of this zone. These findings are in conformity with the results, **El-Bassiony et al., (2014)** in cabbage, **Thapa and Rai (2012)** of broccoli, **Thapa et al., (2013)**, broccoli, **El-Magd (2013)**, **Nguille et al., (2014)**, **Singh et al., (2014)** and **Thakur et al., (2016)** in Broccoli. These findings are in accordance with the findings reported by **Changkiri et al., (2022)**. The maximum Total soluble solid °Brix was recorded (8.25) in V₂ (Green Magic). Whereas the minimum Total soluble solid °Brix was found (6.48) in V₄ (Local Broccoli). However, Lucky F1, Fiesta, Broccoli Captain-488, Punjab Broccoli and Palam Haritika are found statistically at par to V₂ (Green Magic). These findings are in accordance with the findings reported by **Changkiri et al., (2022)**. The maximum Vitamin C content was recorded (87.53) in V₂ (Green Magic). Followed by Green Star F1, Palam Haritika, Punjab Broccoli, Lucky F1, Fiesta and Green giant. Whereas the minimum Vitamin C content was found (67.53) in V₄ (Local Broccoli). These findings are in accordance with the findings reported by **Changkiri et al., (2022)**. The maximum Shelf life (days) content was recorded (6.5) in V₂ (Green Magic). Whereas the minimum Shelf life (days) was found (3.6) in V₇ (Green Star F1). However, Punjab Broccoli, Broccoli Captain-488 and Lucky F1 are found statistically at par to V₂ (Green Magic). These findings are in accordance with the findings reported by **Changkiri et al., (2022)**.

IV. Conclusion

In view of experimental results obtained during the present Investigation, variety V₂ (Green Magic) emerged as superior over all other varieties, in relation to growth, yield, quality and cost benefit ratio 1: 5.66 of Broccoli under the agro-climatic condition of Prayagraj. However, since this is based on one – season experiment, further trails may be needed to substantiate the results.

References

- [1] Singh, R., & Deepanshu. (2023). Effect Of Organic And Inorganic Fertilizers On Growth, Yield And Quality Of Broccoli (Brassica Oleracea Var. Italica). *International Journal Of Environment And Climate Change*, 13(9), 2965–2972.
- [2] Changkiri, I., Singh, D., & Wesley, C. J. (2022). Varietal Evaluation Of Broccoli (Brassica Oleraceae Var. Italica). *International Journal Of Plant & Soil Science*, 34(22), 96–101.
- [3] El-Bassiony Am, Fawzy Zf, El-Nemr Ma, Yunsheng L. Improvement Of Growth, Yield And Quality Of Two Varieties Of Khol-Rabi Plants As Affected By Application Of Some Biostimulants. *Middle East J Agric Res*. 2014;3(3):491-8.
- [4] El-Magd Mma, El-Bassiony Am, Fawzy Zf. Effect Of Organic Manure With Or Without Chemical Fertilizers On Growth, Yield And Quality Of Some Varieties Of Broccoli Plants. *J Appl Sci Res*. 2006;2(10):791-8.
- [5] El-Magd Mm. Evaluation Of Some Broccoli Cultivars Ongrowth, Head Yield And Quality Under Different Planting Dates. *J Appl Sci Res*. 2013;9(11):5730-6.
- [6] Gogoi S, Millu R, Das P, Bora N, Das Bk. Effect Of Sowing Dates And Spacing On Broccoli (Brassica Oleraceavar. Italica) Seed Production. *Indian J Agric Res*. 2016;50(4):350-3.
- [7] Hafiz Ma, Biswas A, Zakaria M, Hassan J, Ivy Na. Effect Of Planting Dates On The Yield Of Broccoli Genotypes. *Bangladesh J Agric Res*. 2015;40(3):465-78.
- [8] Nguille R, Biswas Pk. Performance Of Different Varieties Of Broccoli Under Rainfed Mid-Hill Conditions Of Mokokchung District Of Nagaland. *Int J Farm Sci*. 2014;4(2):76-9.
- [9] Singh, R.; Kumar, S. And Kumar, S. (2014). Performance And Preference Of Broccoli Varieties Grown Under Low Hill Conditions Of Himachal Pradesh. *Indian Res. J. Ext. Edu.*, 14(1): 112-114.
- [10] Thakor Dp. (2008) Influences Of Different Cultivars And Plant Spacing On Growth, Yield And Quality Of Garden Pea. Unpublished M.Sc. (Agri.) Thesis, Submitted To Sardarkrushinagar Dantiwada Agricultural University. Sardarkrushinagar; 2008.
- [11] Thakur S, Thakur R, Mehtha Dk. Evaluation Of Different Genotypes Of Broccoli In Dry Temperate Conditions Of Kinnur District Of Himachal Pradesh In India. *International Journal Of Science. Environ Technol*. 2016;5(3):1673-9.
- [12] Thapa U, Rai R, Lyngdoh Ya, Chattopadhyay Sb, Prasad Ph. Assessment Of Producing Quality Sprouting Broccoli (Brassica Oleraceavar. Italica) Under Cover And Open Condition. 2013;8(15):1315-8.
- [13] Thapa, U. And Rai, R. (2012). Evaluation Of Sprouting Broccoli (Brassica Oleracea Var. Italica) Genotypes For Growth, Yield And Quality. *Int. J. Agric. Sci.*, 4(7): 284-286.
- [14] Thapa, U.; Rai, R.; Lyngdoh, Y.A.; Chattopadhyay, S.B. And Prasad, P.H. (2013). Assessment Of Producing Quality Sprouting Broccoli (Brassica Oleracea Var. Italica) Under Cover And Open Condition. *Afr. J. Agric. Res.*, 8(15): 1315-1318.
- [15] Dhillon, B. S., Tyagi, R. K., Saxena, S. And Randhaw, G. J. (2005). *Plant Genetic Resources: Horticultural Crops*. Narosa, New Delhi. Isbn-10(1): 332.
- [16] Guo, J. H., Lee, S., Chiang, F. And Chang, C. (2001). Antioxidant Properties Of The Extracts From Different Parts Of Broccoli In Taiwan. *Journal Of Food And Drug Analysis*. 9: 96-101.
- [17] Guo J. T., Lee H.-L., Chiang S.-H., Chang F.-I. Chang C.-Y. (2001). Antionxidant Properties Of The Extracts From Different Parts Of Broccoli In Taiwan. *J. Food Drug Analysis*. 9: 96-101.

Table 1: Effect of different varieties of Broccoli (*Brassica Oleraceae* var. *Italica*) on growth, yield and quality.

Notation	Varieties	Days of germination	Plant height (cm)	No. of leaves per plant	Plant spread (cm)	Days of curd initiation	Days to harvest	Curd diameter (cm)	Curd weight (g)	Curd yield plot (Kg)	Curd yield per ha (t/ha)	Total soluble solid °Brix	Vitamin C content	Shelf life
V ₁	Fiesta	3.52	54.62	29.02	47.21	71.87	93.80	14.25	420.71	3.79	14.02	7.47	74.80	4
V ₂	Green Magic	3.07	64.31	35.87	63.03	63.74	87.80	16.31	507.50	4.57	16.92	8.25	87.53	6.5
V ₃	Green giant	4.43	59.42	29.49	46.92	70.27	92.36	15.25	357.51	3.22	11.92	7.10	76.47	6.4
V ₄	Local Broccoli	4.13	51.47	28.08	43.20	73.34	95.97	13.44	304.46	2.74	10.15	6.48	67.53	6.3
V ₅	Lucky F1	3.31	56.55	27.57	48.20	71.90	94.66	15.33	440.83	3.97	14.69	7.44	78.56	5
V ₆	Broccoli Hybrid	3.85	52.64	29.49	45.42	74.75	96.67	13.42	335.08	3.02	11.17	7.06	71.31	7
V ₇	Green Star F1	3.73	54.44	25.32	52.23	71.48	92.05	13.72	392.64	3.53	13.09	7.32	80.62	3.6
V ₈	Broccoli Captain-488	3.38	56.85	29.27	53.05	70.10	91.13	16.23	427.37	3.85	14.25	7.14	70.24	5.2
V ₉	Green Fairy	3.78	58.21	27.16	50.77	72.05	94.47	14.35	366.17	3.30	12.21	6.53	67.76	6.3
V ₁₀	Punjab Broccoli	3.50	61.32	19.43	44.34	73.09	97.54	15.34	413.54	3.72	13.78	7.53	78.24	5.17
V ₁₁	Palam Haritika	5.54	54.57	29.37	47.21	68.44	92.07	15.11	407.40	3.67	13.58	7.23	77.55	4.54
	F-Test	S	S	S	S	S	S	S	S	S	S	S	S	S
	S.Ed. (+)	0.058	0.380	2.765	0.296	0.595	0.509	0.166	0.262	0.020	0.020	0.044	0.128	0.586
	C.D. at 5%	0.122	0.793	0.636	0.618	1.241	1.061	0.347	4.718	0.042	0.042	0.091	0.207	1.222
	CV	1.589	0.820	1.327	0.737	1.027	0.668	1.378	0.697	0.0697	0.697	0.737	0.266	12.729