International Journal of Biology Sciences

ISSN Print: 2664-9926
ISSN Online: 2664-9934
NAAS Rating (2025): 4.82
IJBS 2025; 7(10): 86-89
www.biologyjournal.net
Received: xx-01-2025
Accepted: xx-02-2025

Roopali
Ph.D. Research Scholar, Department of Horticulture, College of Agriculture, Assam Agricultural University, Jorhat, Assam, India

Deepa B Phookan
Professor, Department of Horticulture, College of Agriculture, Assam Agricultural University, Jorhat, Assam, India

Corresponding Author:
Roopali
Ph.D. Research Scholar, Department of Horticulture, College of Agriculture, Assam Agricultural University, Jorhat, Assam, India

Assessment of quality attributes parameter in different sowing media of Broccoli (*Brassica oleracea* var. *italica* L.) under Jorhat (Assam)

Roopali and Deepa B Phookan

DOI: https://www.doi.org/10.33545/26649926.2025.v7.i10b.500

Abstract
An experiment was conducted at Horticulture Experimental Farm, Department of Horticulture, College of Agriculture, Assam Agricultural University, Jorhat, Assam during the year 2020-21 and 2021-22 for knowing the potentiality of different seedling growing media viz., Cocopeat: Perlite: Vermiculite (3:1:1), Cocopeat: Perlite: Vermiculite (2:1:1), Cocopeat: Vermicompost (1:1),Vermicompost: Perlite: Vermiculite (3:1:1), Vermicompost: Perlite: Vermiculite (2:1:1), Cocopeat: Vermicompost: Perlite: Vermiculite (1:1:1:1) and Conventional nursery. These seven treatments were analyzed in RBD with 3 replications. The higher seedling emergence percentage (93.15), seedling height (17.87 cm), leaf area (9.09 cm^2), root length (6.04 cm), shoot length (10.24 cm), seedling growth index (1516.35), chlorophyll content (0.32 mg g^{-1}fw), minimum days to two-true leaf stage (7.03 days), minimum days to transplanting (28.55 days) and the lowest diseases incidence (3.44 %) under the greenhouse condition was recorded in the treatment T_3 [(Cocopeat: Vermicompost (1:1)].

Keywords: Broccoli, seedling sowing media, seedlings parameters

Introduction
Broccoli is a high-quality vegetable for fresh use and is one of the most popular frozen vegetables. It is also used as a vegetable in many other countries, such as Spain, Mexico, Italy, France and the United States. Broccoli production in India 674 tones from an area of 369 hectare (Anonymous, 2018) [9]. India is the second largest producer of broccoli after China. Nutritionally, it is rich in vitamin-A (2500 I.U.), vitamin C (113 mg), protein (3.6 g), carbohydrates (5.9 g) and minerals like calcium (103 mg), iron (1.1 mg), phosphorous (78 mg), potassium (382 mg) and sodium (15 mg) per 100 g of an edible portion (Rana, 2008) [5]. The composition of the medium influences the quality of the seedlings (Wilson *et al*., 2001) [8]. For a plant to strengthen its new root system there must be a ready supply of moisture and oxygen for growth of all living cells. Coarse-textured media often meet these requirements. Most commercially prepared mixes are termed “artificial”, which means they contain no soil. Artificial growing media are materials other than soils in which plants are grown. These can include organic materials such as compost, peat, cocopeat, vermicompost, and tree bark, or inorganic materials such as clay, vermiculite, minerals, rock wool, etc. (Vaughn *et al*., 2011) [7].

Several growing media such as cocopeat, perlite, vermiculite, rock wool, sawdust, and compost were found to be individually or in combination suitable for high-value crops such as broccoli, tomato, capsicum, and cucumber. The soil is generally used as a basic medium because it is easily available and cheap for supplementing the soil, which is aimed to make media more porous (vermiculite, perlite, cocopeat etc.) while the organic matter (vermicompost) is added so as to supplement adequate nutrients for the seedling. The Growing media have three main functions: 1) provide aeration and water, 2) allow for maximum root growth and 3) physically support the plant. The growing medium should have adequate pore space between the particles (Bilderback *et al*., 2005) [2]. Appropriate particle size selection or combination is critical for a light and fluffy (well-aerated) medium that promotes fast seed germination, strong root growth and adequate water drainage.

Material and methods

The present investigation was conducted in the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during 2019-2020 and 2020-21. The methodology followed and the materials used in the present study are detailed below.

Treatment detail (Nursery Media composition)

Treatment	Components	Ratio
T_1	Cocopeat: Perlite: Vermiculite	(3:1:1)
T_2	Cocopeat: Perlite: Vermiculite	(2:1:1)
T_3	Cocopeat: Vermicompost	(1:1)
T_4	Vermicompost: Perlite: Vermiculite	(3:1:1)
T_5	Vermicompost: Perlite: Vermiculite	(2:1:1)
T_6	Cocopeat: Vermicompost: Perlite: Vermiculite	(1:1:1:1)
T_7	Conventional nursery	-

All the observed data were statistically analyzed by the method of analysis of variance describe by Panse and Sukhatme (1978) [4]. The data obtained from different treatments during field experimentation were subjected to the analysis of variance by Randomized Block Design. The size of plot was 3.60 m x 3.15 m and the total experimental area was 330 sq. m. The space between replications was 60 cm and between plots was 50 cm. The plant population in each plot was 42.

Fig 1: Overview of experimental plot

Results and Discussion

Conclusion

The findings of this investigation showed that broccoli seedling raised under conventional greenhouse with the sowing media T_3 [(Cocopeat: Vermicompost (1:1) and sowing media T_6 [Cocopeat: Vermicompost: Perlite: Vermiculite (1:1:1:1)] is more effective than raising seedlings in the traditional open field i.e.T_7 (Conventional nursery).

These media have a significant ameliorative potential to produce broccoli seedlings that are robust and healthy, which ultimately leads to improved performance in the main field after transplanting in terms of yield and yield attributing characters

Acknowledgement

We gratefully acknowledge the College of Agriculture, Assam Agricultural University, Jorhat, Assam, India for the research and financial and other facilities and to the Horticulture Research Station, Ktrain, Himachal Pradesh and Daffodils Nursery, Guwahati, Assam providing me seeds and seed sowing material to carry out this experiment successfully.

4.4 Quality Parameters of Broccoli

4.4.1 Crude protein content in the head (%)

Table 4.4.1 reveals that the T_6 [Cocopeat: Vermicompost: Perlite: Vermiculite (1:1:1:1)] was given the highest crude protein content of 2.46 % in the broccoli head, followed by2.11% in treatments T_3 [Cocopeat: vermicompost (1:1)] and 1.81 % in T_4 [(Vermicompost: Perlite: Vermiculite (3:1:1)]. While the lowest crude protein content 0.88% was recorded in T_7 (Conventional nursery).

The greater availability of nitrogen in the organic manure promotes protein synthesis with the help of enzymes and growth regulators received from growing media, this may also contribute to the increased uptake of nutrients by broccoli roots. These findings of the present investigation were supported by the findings of Sable and Bhamare (2007) [6].

Table 4.4.1: Crude protein content in the head (%)

Treatment	2019-20	2020-21	Pooled
T_I	1.76	0.91	1.34
T_2	1.48	0.86	1.17
T_3	2.26	1.96	2.11
T_4	2.17	1.44	1.81
T_5	2.03	1.05	1.54
T_6	2.83	2.08	2.46
T_7	1.02	0.73	0.88
S. Ed(±)	0.13	0.10	0.11
CD (0.05)	0.28	0.22	0.22

4.4.2. Vitamin-C (mg/100g) content in head

Data presented in Table 4.3.2 showed the significant effect of sowing media treatments for the Vitamin-C content of

broccoli head under green house and conventional nursery. The highest 80.35 mg/100 g vitamin-c content in broccoli head was recorded in T_6 [(Cocopeat: Vermicompost: Perlite: Vermiculite (1:1:1:1)], while the lowest 65.02 mg/100g vitamin-c content was recorded in the treatment T_7 (Conventional nursery).

According to Bahadur *et al.*, (2003) [1] the higher level of organic sowing media and vermicompost combinations increased the ascorbic acid content, this may be attributed to the increased availability of nutrients which may result in the synthesis and accumulation of more photosynthates, which may have mobilised the ascorbic acids biosynthesis. In addition to this, it was reported that organic growing media (cocopeat, perlite, vermiculite, and vermicompost) improved the levels of vitamin -C in broccoli head.

Table 4.3.2: Vitamin -C content (mg/100g) content in head

Treatment	Vitamin -C content (mg/100g)		
	2019-20	2020-21	Pooled
T_1: Cocopeat:Perlite: Vermiculite (3:1:1)	71.38	70.94	71.16
T_2: Cocopeat:Perlite: Vermiculite (2:1:1)	68.85	64.76	66.81
T_3: Cocopeat:Vermicompost (1:1)	77.15	75.27	76.21
T_4: Vermicompost:Perlite: Vermiculite (3:1:1)	76.37	74.29	75.33
T_5: Vermicompost:Perlite: Vermiculite (2:1:1)	74.81	73.83	74.32
T_6: Cocopeat:Vermicompost:Perlite: Vermiculite (1:1:1:1)	79.22	81.48	80.35
T_7: Conventional nursery	66.89	63.14	65.02
S. Ed (±)	1.77	1.70	1.29
CD (0.05)	3.85	3.71	2.64

4.3.3. Dry matter content in head (%)

Table 4.3.3 reveals the dry matter content of curd was significantly influenced by the different levels of sowing media combinations. T_6 [(Cocopeat: Vermicompost: Perlite: Vermiculite (1:1:1:1)] produced the highest dry matter content of broccoli head (8.95%), followed by 7.77% in T_3 [Cocopeat: vermicompost (1:1)].While, T_7 (Conventional nursery) recorded the significantly lowest 5.35% dry matter content. However, the treatment T_2 and T_7 were at par.

High dry matter content might be due to the high-water holding capacity to hold water in the plant, more water accumulation in the plant leads to more photosynthesis and accumulates high photosynthates, which is positively correlated with the dry matter.

Table 4.3.3: Dry matter content of head (%)

Treatment	Dry matter content of head (%)		
	2019-20	2020-21	Pooled
T_1: Cocopeat: Perlite: Vermiculite (3:1:1)	6.61	6.69	6.65
T_2: Cocopeat: Perlite:Vermiculite (2:1:1)	5.98	5.87	5.93
T_3: Cocopeat: Vermicompost (1:1)	7.36	8.62	7.99
T_4: Vermicompost: Perlite: Vermiculite (3:1:1)	7.22	8.05	7.64
T_5: Vermicompost: Perlite: Vermiculite (2:1:1)	6.76	7.52	7.14
T_6: Cocopeat: Vermicompost: Perlite: Vermiculite (1:1:1:1)	8.85	9.06	8.95
T_7: Conventional nursery	5.01	5.69	5.35
S. Ed (±)	0.61	0.53	0.40
CD (0.05)	1.33	1.17	0.80

4.4.4. Fiber content in the head (mg/ 100g)

Data presented in Table 4.4.4 revealed the significant influence on fiber content in the head by the different sowing media during both years of studies. The greenhouse grown seedling with different sowing media showed better results than the seedlings grown in conventional nursery.

On the basis of the pooled mead, the T_6 [(Cocopeat: Vermicompost: Perlite: Vermiculite (1:1:1:1)]had maximum fiber content (24.34mg/100g) and found superior overall other treatments, followed by21.70mg/100gwith T_3 [Cocopeat: Vermicompost (1:1)] and 21.09mg/100g with T_4 [Vermicompost: Perlite: vermiculite (3:1:1)], while the lowest (16.29mg/100g) fiber content was observed in T_7.

The highest fiber content is might be due to the better nutritional environment in the root zone of the plant, early vigorous growth which contributes more protein synthesis in the head and good succulent growth of the plant which ultimately contribute higher fiber content in the head of broccoli.

Table 4.4.4: Fiber content in the head (mg/ 100g)

Treatment	2019-20	2020 -21	Pooled
T_I	18.89	17.14	18.02
T_2	19.35	15.70	17.53
T_3	22.21	21.18	21.70
T_4	21.64	20.53	21.09
T_5	19.62	18.88	19.25
T_6	24.92	23.77	24.34
T_7	17.14	15.44	16.29
S. Ed (±)	1.64	1.46	1.03
CD (0.05)	3.58	3.18	2.10

4.4.5. Ash content in the broccoli head (%)

The perusal of data from the Table 4.4.5 revealed ash content in broccoli heads was significantly influenced by the sowing media treatments. The highest (10.14 %) ash content in the head was recorded under T_6 [Cocopeat: Vermicompost: Perlite: Vermiculite (1:1:1:1)], followed by 9.79% in T_3 [Cocopeat: vermicompost (1:1)] and the lowest 7.33% ash content in the head was recorded in T_7 t

(Conventional nursery), T_7 was inferior among all the sowing media treatments. However, there was no significant difference was observed among T_1, T_2 and T_7.

Ash content and fiber content are positively correlated with each other. After fiber was extracted the weight of the dry material (fiber) of the broccoli was measured using a balance machine to determine the ash content. Ash content is dependent on the fiber content of the broccoli. Dhiman k. (2019) [3] reported that ash content in broccoli heads was highest (9.10%) in organic sowing media (cocopeat + perlite + vermiculite + vermicompost).

Table 4.4.5: Ash content in the head (%)

Treatment	2019-20	2020-21	Pooled
T_I	7.30	7.96	7.63
T_2	8.07	7.07	7.57
T_3	9.59	9.98	9.79
T_4	8.93	9.02	8.98
T_5	8.04	8.62	8.33
T_6	9.92	10.36	10.14
T_7	7.72	6.95	7.33
S. Ed (±)	0.22	0.38	0.29
CD (0.05)	0.49	0.83	0.59

Reference

1. Bahadur A, Singh J, Upadhyay AK, Singh KP. Effect of organic manures and biofertilizers on growth, yield and quality attributes of broccoli. Veg Sci. 2003;30(2):192-194.
2. Bilderback TE, Warren SL, Owen JS Jr, Albano JP. Healthy substrates need physicals too! Hort Tec. 2005;15:747-757.
3. Dhiman AK, Attri S, Hamid. Nutritional quality of organic and conventionally grown broccoli (*Brassica oleracea* var. *italica* L.). Pharma Innov J. 2019;8(9):160-162.
4. Panse VS, Sukhatme PV. Statistical methods for agricultural workers. New Delhi: Publication and Information Division, ICAR; 1978. p.301.
5. Rana MK. Olericulture in India. New Delhi: Kalyani Publishers; 2008. p.301.
6. Sable PB, Bhamare VK. Effect of biofertilizers (*Azotobacter* and *Azospirillum*) alone and in combination on reduced levels of nitrogen and quality of cauliflower cv. Snowball-16. Asian J Hort. 2007;2:215-217.
7. Vaughn SF, Deppe NA, Palmquist DE, Berhow MA. Extracted sweet corn tassels as a renewable alternative to peat in greenhouse substrates. Ind Crops Prod. 2011;33:514-517.
8. Wilson SB, Stoffella PJ, Graetz DA. Use of compost as a media amendment for containerized production of two subtropical perennials. J Environ Hort. 2001;19(1):37-42.
9. Ivanov S, Burnaev E. Anonymous walk embeddings. InInternational conference on machine learning 2018 Jul 3 (pp. 2186-2195). PMLR.