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Effect of different growing media on capsicum growth, yield and quality under polyhouse condition

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Abstract
The present experiment was carried out during October, 2022 to March, 2023 in polyhouse, Research field, Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in randomized block design (RBD), with seven treatments replicated thrice with growing media (FYM + cocopeat + vermicompost + perlite +sand) on variety (Indra). On capsicum the treatments were used to find out the most suitable growing media for quality and growth of the capsicum. The results of the experiment have revealed that application of treatment of T6 (cocopeat +vermicompost (1:1) has significantly increased the growth and yield parameters like plant height, number of branches, and yield parameters like days to first harvest, number of fruits per plant and maximum fruit yield. This study used to evaluate the effect of selected treatments on yield of capsicum. And the capsicum plants responded significantly to the growing media supply.

Keywords: Polyhouse, capsicum, growing media

Introduction
Capsicum (*Capsicum annum*.), also called as pepper, is a main vegetable and spice crop originated in the American tropics and today cultivated all over the world for fresh, dried, and processing products. Pepper belongs to the genus Capsicum which is a member of the Solanaceae family. Around the genus Capsicum there is an increasing interest and fascination due to the considerable variation for several traits, which makes this crop extremely versatile and suitable for innumerable uses as food and non-food products. The genus Capsicum includes over 30 species, five of which (*C. annuum*, *C. frutescens*, *C. Chinense*, *C. baccatum*, and *C. pubescens*) are domesticated and mainly grown for consumption. A large number of accessions of domesticated and wild species are stored in the world seed banks, representing a valuable resource for breeding in order to transfer traits related to resistances to various abiotic and biotic stresses as well for quality improvement. The recent advances in terms of genetic and genomic knowledge will help to unlock the potentiality of these resources. The fruit (technically berries in the strict botanical sense) of Capsicum plants have a variety of names depending on place and type. The more piquant varieties are commonly called chilly peppers, or simply chillies.
The pungency of fruit is mainly due to presence of a compound called capsaicin (0.1-1.5%). Capsicum fruits can be eaten raw or cooked. Those used in cooking are generally varieties of the *C. annuum* and *C. frutescens* species, though a few others are used, as well. Growing media plays an important role in successful cultivation of any crop. It should have a property of good water holding capacity and also able to drain excess water to come to field capacity which creates congenial root environment. For proper plant growth, organic fertilizers such as farmyard manure and vermicompost etc. provide consistently all essential nutrients, be it macro or micro, in an adequate quantity resulting in healthy growth of the plants. The more incorporation of organic matters in the media are expected to improve the physical structure of the soil, enhance the population of micro-organisms and increase the potential availability of growth influencing substances.

Materials and Methods
The experiment was conducted during the year 2022-23 in Departmental research field of Department of Horticulture and sciences, Naini Agriculture Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj. The area is situated on the south of Prayagraj on the right bank of Yamuna at Rewa road at a distance of about 6km from Prayagraj city. It is situated at 250.8 ◦N latitude and 810.50◦E longitudes on elevation of 98

meters from the sea level. This region has su tropical climate with extreme of summer and winter the temperature falls down as low as 32F in December to January and very hot summer with temperature reaching up to 115 F in the months of May and June. During winter, frosts and during summer, hot scorching winds are also not uncommon. The average rainfall is around 1013.4 (cm) with maximum concentration during July to September with occasional showers in winters. The experiment was laid by the randomized block design (RBD) with 7 treatments and 3 replications. T_1 Control (Garden soil + FYM) T_2 (Cocopeat) T_3 (Perlite) T_4 (Vermicompost) T_5 (Sand) T_6 (Cocopeat +vermicompost (1:1) T_7 (Perlite + Sand (1:1). Recommended dose of fertilizers was apllied to all the treatments. All the standard recommended cultural practices were followed to raise a successful crop during investigation.

Results and Discussions

The morphological, growth, yield and quality characteristics of the Capsicum namely plant height (cm), number of branches, number of leaves per branch and earliness traits like days to first flowering, days to 50% flowering, days to first fruit setting and days to first fruit picking, yield traits like number of fruits per plant, plot and hectare, quality traits like TSS, ascorbic acid content and shelf life was recorded. Use of different growing will not only increase yield but also improve physical, chemical and biological properties of soil. It is found that combination of cocopeat and vermicompost in a proper ratio had a positive impact on Capsicum growth and development. The data related to various growth, yield and quality traits in Capsicum are represented in Table 1 and Table 2 whereas the data related to benefit cost ratio is represented in Table 3.

Table 1: Impact of different growing media on growth and earliness traits in Capsicum

Use of different growing media had an important impact on all growth and earliness traits in Capsicum. Significantly the highest plant height after 30 DAT (30.75 cm), after 60 DAT (47.64 cm) and after 90 DAT (72.65 cm), number of branches/plant (18.27), number of leaves/branch (91.30). In terms of earliness traits the days to first flowering (47.98), days to 50% flowering (53.60), days to first fruit setting (58.54) and days to first fruit picking (72.12) was recorded. The maximum plant height was observed in the treatment combination of cocopeat and vermicompost might be due to easily available nutrients and improved metabolism. Several investigators showed similar results on different plants such as Kumar and Kohli (2005) [21].

Table 2: Impact of different growing media on yield and quality traits in Capsicum

This table represents yield and quality attributing traits such as number of fruits/plant (18.40), fruit weight (124.43 g), fruit length (10.42 cm), fruit girth (8.39 cm), fruit yield /plant (2.28 kg), fruit yield /plot (20.56 kg), fruits yield /ha (45.51 t/ha), TSS content (150.01◦ brix), vitamin C content (6.80 mg) and shelf life (10.87 days).The maximum fruit number was (18.40) in T_6 followed by T_5 (15.87) and least (11.80) was recorded in control. Application of cocopeat and vermicompostin proper ratio made the crop to yield more number of fruits. Nair and peter (2002) [22] reported the beneficial effect of combined application of organic and inorganic manures which increased fruit number, fruit weight per plant of Capsicum compared with either organic or inorganic fertilizer applied alone.

Table 3: Impact of different growing media on economic analysis (B: Cratio) in Capsicum

In terms of economic analysis, maximum gross return Rs. 111196.30 and net return Rs.45195.30 was recorded in treatment T_6 - cocopeat +vermicompost (1:1) with B:C ratio 1.68 followed by T_5 with gross return, net return and B:C ratio (Rs. 98047.08, Rs. 33092.08 and 1.51respectively) and the least was recorded in control

Table 1: Impact of different growing media on growth and earliness traits in Capsicum

Treatment Notation	Plant Height (cm) [30 DAT]	Plant Height (cm) [60 DAT]	Plant Height (cm) [90 DAT]	No of branches/ plant [60 DAT]	No of branches /plant [90 DAT]	No of leaves /branches [90 DAT]	Days to first flowering [DAT]	Days to 50% flowering [DAT]	Days to first fruit setting [DAT]	Days to first fruit picking [DAT]
T_1	25.10	41.99	59.75	6.27	10.27	66.03	44.00	49.62	54.56	68.14
T_2	27.99	44.88	63.78	7.27	13.33	84.03	47.98	53.60	58.54	72.12
T_3	29.05	45.94	70.64	8.27	12.27	83.03	44.67	50.29	55.23	68.81
T_4	27.30	44.19	68.54	8.27	16.27	94.03	35.67	41.29	46.23	59.81
T_5	29.79	46.68	65.10	7.27	14.27	69.30	39.67	45.29	50.23	63.81
T_6	30.75	47.64	72.65	10.33	18.27	91.30	38.67	44.29	49.23	62.81
T_7	28.94	45.83	69.51	9.33	14.27	82.03	45.67	51.29	56.23	69.81
S.E. (m)	0.57	0.56	1.29	0.37	0.67	3.58	0.14	0.14	0.14	0.13
C.V.	5.22	3.28	5.09	11.89	12.56	11.63	0.57	0.49	0.45	0.36

Table 2: Impact of different growing media on yield and quality traits in Capsicum

Treatment Notation	No of fruits/plant	Individual Fresh fruit length (cm)	Individual Fresh fruit width (cm)	Individual Fresh fruit weight (g)	Fruit yield per plant (Kg/plant)	Fruit yield per plot (Kg/plot)	Fruit yield per hectare (t/ha)	Vitamin C content (mg/100g)	TSS [°Brix]	Shelf life [Days after harvest]
T_1	11.80	7.68	5.27	112.51	1.32	11.91	26.35	143.70	4.90	6.80
T_2	14.87	8.59	6.69	117.41	1.74	15.66	34.66	145.43	5.69	7.80
T_3	15.67	9.81	7.26	120.28	1.88	16.90	37.41	143.77	6.44	8.87
T_4	14.07	8.80	7.13	116.67	1.64	14.72	32.57	147.70	5.92	9.87
T_5	15.87	8.38	7.79	121.42	1.92	17.27	38.23	146.27	6.56	7.87
T_6	18.40	10.42	8.39	124.43	2.28	20.56	45.51	150.01	6.80	10.87
T_7	13.67	9.05	7.33	120.46	1.64	14.76	32.68	144.63	5.64	9.87
S.E. (m)	0.25	0.03	0.02	0.40	0.04	0.32	0.71	0.04	0.01	0.03
C.V.	2.92	0.55	0.04	0.58	3.43	3.51	3.50	0.04	0.04	0.64

Table 3: Impact of different growing media on Economic analysis (B: C ratio) in Capsicum

Treatment Details	Fruit yield/200 sq. m (q/ha)	Cost of cultivation (INR)	Gross Return (INR)	Net return (INR)	BC Ratio
T_1	9.57	65,425.00	76,584.65	11,159.65	1.17
T_2	11.45	65,041.00	91,589.56	26,548.56	1.41
T_3	12.07	65,001.00	96,559.54	31,558.54	1.49
T_4	10.98	65,885.00	87,821.15	21,936.15	1.33
T_5	12.26	64,955.00	98,047.08	33,092.08	1.51
T_6	13.90	66,001.00	1,11,196.30	45,195.30	1.68
T_7	11.00	65,031.00	88,019.07	22,988.07	1.35

Conclusion

It is concluded from the present study of Effect of different growing media on Capsicum growth, yield and quality under polyhouse conditions that the treatment T_6- cocopeat +vermicompost (1:1) was identified as a suitable treatment with better plant height at 30, 60 and 90 days (cm), more number of branches, maximum number of fruits per plant, fruit length (cm), Treatment T0 control with lowest was recorded. The application of cocopeat and vermicompost together can increase the yield, improve the input-use efficiency by the crop and can certainly lower down the expenditure on costly fertilizers to the farmers. The B: C ratio was maximum at T_6 with 1.68.

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