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Studies on effect of different growing media combinations on growth, yield and quality of parthenocarpic cucumber (*Cucumis sativus* L.) in soilless cultivation under naturally ventilated polyhouse

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Abstract

The present investigation entitled “Studies on effect of different growing media combinations on growth, yield and quality of parthenocarpic cucumber (*Cucumis sativus* L.) In soilless cultivation under naturally ventilated polyhouse” was carried out during 2020-21 at Centre of Excellence for Protected Cultivation (CEPC), Horticultural Research Station, Dr. Y. S. R. Horticultural University, Venkataramannagudem, West Godavari District, Andhra Pradesh. The experiment was laid out in randomized block design (RBD) with 3 replications comprising 14 treatment combinations. Among different combinations of growing media, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v) recorded maximum vine length (217.86 cm), internodal length (15.10 cm), leaf chlorophyll content (37.90 SPAD units) at final harvest, minimum days to first female flower appearance (17.16 days), days to first harvest (32.13 days), highest fruit length (18.40 cm), fruit diameter (4.60 cm), fruit mesocarp thickness (1.37 cm), fruit yield per plot (24.68 kg), estimated fruit yield (49.36 t ha⁻¹) and highest ascorbic acid content (3.79 mg/100 g). No significant difference was observed among different growing media combinations in days to final harvest. whereas, Cocopeat with EC 1.00 + 0.10 dS m⁻¹ showed least performance in all the parameters.

Keywords: Growing media, cocopeat, vermicompost, FYM, neem cake, grow bags, polyhouse, Parthenocarpic cucumber

Introduction

Cucumber (*Cucumis sativus* L.) (2n = 14) is a member of Cucurbitaceae family having 120 genera and 825 species and is one of the most popular vegetable crops cultivated broadly throughout the world which was originated in Southern Asia (Gangadhara *et al.*, 2019) [4]. It is thermophilic in nature and frost susceptible (Bacci *et al.*, 2006) [2], growing best at a temperature range of 22°C - 27°C. High temperature during crop growth leads to production of male flowers, while at fruit development stage results in fruit bitterness (Singh *et al.*, 2017) [8]. Basically, it is monoecious, trailing or climbing vine with angled and hirsute or rough stems. Leaves are triangular-ovate, somewhat three lobed with mostly acute curves. The staminate flowers are in clusters with short and slender pedicels. The pistillate flowers are usually solitary with stout and short pedicels. Sex expression is generally influenced by the environment. Under long day and high light intensities staminate flowers are predominant, whereas under short day and low light intensities female flowers are predominant. In botanical terms fruit is classified as a pepo (Yadav *et al.*, 2020) [10].

The cultivation of plants in systems without soil *in situ* is defined as “soilless culture” (Gruda, 2009) [5]. Soilless culture is a method of growing plants without the use of soil as a growing medium in which the inorganic nutrients absorbed by the roots are supplied through irrigation water. Many such systems are based on the use of solid rooting media for growing plants. They are usually called growing media or substrates. Soilless culture offers an alternative to soil culture when serious soil and water problems (*i.e.*, soil born pests, nematodes, soil and water salinity, chemical residues in soil, lack of fertility, water shortage) creates difficulties in traditional soil based production. The main advantages of soilless culture are the most accurate control over the supply of water, nutrients, pH, root temperature, increased productivity through easier and more accurate control of production factors, reduction in labor requirement, no need of soil sterilization, more crops per year *etc.*, (Tuzel *et al.*, 2008) [9].

Container farming refers to growing of plants in small containers like polybags, grow bags, pots instead of planting them in the soil. In the present investigation an attempt was made to identify best growing media combination for container cultivation of parthenocarpic cucumber under naturally ventilated polyhouse.

Material and Methods

The present investigation was carried out during 2020-21 at Centre of Excellence for Protected Cultivation (CEPC), Horticultural Research Station, Dr. Y. S. R. Horticultural University, Venkataramannagudem, West Godavari District, Andhra Pradesh. The experiment was laid out in randomized block design (RBD) with 3 replications comprising of 14 treatment combinations *i.e.*, T₁ - Cocopeat with EC 0.50 + 0.10 dS m⁻¹, T₂ - Cocopeat with EC 1.00 + 0.10 dS m⁻¹, T₃ - Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 25% (v/v), T₄ - Cocopeat with EC 1.00 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 25% (v/v), T₅ - Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + FYM @ 25% (v/v), T₆ - Cocopeat with EC 1.00 + 0.10 dS m⁻¹ @ 75% + FYM @ 25% (v/v), T₇ - Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 90% + Neem cake @ 10% (v/v), T₈ - Cocopeat with EC 1.00 + 0.10 dS m⁻¹ @ 90% + Neem Cake @ 10% (v/v), T₉ - Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 15% + Neem Cake @ 10% (v/v), T₁₀ - Cocopeat with EC 1.00 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 15% + Neem Cake @ 10% (v/v), T₁₁ - Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + FYM @ 15% + Neem Cake @ 10% (v/v), T₁₂ - Cocopeat with EC 1.00 + 0.10 dS m⁻¹ @ 75% + FYM @ 15% + Neem Cake @ 10% (v/v), T₁₃ - Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v), T₁₄ - Cocopeat with EC 1.00 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v). Media was prepared with different combinations of cocopeat, vermicompost, farm yard manure and neem cake on volume basis as per the treatments and filled into the grow bags. The land in the polyhouse was levelled and the entire land was covered with weed mat of 110 GSM without exposing soil, to suppress the weeds and to avoid the contact between soil and grow bags and are filled with media are arranged at 50 × 60 cm spacing. Variety used in the experiment is Pusa Parthenocarpic Cucumber - 6 improved variety of parthenocarpic gynoecious cucumber released from IARI, New Delhi. The twelve days old seedlings were transplanted in the grow bags which were already kept ready. Observations recorded are vine length (cm), internodal length (cm), leaf chlorophyll content (SPAD units) for five randomly selected and labelled plants per plot was measured at 30 DAT, 60 DAT and at final harvest, yield attributes like days to first female flower appearance, days to first harvest, days to final harvest, fruit length (cm), fruit diameter (cm), mesocarp thickness (cm), yield per plot (kg), estimated yield (t/ha) and quality parameter ascorbic acid (mg/100 g) were measured as per the standard procedures.

Results and Discussion

Effect of different growing media combinations on plant growth

The data pertaining to vine length (cm), internodal length (cm), leaf chlorophyll content (SPAD units) showed significant difference among different growing media combinations at 30 DAT, 60 DAT and final harvest (Table 1).

Among different combinations of growing media, T₁₃ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v) recorded maximum vine length (217.86 cm) and leaf chlorophyll content (37.90 SPAD units) at final harvest. Highest internodal length (15.10 cm) was recorded in T₁₃ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v) which is on par with T₉ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 15% + Neem Cake @ 10% (v/v) (14.53 cm) at final harvest.

Effect of different growing media combinations on yield and quality

In yield and yield attributes no significant difference was observed among different growing media combinations in days to final harvest. The media combination of Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v) (T₁₃) recorded least number of days to first female flower appearance (17.16 days), minimum days to first harvest (32.13 days), highest fruit length (18.40 cm) and fruit mesocarp thickness (1.37 cm) which are on par with T₉ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 15% + Neem Cake @ 10% (v/v) (17.96 days, 32.26 days, 18.10 cm and 1.32 cm respectively) and T₁₁ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + FYM @ 15% + Neem Cake @ 10% (v/v) (18.01 days, 33.10 days, 17.20 cm and 1.29 cm respectively). Highest fruit diameter (4.60 cm) was observed in T₁₃ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v) which is on par with T₉ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 15% + Neem Cake @ 10% (v/v) (4.46 cm). Highest fruit yield per plot (24.68 kg) and estimated fruit yield (49.36 t ha⁻¹) were observed in T₁₃ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v). Among different combinations of growing media, T₁₃ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v) recorded maximum ascorbic acid content (3.79 mg/100 g). Whereas, T₂ *i.e.*, Cocopeat with EC 1.00 + 0.10 dS m⁻¹ showed least performance in all the parameters.

Higher values of growth and yield parameters in T₁₃ *i.e.*, Cocopeat with EC 0.50 + 0.10 dS m⁻¹ @ 75% + Vermicompost @ 10% + FYM @ 10% + Neem Cake @ 5% (v/v) might be due to more availability of essential nutrients along with favorable conditions in the media combination which facilitated better aeration, adequate drainage and higher nutrient uptake. Use of cocopeat with lower electrical conductivity resulted in better availability of nutrients. Vermicompost contains a greater number of nitrogen fixing, phosphate solubilizing and other beneficial microbes, antibiotics, vitamins, hormones, enzymes, which have better effect on growth and yield of plants. Vermicompost and neem cake in the media combination also improved the physical and chemical properties of the media combination leading to the adequate supply of nutrients to the plants which might have promoted the maximum vegetative growth and higher manufacture of food and its subsequent portioning to sink. These results are in congruence with recent studies of Yadav *et al.* (2020) [10] in cucumber, Lata *et al.* (2018) [7] in cucumber, Deogade *et al.* (2020) [3] in calendula, Arunesh *et al.* (2020) [1] in gerbera and Kala *et al.* (2020) [6] in

chrysanthemum.

Table 1: Effect of different growing media combinations on growth parameters in soilless cultivation under naturally ventilated polyhouse

Treatments	Vine length (cm) Means			Internodal length (cm) Means			Leaf chlorophyll content (SPAD Units)		
	30 DAT	60 DAT	Final harvest	30 DAT	60 DAT	Final harvest	30 DAT	60 DAT	Final harvest
T ₁	132.80	165.33	193.26	9.96	13.93	13.90	33.71	31.80	33.90
T ₂	92.93	121.66	150.20	7.34	9.33	11.23	32.17	31.66	31.36
T ₃	131.86	160.16	189.60	8.10	13.86	12.16	33.01	32.86	30.86
T ₄	132.53	176.60	196.53	9.70	13.96	11.90	32.35	30.93	31.98
T ₅	121.60	164.00	199.66	9.56	13.36	13.60	32.36	31.93	32.93
T ₆	113.00	145.56	183.06	9.93	13.16	12.46	32.49	31.78	32.50
T ₇	130.46	168.00	194.80	10.01	13.20	13.43	32.47	32.20	33.10
T ₈	113.86	178.33	193.46	9.20	13.30	13.83	32.26	31.26	33.86
T ₉	139.80	180.66	213.86	10.23	14.46	14.53	35.11	34.96	35.56
T ₁₀	126.60	173.66	196.60	9.43	13.03	14.16	32.63	31.16	32.31
T ₁₁	136.93	179.00	212.81	10.16	14.03	14.26	34.13	34.30	34.90
T ₁₂	125.06	172.00	191.86	9.30	13.70	12.13	32.71	32.60	30.60
T ₁₃	150.20	183.33	217.86	10.95	14.70	15.10	38.50	36.90	37.90
T ₁₄	137.46	164.00	194.93	9.13	13.06	14.03	33.48	33.76	31.76
SE(m) +	1.73	2.40	3.02	0.11	0.22	0.23	0.50	0.49	0.46
C.D (0.05)	5.05	6.98	8.77	0.32	0.64	0.66	1.45	1.43	1.34
C.V %	5.36	6.50	7.68	6.00	5.86	5.93	5.59	5.60	5.41

Table 2: Effect of different growing media combinations on yield attributes in soilless cultivation under naturally ventilated polyhouse

Treatments	Days to first female flower appearance	Days to 1 st harvest	Days to final harvest	Fruit length(cm)	Fruit diameter(cm)
T ₁	19.60	34.80	78.80	16.63	4.25
T ₂	23.66	38.73	78.40	13.56	3.81
T ₃	20.20	34.20	78.39	17.06	4.09
T ₄	19.00	34.20	78.80	16.00	4.20
T ₅	19.86	33.60	78.00	16.03	4.11
T ₆	20.93	35.26	79.00	16.96	4.36
T ₇	19.20	33.00	79.20	16.70	4.19
T ₈	18.80	33.46	78.19	16.30	4.28
T ₉	17.96	32.26	79.99	18.10	4.46
T ₁₀	21.46	34.06	78.60	16.46	4.22
T ₁₁	18.01	33.10	79.40	17.20	4.38
T ₁₂	19.40	34.66	78.00	16.10	4.01
T ₁₃	17.16	32.13	81.00	18.40	4.60
T ₁₄	20.53	34.60	78.60	16.23	3.88
SE(m) +	0.34	0.40	1.19	0.29	0.06
C.D (0.05)	0.98	1.16	NS	0.85	0.17
C.V %	5.97	6.03	7.61	5.06	5.35

Table 3: Effect of different growing media combinations on yield and quality attributes in soilless cultivation under naturally ventilated polyhouse

Treatments	Mesocarp thickness (cm)	Ascorbic acid (mg/100g)	Yield/plot (kg)	Estimated Yield (t/ha)
T ₁	1.16	2.89	20.40	40.80
T ₂	1.08	1.50	11.00	22.00
T ₃	1.24	3.00	20.90	41.80
T ₄	1.20	3.20	20.20	40.40
T ₅	1.18	2.10	20.10	40.20
T ₆	1.12	3.45	18.30	36.60
T ₇	1.15	2.20	20.50	41.00
T ₈	1.28	3.60	19.60	39.20
T ₉	1.32	2.79	23.50	47.00
T ₁₀	1.18	2.61	18.70	37.40
T ₁₁	1.29	2.90	21.60	43.20
T ₁₂	1.12	2.81	19.00	40.92
T ₁₃	1.37	3.79	24.68	49.36
T ₁₄	1.10	2.83	18.50	37.00
SE(m) +	0.05	0.04	0.32	0.50
C.D (0.05)	0.02	0.12	0.92	1.47
C.V %	0.02	4.45	6.78	6.20

Conclusion

Based on results obtained in the present experiment, it can be concluded that parthenocarpic cucumber grown in growbags

containing 75% of cocopeat with EC 0.50 + 0.10 dSm⁻¹ + 10% Vermicompost + 10% FYM + 5% Neem Cake (volume/volume) recorded highest yield (49.36 t/ha). Hence

the above growing media combination can be utilized for cultivation of parthenocarpic cucumber in soilless cultivation under naturally ventilated polyhouse.

References

1. Arunesh A, Muraleedharan AK, Sha S, Kumar JL, Joshi Kumar PS, Rajan ER. Studies on effect of different growing media on the growth and flowering of Gerbera cv. Goliath. *Plant Archives* 2020;20(1):653-57.
2. Bacci L, Picanco MC, Gonring AHR, Guedes RNC, Crespo ALB. Critical yield components and key loss factors of tropical cucumber crops. *Crop Protection* 2006;25(10):1117-25.
3. Deogade AS, Ningot EP, Thakare AA, Ingole AR, Dahale MH. Effect of potting mixture and pot size on growth and flowering of calendula. *Journal of Pharmacognosy and Phytochemistry* 2020;9(6):1147-51.
4. Gangadhara K, Kumar RR, Selvakumar, Apparao VV, Yadav LP. Evaluation of cucumber hybrids/lines for yield and quality under polyhouse. *International Journal of Current Microbiology and Applied Science* 2019;8(6):1652-61
5. Gruda N. Do soilless culture systems have influence on product quality of vegetables? *Journal of Applied Botany and Food Quality* 2009;82:141-47.
6. Kala D, Mahawer LN, Bairwa HL. Response of potting media composition for pot mum chrysanthemum production (*Dendranthema grandiflora* L.). *International Journal of Chemical Studies* 2020;8(2):1246-51.
7. Lata K, Choudhary MR, Sharma R, Ghormade AS. Effect of growing media and fertigation schedules on growth and yield of cucumber (*Cucumis sativus* L.) under polyhouse condition. *International Journal of Current Microbiology and Applied Sciences* 2018;7(12):1-7.
8. Singh MC, Singh JP, Pandey SK, Mahay D, Srivastava V. Factors affecting the performance of greenhouse cucumber cultivation - a review. *International Journal of Current Microbiology and Applied Sciences* 2017;6:2304-23.
9. Tuzel Y, Oztekin GB, Gul A. Recent developments in protected cultivation in Turkey. Second coordinating meeting of the regional FAO working group on Greenhouse crop production. Antalya 2008,75-86p.
10. Yadav S, Garhwal OP, Yadav BC, Choudhary G, Kumari K. Effect of growing media and micronutrients on growth and yield of cucumber (*Cucumis sativus* L.) under polyhouse condition. *Journal of Pharmacognosy and Phytochemistry* 2020;9(2):133-36.