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Study on the growth of eggplant (*Solanum melongena* L.) under hydroponics with modified Hoagland solution

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Abstract
Hydroponics is a new technology for growing plants in nutrient solutions with or without the use of an artificial medium (example. sand, gravel, vermiculate, rock wool, coco peat) to provide mechanical support. Hence, an experiment was carried out on “Study on the growth of hydroponics cultivated egg. Plant (*Solanum melongena* L.) using different media and varied regimes of nitrogen and potassium” in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamilnadu, India during January - April 2018. Coco peat and sand were used as media with different concentration of N and K nutrients based on modified Hoagland solution. Among the different media and nutrients, plants grown under coco peat media with 125% of N and K modified Hoagland solution (298ppm N and 330 ppm K) recorded significantly highest plant height, number of primary branches, number of secondary branches, stem girth, number of leaves and dry matter production.

Keywords: Eggplant, hydroponics, soilless culture, Hoagland solution, brinjal

Introduction

Hydroponics is known as cultivating the plant by placing the root in liquid nutrient solution instead of placing in the soil (Schlegel, 2003) [13]. Hydroponic crop production allows more efficient use of water and fertilizer. Nutrient solution is considered to be one of the most important determining factors of crop yield and quality. Nutrient solution for hydroponics is an aqueous solution containing mainly inorganic ions from soluble salts of essential elements. Soilless culture in bags, pots or troughs with a lightweight medium is the simplest, most economical and easiest to manage of all soilless systems. Eggplant (*Solanum melongena* L.) hybrids are known for their higher yield potential, early maturity and uniform fruit size, attractive and uniform colour of fruits. The brinjal hybrids are more responsive to fertilizer application. In the recent years, an increasing interest in the soilless culture for eggplant occurred (Savvas and Lenz, 2000) [11]. There have been a few attempts for growing eggplant and determining its suitable media in growing bag (Yanmaz, 2002) [16]. Eggplant can be cultivated with good results on mineral substrates like perlite or sand (Hamdy *et al*., 2004) [5]. The cultivation of eggplant in substrate culture is described in regard to different nutrient solutions (Iapichino *et al*., 2007) [6]. The influence of growing media (coco peat, wood fiber and rock wool) on sensory quality and physical traits of eggplant fruit (Gajewski, 2009) [4]. Hence, the present study was focused on the growth of eggplant using different media and nutrient concentration.

Materials and Methods

The experiment was carried out at Department of Horticulture, Faculty of Agriculture, Annamalai University, Tamil nadu, India. The media *viz*., coco peat and sand were neutralized and washed thoroughly to get neutral pH, whereas the sand was sieved to get uniform size of less than 2mm and filled in poly bags. Thirty five days old eggplant seedlings of Dhruva hybrid were transplanted into experimental pots containing different media. The experiment was laid out in factorial completely randomized design replicated thrice with two potting media and five different nutrient concentrations (Table 1). Potassium sulphate, Magnesium sulphate, Potassium phosphate, Calcium nitrate, Ammonium sulphate, Iron EDTA, Manganese sulphate, Boric acid, Sodium molybdate, Zinc EDTA and Copper EDTA were used as sourcesof fertilizer. The treatment was imposed by drip irrigation as constant fertigation at 3 days interval and 2 days interval for coco peat and sand respectively. The statistical analysis was carried outas per Snedecor and Cochran (1975) [15].

Table 1: Media and nutrient concentration selected for the experiment

Factor 1	Media	Factor 2	Nutrient solution	Nutrient concentration (ppm)											
				N	P	K	Ca	S	Mg	Fe	Mn	Zn	B	Cu	Mo
M1	Sand	N1	50% of N&K	119	39	132	130	48	61	0.8	0.5	0.3	0.4	0.05	0.04
M2	Coco peat	N2	75% of N&K	179	39	198	130	48	61	0.8	0.5	0.3	0.4	0.05	0.04
		N3	100% of N&K	238	39	264	130	48	61	0.8	0.5	0.3	0.4	0.05	0.04
		N4	125% of N&K	298	39	330	130	48	61	0.8	0.5	0.3	0.4	0.05	0.04
		N5	150% of N&K	357	39	396	130	48	61	0.8	0.5	0.3	0.4	0.05	0.04

Results and Discussion

The result on growth parameters of eggplant as influenced by different media and nutrient concentration is presented in Tables 2. Different growing media and nutrient solution with various regimes of nitrogen and potassium significantly influenced the plant height, number of primary branches, number of secondary branches, stem girth, number of leaves and dry matter production. The highest plant height of 99.18 cm was recorded in M_2N_4 *i.e.* plants grown on coco peat and received 125% of N and K modified Hoagland solution followed by M_1N_4 (90.95 cm) which received sand + N125:K125% of modified Hoagland solution. However among the interactions the least plant height of 47.82 cm was recorded in M_1N_1 (sand + N50:K50% of modified Hoagland solution). The highest number of primary branches (4.11) was recorded in M_2N_4 (coco peat + N125:K125% of modified Hoagland solution) followed by M_2N_3 (3.56) (coco peat + N100:K100% of modified Hoagland solution) and the least number of primary branches was recorded in M_1N_1 (1.22) which received sand + N50:K50% of modified Hoagland solution. The highest number of secondary branches was recorded in M_2N_4 (coco peat + N125:K125% of modified Hoagland solution) of 7.78 followed by M_2N_3 (coco peat + N100:K100 % of modified Hoagland solution) of 6.56. However among the interactions the least number of secondary branches was recorded in M_1N_1 (sand + N50:K50% of modified Hoagland solution) of 1.67. The highest stem girth of 4.09 cm was recorded in M_2N_4 (coco peat + N125:K125% of modified Hoagland solution), followed by M_2N_3 (3.65 cm) which received coco peat + N100:K100% of modified Hoagland solution. However among the interactions the least stem girth of 0.79 cm was recorded in M_1N_1 (sand + N50:K50% of modified Hoagland solution). The highest number of leaves of 63.61 was recorded in M_2N_4 followed by M_2N_3 (57.84) and the least number of leaves (27.77) was recorded in M_1N_1. The highest dry matter production of 125.97 g was recorded in M_2N_4, followed by M_1N_4 (117.71 g). However among the interactions the least dry matter production of 63.00 g was recorded in M_1N_1.

This result is similar with the findings of Sardoei *et al*. (2014) reported that better growth of *Zinnia elegans* was recorded on media consisted of coco peat alone. Paul Wahome *et al*. (2011) found that the plant height, number of shoots plant^{-1}, cut flower length and yield of *Gypsophila paniculata* was found to be the least in plant grown in sand under different hydroponics system. This may be mainly attributed to better moisture availability and favorable aeration condition of the media. The reason for the better performance of coco peat could be superior over other media might be related to its characteristics including higher total pore space (TPS) and water holding capacity (WHC) (Farzad Nazari *et al*., 2011). The growth parameters recorded maximum in 125% of N and K modified Hoagland solution. The highest growth parameters may be due to increased levels of nitrogen and potassium and it has been reported that the presence of increased levels of N promotes development of the above ground organs (Singh *et al.*, 2003). The reason might be that nitrogen supply is related to carbohydrate utilization, enhancing protein synthesis that allows the plants to grow faster, increase rate of metabolism, cell division, cell elongation and thereby stimulating apical growth as well as formation of leaves and plant spread (Mastiholi *et al*., 2009).The least performance in N1 (N50: K50 % of modified Hoagland solution) might be due to the deficiency of nutrients, which leads to adverse effect on plant height, branch production, stem girth and number of leaves (Sat Pal Sharma and Brar, 2008).

Table 2: Influence of media and nutrient solution on growth of eggplant

Treatments	Plant height	No. of primary branches	No. of secondary branches	No. of leaves	Stem girth	Dry matter production
M_1N_1	47.82	1.22	1.67	27.77	0.79	63.00
M_2N_1	51.79	1.89	2.80	33.45	1.90	70.54
M_1N_2	58.74	1.78	2.33	33.15	1.38	78.96
M_2N_2	64.65	2.78	4.00	39.13	2.52	86.92
M_1N_3	84.21	2.67	4.89	51.67	2.48	109.08
M_2N_3	91.03	3.56	6.56	57.84	3.65	117.27
M_1N_4	90.95	3.33	5.99	57.27	2.88	117.71
M_2N_4	99.18	4.11	7.78	63.61	4.09	125.97
M_1N_5	51.56	1.44	1.89	30.78	1.04	71.12
M_2N_5	57.43	2.33	3.33	36.49	2.18	78.58
S.Ed	2.75	0.16	0.06	2.25	0.13	3.96
CD (p=0.05)*	5.52	0.34	0.13	4.52	0.26	7.93

Conclusion

From the above results obtained it was revealed that coco peat media with 125% of N and K in modified Hoagland solution was found to be optimum for soilless substrate culture of eggplant. There was no yield loss due to wilt or nematode incidence because the media used were completely sterile and pathogen free.

References

1. Cuckoorani M. Organic nutrient scheduling in soilless vegetable cultivation. M.Sc. (Ag) thesis, Kerala Agricultural University, Thrissur, 2013.
2. Farzad Nazari, Homayoun Farahmand, Morteza Khosh-Khui, Hassan Salehi. Effect of coir as a component of potting media on growth, flowering and physiological characteristics of hyacinth (*Hyacinthus orientalis* L. cv. Sonbol-e-Irani). Intl. J. of Agric. and Food Sci., 2011;1(2):34-38.
3. Sushmetha V, Malarvannan S, Abarna V. Comparative studies on biophysical and biochemical basis of resistance in Brinjal and Chilli against aphid (*Aphis gossypii*). Int. J Biol. Sci. 2022;4(2):108-111. DOI: 10.33545/26649926.2022.v4.i2b.85
4. Gajewski M, Kowalczyk K, Bajer M, Radzanowska J. Quality of eggplant fruits in relation to growing medium used in greenhouse cultivation and to a cultivar. Notulae Botanicae Horti Agrobotanici Cluj-Napoca. 2009;37(1):229-234.
5. Hamdy A, Chouaib W, Pacucci G. Eggplant production in soilless culture under saline irrigation practices and soil conditioner application. Acta Hort. (ISHS). 2004;633:245-251.
6. Iapichino G, Moncada A, Anna DF. Planting density and pruning method affect eggplant soilless culture. Acta Hort. 2007;747:341-346.
7. Marschner H. Mineral nutrition of higher plants, 2 ndedn. Acadamic, London, 1995.
8. Mastiholi AB, Hiremath SM, Patil PL. Performance of medicinal coleus as influenced by nitrogen, phosphorous and potassium levels under irrigated conditions. J. of Medicinal and Aromatic Plant Sciences. 2009;31(4):297-301.
9. Paswan A, Choudhary AS, Raj S, Sonloi P, Sonwani A. Effect of integrated nutrient management on yield of Brinjal. Int. J Agric. Food Sci. 2022;4(1):12-16. DOI: 10.33545/2664844X.2022.v4.i1a.59
10. Sardoei AS, Fahraji SS, Ghasemi H. Effect of different growing media on growth and flowering of zinnia (*Zinnia elegans*). Int. J Adv. Biol. Biom. Res. 2014;2(6):894-899.
11. Savvas D, Lenz F. Effects of NaCl or nutrient-induced salinity on growth, yield, and composition of eggplants grown in rockwool. Sci. Hortic., 2000;84(1):37-47.
12. Sat Pal Sharma, Brar JS. Nutritional requirement of brinjal (*Solanum melongena* L.). Agric. Rev., 2008;29(2):79-88.
13. Schlegel RJ. Encyclopedic Dictionary of Plant Breeding and Related Subjects. New York: CRC Press; c2003.
14. Degebasa AC. Assessment of plant growth regulators and chemicals for potato (*Solanum tuberosum* L.) dormancy breaking and subsequent yield in central highlands of Ethiopia. Int. J Hortic. Food. Sci 2020;2(1):10-20.
DOI: 10.33545/26631067.2020.v2.i1a.32
15. Snedecor GW, Cochran WG. Statistical methods (16th Ed.). Oxford and IBH Publishing Co., Calcutta; c1975. p. 349-351.
16. Yanmaz R. Veg. Bibliography of Turkey. (1923-1999). In Turkish; 2002. p. 391.
17. Paul Wahome K, Tajudeen Oseni O, Michael Masarirambi T, Victor Shongwe D. Effect of different hydroponics systems and growing media on the vegetative growth, yield and cut flower quality of gypsophila (*Gypsophila paniculata* L.). World J of Agric. Sci., 2011;7(6):692-698.
18. Amruta Katti, Rudresh DL, RS Jawadagi, Shashikanth Evoor, Sanjeevraddi G Reddi. Plant growth promoting microbial consortia for enhancing growth and yield attributes of Brinjal (*Solanum melongena* L.). Int. cx J Hortic Food Sci. 2022;4(1):176-180. DOI: 10.33545/26631067.2022.v4.i1c.138
19. Fusuo Zhang, JunfangNiu, Weifeng Zhang, Xinping Chen, Chunjian Li, Lixing Yuan, JianchangXie. Potassium nutrition of crops under varied regimes of nitrogen supply. Plant and Soil. 2010;335:21-34.
20. Singh SS, Gupta P, Gupta AK. Handbook of agriculture sciences. Kalyani Publishers, New Delhi, India; c2003. p. 184-185.