The Pharma Innovation Journal 2023; 12(3): 2243-2246

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(3): 2243-2246

www.thepharmajournal.com
Received: 10-01-2023
Accepted: 25-02-2023

S Karak
Department of Agronomy, Faculty of Agriculture, BCKV, P.O. Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India

U Thapa
Department of Vegetable Science, Faculty of Horticulture BCKV, P.O. Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India

Corresponding Author:
S Karak
Department of Agronomy, Faculty of Agriculture, BCKV, P.O. Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India

Response of different growing media for growth and yield of fodder maize (*Zea mays* L.) under soilless culture systems

S Karak and U Thapa

Abstract
The present experiment was conducted under protected conditions (naturally ventilated greenhouse) during Rabi season of the year 2020, in humid subtropical region of West Bengal under the Department of Vegetable Science, Bidhan Chandra Krishi Viswavidalayaya, Mohanpur, Nadia. The aim of the experiment was to find out the best performing growing media based on the evaluation of various growth, yield and quality parameters of fodder maize. The trial was laid out in Factorial Completely Randomized Design with six treatments, each replicated four times. The six treatments of different growing media consists of (viz: G_1 - Cocopeat, G_2 Vermicompost, G_3 -Vermiculite, G_4 Cocopeat and Vermicompost, G_5 - Vermiculite and Vermicompost and G_6 - Cocopeat + Vermicompost +Vermiculite) Statistical analysis of data revealed a significant effect of various growing media on days to emergence of fodder maize. The earliest days to emergence of 3.67 days was recorded when the maize fodder was raised in the mixture of Cocopeat: Vermicompost: Vermiculite in the ratios of 1:1:1. The highest plant height of 18.00cm was obtained when plants were grown in the mixture of Cocopeat+vermicompost. + Vermiculite. Lowest plant height of 13.17cm was obtained from cocopeat singly as growing media. Plants grown in the mixture of Cocopeat +Vermicompost + Vermiculite produced the highest of 1623.33g of green fodder amongst the other different growing media. The lowest green fodder of 1088.00g was recorded from the plants which were grown on cocopeat only. From the investigation it was concluded that the green fodder along with others parameters was found best when plants were grown in the mixture of Cocopeat+vermicompost. + Vermiculite.

Keywords: Soilless cultivation, fodder, maize, growing media

Introduction
Green fodder is an important part of the dairy ration. Its absence has a direct impact on the production and reproduction processes of the dairy animals. A prolific dairy farming requires that good quality green fodder should be supplemented to the animals on regular basis (Younas and Yaqoob, 2005; Naik *et al*., 2012) [8]. In this aspect, maize (*Zea mays* L.) is suggested as a supplementary diet in term of green fodder. Maize (*Zea mays* L.) is a multi-trait crop. It is accounted as the country's third important cereal crop followed by wheat and rice. Its nutritive value makes it a suitable constituent of cattle diet in terms of fodder (Tariq and Iqbal, 2010; Tahir and Habib, 2013) [6, 5]. In the last few decades, however, open field/soil based agriculture has been facing some major challenges. Most important among them is the drastic decrease in per capita land availability. This has been attributed chiefly to population explosion, industrialization and rapid urbanization in the past decades. Under such circumstances, soil-less culture can be introduced successfully (Butler & Oebker, 2006) [2] and it is becoming more relevant in the present scenario to cope with these challenges. This system will also help to face the challenges of climate change and also helps in production system management for efficient utilization of natural resources and mitigating malnutrition (Butler & Oebker, 2006) [2]. Container culture or substrate culture is indeed the most popular method of soilless culture adopted commercially. One of the most important cultural inputs involved in greenhouse crop production, perhaps is the type of growing media used (Angin *et al*., 2011) [1]. To overcome the complications and issues associated with fodder production, hydroponic/Soilless technology is presented as the sustainable, cost-effective and environmentally benign substitute (Naik *et al*., 2013; Naik *et al*., 2015) [3, 4]. This technique is unique as it ensures the availability of green fodder around the year and within a small germination period Over the last decades, progress of soilless culture techniques has been rapid in developed countries (USA, Japan, the Netherlands), but its use is still limited in

countries like India. In light of this, not much work has been done in our country on this field and information is lacking. The aspiration of the current study is aimed at suggesting the best alternative to the conventional fodder production practice. The objectives of this experiment was to popularize soilless culture techniques for producing fodder maize in semi-urban and urban areas to find out the best growing media with respect to growth and Yield.

Materials and methods

The present experiment was conducted under protected conditions (naturally ventilated greenhouse) during Rabi season of the year 2020, in humid subtropical region of West Bengal under the Department of Vegetable Science, Bidhan Chandra Krishi Viswavidalayaya, Mohanpur, Nadia. Air temperature and relative humidity inside the greenhouse were recorded every day by means of electronic sensors placed beside the cropped area during the conduct of the experiments. The trial was laid out in Factorial Completely Randomized Design with six treatments, each replicated four times. The six treatments of different growing media consists of (viz: G_1 - Cocopeat, G_2 Vermicompost, G_3 -Vermiculite, G_4 Cocopeat and Vermicompost, G_5 - Vermiculite and Vermicompost and G_6 - Cocopeat + Vermicompost +Vermiculite) were used. The aim of the experiment was to find out the best performing growing media based on the evaluation of various growth, yield and quality parameters of fodder maize.

In the experiment seeds of African tall Maize variety (*Zea mays* L.) was used and soaked for 12 hours in tap water. Before sowing the seeds the stray foam trays were filled with different growing media. After sowing, the seeded trays were incubated for 3 days at 20ºC. When the seeds started germination, the seed trays were shifted to a greenhouse and placed stray foam tray in plastic tray which containing nutrient solutions. Standard management practices for soilless cultivation were followed to raise healthy and robust seedlings. Constant concentration of nutrient solution (6 mmols) as reported by Nicola *et al*. (2004) was fed to each tray on fifth day after seedlings emerged. Both pH (by pH meter) and electrical conductivity (EC) of the solution were checked two times by following the method stated by Jackson (1973) during the growing period and kept close to the range of 5.5 – 6.5 and 2,000µS cm-1, respectively. The solutions were frequently stirred to avoid algal growth. The stray foam plug trays were not kept submerged in nutrient solution for more than two days at a stretch to avoid damping off of seedlings. The observations were recorded from randomly selected plants. The growth and yield attributing parameters were recorded after 28 days during the harvest of the crop

Results and Discussion

Growth parameters

Data regarding days to emergence of different growing media treatment is presented in Table 1. Statistical analysis of data revealed a significant effect of various growing media on days to emergence of fodder maize. The earliest days to emergence of 3.67 days was recorded when the maize fodder was raised in the mixture of Cocopeat: Vermicompost: Vermiculite in the ratios of 1:1:1. The longer days of 7.00 days to emergence were noticed when the plants were raised only in the cocopeat as growing media. Plant height under different growing media was influenced significantly. The highest plant height of 18.00cm was obtained when plants were grown in the mixture of Cocopeat+vermicompost. + Vermiculite. Lowest plant height of 13.17cm was obtained from cocopeat singly as growing media. The highest plant height in the mixture of cocopeat + vermicompost + Vermiculite might be due to better physicochemical properties of the mixture compared to vermicompost, cocopeat and vermiculite individually. Sun-ZhiQiang *et al*. (2003) [7] made similar observations in their study. Statistical analysis of data revealed that root length for various growing media was significant. Mean values showed maximum root length of (8.33cm) from the T_6 (Cocopeat+vermicompost. + Vermiculite) The root growth in this treatment was greater as compare to other growing media due to more availability of nutrient from this combination of growing media. The lowest root length value of 5.50 cm was produced from the plant which was grown singly growing media as cocopeat. The second lowest (6.01cm) root length also produced from the plants which was grown singly with vermiculite as growing media only. Regarding the parameter total number of leaves per plant, it was observed that number of leaves per plant among different growing media showed statistically significant differences. Highest number of leaves per plant (7.00) was obtained when the mixture of Cocopeat+vermicompost + Vermiculite was used as growing medium. Plants grown only in Cocopeat and vermiculite produced the lowest number of leaves per plant (4.00). The best result of the mixture Cocopeat+vermicompost + Vermiculite in both the cases of plant height and total number of leaves per plant may be due synergistic effects of the mixture of growing medium for growth and development of the plants. Other reason might be due to increasing water holding capacity and aeration which promotes vigorous growth and in turns which allows better growth of plant and therefore helps to produce more number of leaves. Gomez-Merino *et al*. (2012) reported that mixtures of cocopeat with other organic substrates produced higher growth and yield in vegetable crops also.

Green fodder and dry fodder yield:

It is evident from the Table-1 that there are significant differences among the various growing media on green fodder yield. Plants grown in the mixture of Cocopeat +Vermicompost + Vermiculite produced the highest of 1623.33g of green fodder amongst the other different growing media. The result may be due to ideal conditions for good growth of plants in the mixture medium giving way to higher yield. The lowest green fodder of 1088.00g was recorded from the plants which were grown on cocopeat only. It was noticed from the Fig 1 that plants which were grown in singly growing media as vermicompost may also gives better fodder weight compare to singly cocopeat and vermiculite as growing media. Nagraj *et al.* (2015) also concluded that soilless media has a good effect on yield of different vegetables. The temperature, moisture capacity, aeration etc. of growing media can affect especially root growth, water and mineral uptake. Cocopeat and vermiculite which quickly heat up and cool down are good media in regard to drainage and aeration. It was reported that the water holding of cocopeat is better than those of vermiculite and vermicompost. These factors can effect of growth and yield of the crops. The data regarding dry fodder yield of various treatments is presented in Table 1 and Figure 2. Statistical analysis of the data showed that hydroponically dry weight of various treatments

was found significant. It was observed that the maximum dry fodder weight of 249.22gm was recorded from the treatment - 6 Cocopeat + Vermiculite + Vermicompost) while minimum of dry fodder of 167.45 gm was recorded from T_1 (Cocopeat). From the current investigation, however it is concluded that maize crop is the best fodder that can be grown in the soilless system for production of green fodder with lower water usage. Amongst the different growing media the mixture of Cocopeat +Vermicompost + Vermiculite was found the best media for producing higher green fodder.

Table 1: Response of different growing media on growth and yield of fodder maize

Treatments	Growing Media	Days to emergence	Plant Height	Root Length	Number of leaves	Green fodder weight (g)	Dry fodder weight (g)
T1	Cocopeat (G1)	7.00	13.17	5.50	4.00	1088.00	167.45
T2	Vermicompost (G2)	6.33	14.00	7.71	5.00	1391.33	213.60
T3	Vermiculite (G3)	5.00	13.67	6.01	4.00	1278.33	196.71
T4	Cocopeat + Vermicompost (G4)	4.67	16.33	8.17	6.00	1530.00	235.46
T5	Cocopeat + Vermiculite (G5)	5.67	15.00	6.73	5.00	1356.33	207.87
T6-	Cocopeat + Vermiculite + Vermicompost (G6)	3.67	18.00	8.33	7.00	1623.33	249.22
Sem+		0.388	0.411	0.192	0.285	16.64	2.391
CD@5%		1.18	1.25	0.58	0.87	50.49	7.25

Fig 1: Response of different growing media on green fodder weight

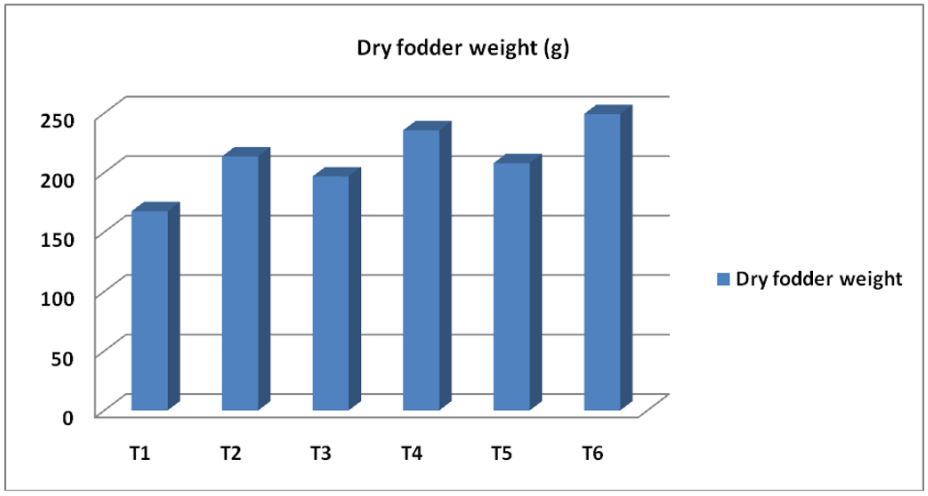

Fig 2: Response of different growing media on dry fodder weight

References

1. Angin I, Kose M, Aslantas R. Effect of diatomite on growth of strawberry. Pakistan J Botany. 2011;43(1):573-577.
2. Butler JD, Oebker NF. Hydroponics as a Hobby Growing Plants without Soil. Circular 844. Information Office, College of Agriculture, University of Illinois, Urbana, 2006, IL 61801.
3. Naik PK, Dhuri RB, Karunakaran M, Swain BK, Singh NP. Hydroponics technology for green fodder production. Indian Dairyman 2013;65:54-58.
4. Naik PK, Swain BK, Singh NP. Production and

utilisation of hydroponics fodder. Ind J Anim Nutr. 2015;32:1-9.
5. Tahir A, Habib N. Forecasting of maize area and production in Pakistan. Crop Prod. 2013;2:44-48.
6. Tariq M, Iqbal H. Maize in Pakistan-An overview. Kasetsart J Nat Sci. 2010;44:757-763.
7. Thornton PK. Livestock production: Recent. Sun-ZhiQiang, Li-ShengLi and Zhang-HuiMei. Comparison between several substrates on soilless culture of sweet pepper (*Capsicum annuum*). J. Huazhong Agricultural University. 2003;22(3):266- 269
8. Younas M, Yaqoob M. Feed resources of livestock in the Punjab, Pakistan. Livestock Res Rural Develop. 2005;17:2005.