RESEARCH ARTICLE

EFFECT OF ORGANIC POTTING MEDIA ON SHELF LIFE OF TOMATO GROWN ON ROOF TOP

Naganandhini, L., V.A. Sathiyamurthy, T. Arumugam, S. Padmapriya* and A. Bharani

Department of Hort., Controllerate of Examinations, TNAU, Coimbatore
Email: spadmapriyaa@yahoo.co.in

Received-06.07.2021, Revised-17.07.2021, Accepted-26.07.2021

Abstract: A study on the effect of different organic potting media on shelf life of tomato grown on roof top was conducted at roof top of Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore. Eight media composition and seven different foliar sprays were included in the study. Nutrients and organics used in the experimentincluded vermicompost, digested coir compost, red soil, farm yard manure, wood ash, panchagavya, groundnut cake extract and humic acid. The resultsof experimentrevealed that the fruits of the tomato plants grown in the nutrient media containingDigested coir compost 25% + Red soil 25%+ FYM 25% + Vermicompost 25%) along with organic foliar spray Panchagavya 5 % + Humic acid 2% recorded low physiological loss in weight(10.99), high pericarp thickness(0.4252), high fruit firmness(0.7022 kg cm^{-2}) and high shelf life(11.88 days).

Keywords: Potting media, Roof top, Digested coir compost, Panchakavya, Humic acid

INTRODUCTION

The continuous growth of the human population on earth is creating a lot of social, economic and ecological pressures on the environment. Rooftop gardening is a special type of agriculture by which the urban population could opt for a balanced and sustainable resource utilization. Roof gardens are one of the most innovative and cost-effective ways cities can use to improve the degrading urban environment. It is an innovative intervention to produce a variety of fruits, grains, and vegetable crops on rooftops, grown in containers. Rooftops are underutilized and rarely-considered urban spaces with great potential. The utilization of available unutilized/ underutilized space of the roof-top on every house for growing of different types vegetables has vast scope to increase farm-land in village as well as in urban areas. If each house involves in producing its required vegetable through organic farming, it not only helps to increase the production of vegetable, but also provide the chance to produce healthy and fresh vegetables. Moreover, rooftop gardens keep buildings cooler in summer and warmer in winter. Air conditioning costs are cut down and roof gardens can cool the whole city by several degrees in summer.

Application of nutrients plays a pivotal role in enhancing the growth, production and quality of the crop. Continuous and heavy application of chemical inputs resulted in a major shift in soil microbial population, nutrient imbalance, fast depletion of soil fertility, and continuous deterioration of soil physical and chemical properties and accumulation of toxic contaminants (Gaur, 2001). Organically grown foods taste better and contain a better balance of vitamins and minerals with improved quality than conventionally grown foods. The increased use of organic inputs in the production of agricultural and horticultural crops is helpful for sustained human wellbeing and preservation of the soil health. Keeping these facts in view, the present investigation was planned to find out the appropriate combination of organic inputs and media required for growing tomato on roof top for improved yield and post harvest quality.

MATERIALS AND METHODS

The experiment was conducted at the roof top of Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore during 2016-17. Seeds of TNAU Tomato Hybrid CO 3 was used for this study. The experiment was laid out in a factorial completely randomized design with two factors, the first factor denoted the potting media and the other factor was foliar spray of organic nutrients. Media with eight different combination of organic amendments were prepared as furnished in the set of treatments mentioned below.

Treatment details

Factor 1. Potting media composition

M_1	Digested coir compost @ 50% + FYM @ 50%
M_2	Digested coir compost @ 50% + Vermicompost @ 50%
M_3	Digested coir compost @ 50% + FYM @ 25%+ Vermicompost @ 25%

*Corresponding Author

M_4	Digested coir compost @ 25% + Red soil @ 25%+ FYM @ 50%
M_5	Digested coir compost @ 25% + Red soil @ 25%+ FYM @ 25%+Vermicompost @ 25%
M_6	Digested coir compost @ 25% +Red soil @ 25%+ Vermicompost @ 50%

Factor 2. Organic foliar nutrients

I_1	Control (water spray)
I_2	Panchagavya @ 10 %
I_3	Groundnut cake extract @ 5 %
I_4	Humic acid @ 2%
I_5	Panchagavya@10 % + Groundnut cake extract @5 %
I_6	Panchagavya@5 % + Humic acid @2%
I_7	Panchagavya@10 % + Groundnut cake extract @5 % + Humic acid @2%

The size of the grow bag used for this study was 43 cm (height) x 21 cm (width). The media was prepared based on the proposed treatments. Eight bags were filled with the respective media composition for each replication in each treatment for raising the tomato crop. Five plants were selected at random in each replication an in each treatment and utilized for recording observations and mean values were subjected to statistical analysis. The physiological loss in weight was determined by the method described by A.O.A.C. (1975). Five fruits were selected randomly at breaker stage from the plants and their firmness were measured by using penetrometer (LT Lurton model FG 5000 A) and expressed in kg/cm^2. Twenty five fruits of uniform maturity (breaker stage) were selected at random in each replication. These fruits were kept in trays under ambient storage temperature (25-30^oC). The number of days taken for 30 per cent moisture loss and 35 per cent spoilage was noted and expressed as number of days of shelf life (Abound, 1974). Statistical analysis of data was done by adopting the standard procedures of Gomez and Gomez (1984) and critical differences were worked out at five per cent probability level where the treatment differences were significant after estimating the analysis of variance.

RESULTS

The physiological weight loss during different days of storage was found to be significant for different media composition (Table 1). The physiological weight loss showed a uniform increasing trend with the increase in the storage life. The mean physiological loss in weight was the lowest in media composition M_5 (DCC @ 25% + Red soil @ 25%+ FYM @ 25% + Vermicompost @ 25%) with 11.33 per cent during the entire storage period of 15 days. In case of application of foliar nutrient spray,physiological loss in weight was the lowest in treatment I_6(Panchagavya @ 5% + Humic acid @ 2%) with 10.99 per cent during the entire storage period of 15 days.The highest overall mean for physiological loss in weight was recorded in I_1(water spray) with 13.73 per cent.

The firmness of the fruits were significantly influenced by the use of nutrient media and organic foliar nutrient spray and the values are presented in Table 2.The treatment combination of M_5I_6 (DCC @ 25% + Red soil @ 25%+ FYM @ 25%+Vermicompost @ 25% with Panchagavya @ 5% + Humic acid @ 2%) was observed to have high fruit firmness (0.7022 kg cm^{-2}) and lowest fruit firmness (0.2446 kg cm^{-2}) was recorded in M_2I_1 (DCC @ 50% + Vermicompost @ 50% with water spray).

The pericarp thickness of the fruits were significantly influenced by the use of nutrient media and organic foliar nutrient spray and the values are depicted in the Table 3. The fruits from nutrient media composition M_5 (DCC @ 25% + Red soil @ 25%+ FYM @ 25%+Vermicompost @ 25%) recorded high pericarp thickness (0.4252 mm). The use of foliar nutrient spray revealed that the treatment I_6(Panchagavya @ 5% + Humic acid @ 2%) recorded high pericarp thickness (0.4996 mm). The treatment combination of M_5I_6 (DCC @ 25% + Red soil @ 25%+ FYM @ 25%+Vermicompost @ 25% with Panchagavya @ 5% + Humic acid @ 2%)was observed to have high pericarp thickness (0.5360 mm).

The fruits from the nutrient media composition M_5 (DCC @ 25% + Red soil @ 25%+ FYM @ 25%+Vermicompost @ 25%) exhibited high shelf life 10.41 days and those from the nutrient media composition M_2 (DCC @ 50% + Vermicompost @ 50%) exhibited low shelf life 9.33 days respectively.The fruits from the treatment I_6(Panchagavya @ 5% + Humic acid @ 2%) exhibited high shelf life 11.88 days and the fruits from the treatment I_1(water spray) exhibited low shelf life 7.71 days (Table 4).The treatment combination of M_5I_6 (DCC @ 25% + Red soil @ 25%+ FYM @ 25%+ Vermicompost @ 25% with Panchagavya @ 5% + Humic acid @ 2%)was observed to have high shelf life of 14.27 days.

DISCUSSION

In the present study, the treatment combination M_5I_6 (DCC @ 25% + Red soil @ 25%+ FYM @ 25% + Vermicompost @ 25% with Panchagavya @ 5% + Humic acid @ 2%) significantly altered the physiological loss in weight, fruit firmess, pericarp thickness and shelf life of tomato during storage. The physiological loss in weight during storage occured continuously due to moisture loss, thereby the fruits losing their freshness. In the current investigation, the tomato fruits stored well for 8-14 days at ambient conditions. The rate of textural deterioration varied widely depending upon the commodity and storage conditions as observed earlier by various workers. Khamkar (1993) reported that the usage of vermicompost had the ability to increase the shelf life and quality of the produce when compared to other organic manures.

The maximum shelf life was observed in the foliar spray of Panchagavya @ 5% + Humic acid @ 2%. Baldotto (2013), stated that the foliar application of humic acid, which exhibited auxin-like activity, enhanced nutrient uptake which may be responsible for the longer vase life of cut stems. Application of humic acid significantly improved the fruit firmness (Pademet *al*. 1999) and in case of broccoli, humic acid application significantly reduced the water loss and enhanced the shelf life of broccoli (Ping and Able, 2001) supports the results of the present experiment. Zhao *et al*. (2010) reported that in cucumber, the addition vermicompost or vermicompost with organic-inorganic mixed fertilizers significantly improved the overall quality of cucumber, including the ratio of sugar to organic acid, vitamin C and soluble protein in greenhouse compared with addition of pure inorganic fertilizer and pure chick manure compost. Çolpan et al. (2013) opined that vermicompost is rich in potassium and thus potassium improved the yield and fruit quality of tomato which is in corroboration with the findings of the present study.

Table1. Effect of organic nutrient media and foliar spray on physiological weight loss (%) of fruits of TNAU Tomato Hybrid CO 3

	I_1	I_2	I_3	I_4	I_5	I_6	I_7	Mean
M_1	13.44	13.31	12.50	12.82	12.32	11.34	12.88	12.66
M_2	16.27	13.48	14.03	12.97	14.40	12.97	13.42	13.93
M_3	13.46	13.31	12.33	13.15	12.52	11.57	13.34	12.81
M_4	12.90	12.64	12.00	12.93	12.29	9.79	13.18	12.24
M_5	13.03	12.07	11.43	10.25	10.64	9.69	12.24	11.33
M_6	13.28	12.75	11.39	13.11	12.55	10.57	13.68	12.47
Mean	13.73	12.92	12.28	12.54	12.45	10.99	13.12	
	M	I	MxI					
CD (0.05)	0.61	0.66	1.61					

Table 2. Effect of organic nutrient media and foliar spray on firmness (kg cm^{-2}) of fruits of TNAU Tomato Hybrid CO 3

	I_1	I_2	I_3	I_4	I_5	I_6	I_7	Mean
M_1	0.3595	0.5712	0.5760	0.5276	0.4895	0.5937	0.4756	0.5133
M_2	0.2446	0.5483	0.5613	0.4199	0.4490	0.6040	0.4267	0.4648
M_3	0.4362	0.5534	0.5794	0.5341	0.5059	0.6741	0.4873	0.5386
M_4	0.4082	0.5756	0.5372	0.4641	0.4967	0.6714	0.4781	0.5188
M_5	0.4634	0.5959	0.5877	0.5355	0.5590	0.7022	0.4971	0.5630
M_6	0.4307	0.5647	0.5835	0.5130	0.5229	0.6729	0.4356	0.5319
Mean	0.3904	0.5682	0.5709	0.4990	0.5038	0.6531	0.4667	
	M	I	MxI					
CD (0.05)	0.05	0.05	0.12					

Table 3. Effect of organic nutrient media and foliar spray on Pericarp thickness (mm) of the fruits of TNAU Tomato Hybrid CO 3

	I_1	I_2	I_3	I_4	I_5	I_6	I_7	Mean
M_1	0.2460	0.3825	0.4355	0.3580	0.2925	0.4945	0.3505	0.3656
M_2	0.1725	0.4030	0.4165	0.2910	0.3170	0.4415	0.3300	0.3388
M_3	0.3330	0.3825	0.4460	0.3320	0.3585	0.5095	0.3500	0.3874
M_4	0.2715	0.4140	0.4565	0.3580	0.3385	0.5170	0.3505	0.3866
M_5	0.3200	0.4355	0.4885	0.3825	0.4000	0.5360	0.4140	0.4252
M_6	0.3165	0.4280	0.4605	0.3720	0.3540	0.4990	0.3300	0.3943
Mean	0.2766	0.4076	0.4506	0.3489	0.3434	0.4996	0.3542	
	M	I	MxI					
CD (0.05)	0.04	0.04	0.09					

Table 4. Effect of organic nutrient media and foliar spray on shelf life of the fruits (days) of TNAU Tomato Hybrid CO 3.

	I_1	I_2	I_3	I_4	I_5	I_6	I_7	Mean
M_1	7.29	9.86	10.63	9.94	10.45	11.80	9.07	9.86
M_2	6.52	9.55	9.84	9.59	9.95	11.36	8.50	9.33
M_3	8.04	9.76	10.13	8.95	9.55	11.16	8.78	9.48
M_4	8.23	10.13	11.33	9.63	10.26	11.66	9.20	10.06
M_5	8.19	10.39	11.43	9.55	10.39	14.27	8.69	10.41
M_6	8.00	10.19	11.23	9.10	9.96	11.04	8.80	9.76
Mean	7.71	9.98	10.76	9.46	10.09	11.88	8.84	
	M	I	MxI					
CD (0.05)	0.62	0.67	1.63					

REFERENCES

A.O.A.C.(1975).Official methods of analysis. Association of analytical chemists, Washington.

Abound, H.A.(1974). A study of physical and chemical changes observed in six commercial cultivars of field grown vine ripened tomatoes in the fresh state and after storage. Diss. Abstr., B-34:50-52

Baldotto, M.A.(2013). Gladiolus development in response to bulb treatment with different concentrations of humic acids.Revista Ceres, 60 (1): 138-142.

Çolpan, E., Zengin, M. and Zbahçe, A. (2013). The effects of potassium on the yield and fruit quality components of stick tomato. Hortic. Environ. Biotechnol. 54, 20–28.

Gaur, A.C.(2001).Organic Manure - A basic input in organic farming. Indian Fmg., 51(3): 3-6, 11.

Gomez, K.A. and Gomez, A.A. (1984). Statistical procedures for agricultural research.Wiley Inter Science Publication, John Wile and Sons, New York, USA, 680.

Khamkar, M. G.(1993). Vegetable farming using vermicompost. Proc. Congr. on Traditional Science and Technologies of India. Haryana Agricultural University, Hisar, 14-16, Feb., 1990.

Padem, H., Ocal, A. and Bieche,B.J.(1999).Effect of humic acid applications on yield and some characteristics of processing tomato. Acta Hort., 487: 159-163.

Ping, Y. and Able (2001).Effect of anti-transpiration agents on the water loss in broccoli during storage. China Vegetable, 4: 12-13.

Zhao, H., Luo, J., Dan, Y., Wang, A., Liu, P. and Feng, K. (2010). Effects of vermicompost organic-inorganic mixed fertilizer on yield and quality components of cucumber cultivated in greenhouse (in Chinese with English abstract). Plant Nutr.Fertil. Sci. 16, 1288–1293.