

ORIGINAL ARTICLE

Evaluation Effect of Media and Cultivars on Some Qualitative Traits in Pepper (*Capsicum annum* L.)

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ABSTRACT

Vermicompost is a bioorganic fertilizer rich food that affect on morphological and physiological traits of plant. To this purpose factorial experiment in a randomized complete block design with 18 treatments and three replications in a greenhouse of 10 Municipality of Tehran is done at 2011. Substrates in this study were: 1- vermicompost: perlite (1:1) 2- cocopeat: vermicompost (1:1) 3- coco peat: perlite: vermicompost (2:1:1) 4- coco peat: perlite: vermicompost (1:2:1) 5- cocopeat: perlite: vermicompost (1:1:2) 6- coco peat: perlite (1:1) and the three varieties of *Capsicum* were as follows: *Capsicum annum* var. Alonso, Roxy, Baiela. The result demonstrated that there are a significant difference in amount of TSS, Vitamin C, potassium, iron and calcium in 1% and phosphorus was significant at the 5% level of significance. Different varieties have different answers to the substrates, so that the number and variety Alonso, Roxy highest average in most traits have the highest performance. The results of vermicompost: coco peat (1:1) in soluble solids and phosphorus highest average vermicompost and perlite : coco peat (2:1:1) in characters vitamin C, has the highest average is also the highest potassium and iron, were in vermicompost : perlite : coco peat (1:2:1). Finally the vermicompost: perlite : coco peat (1:1:2) was have highest average of calcium.

Keywords: cocopeat, pepper, perlite, Vermicompost.

Received 02/08/2014 Accepted 24/11/2014

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How to cite this article:

Sahel M L, Vahid A, Mohammadreza H, Javad R. Evaluation Effect of Media and Cultivars on Some Qualitative Traits in Pepper (*Capsicum annum* L.). Adv. Biores., Vol 5 [4] December 2014: 140-144. DOI: 10.15515/abr.0976-4585.5.4.140-144

INTRODUCTION

Peppers, *Capsicum* spp., are grown worldwide for vegetable, spice, ornamental, medicinal and lachrymator uses and is a significant source of vitamins A and C [11]. Peppers have been found along with other food fossils from as early as 6,000 years ago and are considered the first spice to have been used by humans. *C. annum* has subsequently become one of the most important spice commodities as well as an important vegetable crop globally [11,15].

Successful transplanting after the Treasury stage is influenced by the plant type. Agricultural techniques appropriate the plant shape and select the appropriate substrate is one of the determinate factors. [3]. In addition to soil fertility the use of biologic fertilizers causes reducing the negative effects from the application of man-made chemical and synthetic fertilizers. Today, vermicomposting act as a valuable technique for rapid and efficient (in terms of cost and time) for the operational management of organic residues have been reported in various sources. Because the high amounts of nutrients in vermicompost in comparison by other biologic fertilizers can be an appropriate substrate and alternative of substrates such as peat and also use in soil amendment and use of them decreased the application of chemical fertilizers [12].

Nutrients in vermicompost are present in readily available forms for plant uptake; e.g. nitrates, exchangeable P, K, Ca and Mg [6]. Vermicompost is a nutrient-rich, microbiologically active organic amendment which results from the interactions between earthworms and microorganisms in the breakdown of organic matter. It is a stabilized, finely divided peat-like material with a low C:N ratio and high porosity and water-holding capacity that contains most nutrients in forms that are readily taken up by plants [5]. And the use of peat in horticulture has recently been questioned from an environmental

standpoint, since peat is a non-renewable resource and since it plays a major role in atmospheric CO₂ sequestration [15] therefore several investigations were carried out for evaluating the potential of other material for utilization of them as substrate. The substrate is one of the effective factors in plant growth and yield [13] so that stated perhaps the most important factor in production of greenhouse crops is the type of substrate. Vermicompost consists of available forms of nutrition plant uptake such as nitrates, exchangeable phosphorus, potassium, calcium and magnesium.

Trader, [10] cocopeat and fertilizers impact on growth and flowering of *Lilium cv Star gazer* review., And in this experiment sphagnum and bark, peat and sand, (1:1:5) was used as substrate and fertilizer levels in solution the main elements of the NPK results showed that *Lilium* flower earlier than they were grown in cocopeat substrate. Azarmy [4] studied the effect of vermicompost on soil chemical and physical properties of the tomato with a completely randomized block design (RCBD) with four replications. Different levels of vermicompost (0, 5, 10, 15 t ha⁻¹) in surface soil was 15 cm. Soil chemical and physical properties determined after three months from the addition of vermicompost in 15cm of soil. The results showed that organic carbon, manganese, calcium, potassium, phosphorus and nitrogen increased. Soil EC increased as well. Soil pH declined. Soil physical properties such as density, soil porosity improved and the positive effects of vermicompost on soil chemical and physical properties. Astaraei [2] to assess the quality of urban waste compost and vermicompost was conducted an experiment with different ratios 50/50, 70/30, 80/20 and 90/10 and mixture of each other with loam soil and control on bean in greenhouse. The highest amounts of nitrogen, phosphorus and potassium straw and bean seed treatments was observed in vermicompost that indicating that most available and absorb of these treatments. In order to evaluate the growth and characterization of vermicompost and compost of lettuce in a ratio of 80:20 and 50:80 an experiment was performed that results of the aerial and chlorophyll ratio of 80:20 enhanced because of increased activity of worms and humic acid and zinc. [1]. Arouei [1] research concluded that vermicompost is a nutrient-rich organic environment on physiological and morphological characteristics of plants is effective. So an experiment was conducted in agronomy faculty of Ferdowsi University at 2007, that 4 levels of vermicompost include of 10, 25, 50 and 100 percent and 1 level as control and also two levels of phosphorus for producing of tomatoes plantlets. The node characteristic was chlorophyll content and root uptake of N, P and K, respectively. Results showed a significant interaction effect of vermicompost and phosphorus in macro nutrient uptake and other nutrients were not significant. Among the characters throughout the knit simple phosphorus and chlorophyll content was not affected.

According to researches, results in indicated different reactions of growth stages of plant to differentiate levels of vermicompost. So the main goal of this research is effect of different levels of vermicompost and cocopeat on qualitative of pepper.

MATERIAL AND METHODS

This study was conducted to evaluate the effects of vermicompost and different substrates on pepper cultivations on 3 commercial varieties in a factorial experiment in a randomized complete block design with three replications and 18 treatments in greenhouse of Municipality of 10 region at 2011.

Treatments considered in this study include:

1. vermicompost: perlite 50:50
2. Coco peat: 50:50 vermicompost
3. Coco peat: perlite: vermicompost 50:25:25
4. Coco peat: perlite: vermicompost 25:50:25
5. Coco peat: perlite: vermicompost 25:25:50
6. Coco peat: perlite 50:50

The study was conducted on three varieties of *Capsicum*:

Capsicum annum var. *Alonso*, *Roxy*, *Baiela*.

In September 2010 coco peat + perlite planting seeds in trays of peppers were planted. After preparing platforms and pots when the plants reached stage 4 sheets of 12 cm diameter and 10 cm in length were transferred. And after fruit reached commercial maturity traits were measured in vitamin C and nutrient elements.

Vitamin C

Ripe fruits harvested randomize and grind and uniformed by mixer machine. Selected 2 sample of 30 g of this mixture and amount of vitamin C with standard method Index of Indophenol was calculated as mg per hundred grams of material [14].

Fruit soluble solids (TSS)

Handy ESR apparatus was used to measure this factor. A few drops of juice spilled on it and the amount of fruit TSS was read. (14).

Measuring the elements of the fruit

First, provides a warm ash samples were weighted and placed at 600 °C until a white ash is obtained. So the sample accomplished volume by 37% 2 Molar HCL to 200 cc and fall in sample 33cc. so spend in steam bath in half hour and cooled it. So spend it with filter paper and washed with distilled water so volume to 100 cc. it also made hundredth dilute solution (basic and diluted 2 concentration), and samples are read by atomic absorption [15].

Elements phosphorus and potassium

P values measure of olsen and potassium were measured and read by using atomic absorption. (15).

Methods of Data Analysis

After concluding the and given that the test randomized complete block design run was to assess the effects of treatments on the yield and quality of the product obtained using software MSTAT-C attempts to analyze the data and comparison Duncan's multiple range test was used. EXCEL program was used for the diagrams.

Table 1. Vermicompost features

PH	EC	OM%	OC%	C/N	N mg/k	P mg/k	K mg/k	Ca mg/k	Mg mg/k	Fe mg/k	Mn mg/k	Cu mg/k	Zn mg/k	Pb mg/k	Cd mg/k
7.64	1.12	56.8	32.9	21.25	1.55	0.4	0.4	2.73	0.65	5000	275	20	115	19	1

RESULT AND DISCUSSION

Analysis of variance table showed that effect of substrate, cultivar and interaction between the substrate and cultivars for all traits such as: soluble solids, vitamin C and amounts of fruit K and Fe was significant mean at 1% level and fruit's P was significant at 5% level (Table 1).

Table 2. The results of analysis of variance of studied factors

S.O.V	df	Mean of Squares					
		Tss	Vitamin C	P	K	Ca	Fe
Block	2	78/16**	46049/45**	365/264 ^{ns}	78150/9*	1446/3**	1548/9**
Cultivar(A)	5	2/374**	134548/1**	1919/52**	2253600/24**	2956/5**	301/24**
Substrate(B)	2	13/17**	76877/003**	251/5 ^{ns}	1544069/13**	5692/1**	522/645**
A×B	10	2/708**	39071/441*	753/6*	2224906/7**	2455/8**	347/689**
Error	34	0/088	14024/78	271/69	18784/05	22/456	12/907
C.V%	-	3/6%	30/39%	24/1%	3/94%	4/21%	10/78%

ns: non significant; *: significant in 5%, **: significant in 1%.

Also, the results of the comparison means (Table 3), the highest average of coco peat: vermicompost (50:50) in Roxy cultivar was highest level of Tss And the least of them was coco peat: vermicompost (50:50) in Alonso, which was compatible examined the effect of vermicompost on the onions. Probably because of vermicompost nutrients in the root environment, efficient use of water and nutrients to the plant provides. Also, the results of the comparison, the highest average of vitamin C was vermicompost: perlite: cocopeat (25:25:50) in Roxy cultivar. Cocopeat: perlite (50:50) in Alonso cultivar. The results of the comparison mean the highest average of phosphorous (P), cocopeat : vermicompost (50:50) Baiela and least was treatment cocopeat : perlite : vermicompost (25:50:25) Alonso. This results was conforms to the results of Azarmy [4]. And Arouei in 2009 reported that 25 % of vermicompost have most absorption in pepper but in the context of this study, the maximum of 50% vermicompost highest. Reinecks, et al.[8], reported that vermicompost medium is able to convert phosphorus into forms available to plants. Renato et al., [9] Reported that phosphorus is increasing vermicompost increases. The results of the comparison mean the highest average of Potassium (K), cocopeat: perlite: vermicompost (25:50:25) in Roxy cultivar and least average was at vermicompost: perlite (50:50) in the Baiela. The results of the comparison mean the highest average of Iron (Fe) was in, cocopeat: perlite: vermicompost (25:50:25) in Roxy cultivar and least average is cocopeat: vermicompost (50:50) the figure was Baiela. Absorption is a function of soil pH and vermicompost has provided these conditions with greater increases in fruit are absorbed. Azarmy's results at [4] on a capsicum are similar to our results at this

study. The comparison mean the highest average of Calcium (Ca) was in, coco peat: perlite: vermicompost (25:25:50) in Roxy cultivar and least average cultivar treatments cocopeat: perlite: vermicompost (50:25:25) in Baiela.

Table 3. Comparison of means of substrates and cultivars of pepper on studied factors.

Comparison of means							
Parameter	cultivar	1	2	3	4	5	6
Tss	Alonso	7 ef	6/8 f	7/7 de	7 ef	7/7 de	7/7 de
	Roxy	8/8 bc	10/9 a	8/5 bc	8/567 bc	8/133 cd	8/133 cd
	Baiela	7/7 de	9 b	10/5 a	8/5 bc	8/1 cd	8/1 cd
Vitamin C	Alonso	400/4 bc	422/4 bc	334/2 bcd	572 ab	316/8 bcd	316/8 bcd
	Roxy	501/6 b	396 bc	796/4 a	396 bc	409/1 bc	409/1 bc
	Baiela	400/4 bc	299/2 bcd	448/8 b	396 bc	422/4 bc	422/4 bc
P	Alonso	91/53 ab	71/73 abc	68/93 abc	40/33 c	76/6 abc	76/6 abc
	Roxy	77/73 abc	90/43 ab	60/2 bc	60/73 abc	53/3 bc	53/3 bc
	Baiela	79/5 abc	103/2 a	71/13 abc	91/77 ab	41/7 c	41/7 c
K	Alonso	4205 bc	4106 cd	2606 i	3108 g	3108 g	4505 b
	Roxy	3307 fg	2708 hi	3008 gh	5603 a	3706 e	3806 de
	Baiela	2010 j	4205 bc	2509 i	3507 ef	3307 fg	3337 fg
Fe	Alonso	48/6 a	38/9 b	34/7 b	38/6 b	36/2 b	23 def
	Roxy	30/1 bcd	32/6 bc	30/6 bcd	50/3 a	48/1 a	25/6 cde
	Baiela	15 f	50/1 a	31/4 bcd	24/2 cde	19 ef	23 def
Ca	Alonso	84/6 e	107/7 d	88/7 e	163/8 a	113/3 cd	82/3 e
	Roxy	164/2 a	108/7 d	105 d	123/6 c	169/2 a	123/9 c
	Baiela	85 e	146/7 b	65/4 f	84/7 e	123 c	85 e

CONCLUSION

According to experiment results positive effect of vermicompost on quantitative and qualitative properties of sweet pepper is recommended pH of vermicompost on seed germination and pepper to study, as compared with chemical fertilizers and manure vermicompost in the case of sweet pepper examined. Effects of vermicompost farm are being studied.

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