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Effect of FYM and organic solutions on yield and Quality of chilli (*Capsicum annum* L.)

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Abstract

A Field experiment was conducted during kharif season of 2018-19 at Research Experimental field, School of Agricultural sciences, G.H. Rasoni University, M.P. The experiment was laid out in a Factorial Randomized Block Design, comprising twelve treatment combinations. The results indicated that Significantly higher number of fruits per plant, weight of hundred dry Chilli fruits, dry Chilli fruit yield were recorded with treatment RDF (M2) and was on par with treatment FYM equivalent to RDN + RDFYM (M3) except fruit length, ascorbic acid and oleoresin content. Similarly, significantly higher number of fruits per plant, weight of hundred dry Chilli fruits, dry Chilli fruit yield, ascorbic acid and oleoresin content was recorded with treatment Jeevamrut (O2) and was at par with treatment Beejamrut + Jeevamrut + Amrutpani (O3) except fruit length.

Keywords: Chilli, yield, quality, organic solutions, manures

Introduction

Organic farming is an age old traditional practice evolved by our fore fathers, whereas only organic manures or natural inputs available on the farm are used thus reduces the cost of production against chemical inputs. Organic agriculture is a production system sustains the health of soil, ecosystem and people. It relies on ecological processes, biodiversity and cycles adopted to local conditions rather than the use of inputs with adverse effect. Global awareness of health and environmental issues is increasing in recent years and there is a growing demand for organically grown food products world wide. Before the Green revolution cultivation was mostly by natural and traditional farming methods which involve natural methods of maintaining soil fertility and controlling crop pests. Now a days organic farming practices are gaining importance as farmers have realized the benefits in terms of soil fertility, soil health, and sustainable productivity as well as aware about the use of organic solutions like Jeevamrut, Amrutpani, Beejamrut etc. They play a key role in promoting growth and yield of crops. Number of practices are adopted to achieve the goal of successful crop production in organic agriculture. Most of them are evolved by farmers themselves. Microorganisms are well activated in the soil by the addition of different organic solutions. The microorganisms such as nitrogen fixer, azotobacter, Azospirillum and phosphorous solubilizing bacteria like bacillus species are present in the cow dung that is used to prepare different solutions.

The application of the organic liquid formulations will enhance the soil microbial activity and population to a large extent. This in turn has a positive effect on growth and yield of crops. Chilli [*capsicum annum* L.] is an important spice crop and belonging to the family Solanaceae. Chilli fruits are rich source of vitamin C, A and E. The colour plays an important role in assessing the quality of Chilli. Chilli is now gaining more importance in the global market because of its value added products like Chilli powder, oleoresin, capsanthin and Chilli oil etc.

Material and Methods

The experiment was carried out at Research Experimental field and Department of Horticultural laboratory, School of Agricultural sciences, G H Rasoni University, M.P. The experiment was conducted with an aim of utilizing cheap and locally available organic solutions and manures as sources of nutrients. The experiment was laid out in a Factorial Randomized Block Design, comprising of three replications, and twelve treatment combinations, factor - 1 is manures it includes M₁ - FYM equivalent to RDN, M₂ - Recommended dose of fertilizers (100:50:50 kg N, P₂O₅, K₂O / ha), M₃ - FYM equivalent to RDN + RDFYM @ 25 t ha⁻¹, factor - 2 is organic solutions it includes O₁ - Beejamrut + Jeevamrut, O₂ - Jeevamrut, O₃ - Beejamrut + Jeevamrut + Amrutpani, O₄ - Control (no organic solutions). Beejamrut was prepared by following procedure, A drum with a capacity of

65 litres was taken and filled with 50 litres of water. Then 5 kg cowdung was taken and put in a cloth bag and was hanged in the drum in such a way that it was suspended in the middle of the water over night. Next day, the cloth bag containing dung was squeezed twice or thrice in the container and the cloth bag was removed. Then, the lime solution and cow urine were added to the dung extract solution and was used for seedling treatment. Amrutpani was prepared by following procedure, ingredients like cowdung 10 kg, cow urine 10 lit, cow ghee 200 ml, honey ghee 200 ml were put into a drum containing 200 litres water. After that cover the drum with lid and kept in shade and stirred thrice a day. After a week, the Amrutpani was ready and was used for soil application. Jeevamrut was prepared by following procedure, ingredients like cowdung 10 kg, cow urine 10 lit, jaggery 2 kg, legume flour 2 kg, soil 1 kg were put into a drum containing 200 litres water. After that cover the drum with lid and kept in shade and stirred thrice a day. After a week, the Jeevamrut was ready and was used for soil application. The yield parameters such as fruit length was measured from the base to the tip of the red ripe fresh fruits selected at random at the time of second picking and expressed in centimeter (cm). Number of fruits per plant were counted at first picking and second picking in five randomly selected plants and then the mean number of fruits per plant was worked out. Weight of hundreded dry Chilli fruits was taken after harvesting one hundreded fruits and were selected randomly and sun dried and their weight was recorded in gram (gm). Dry Chilli yield per hectare was estimated on the basis of total dry weight of Chilli fruits obtained from the net plot yield (kg/ha) was used for calculating yield and recorded in quintals per hectare. For the estimation of quality parameters, ascorbic acid content was analyzed in mature green fruits selected randomly. The oleoresin was determined in the representative composite samples of sun dried red Chilli fruits collected from each treatment. Ascorbic acid content in mature green fruits was estimated using 2,6-dichlorophenol indophenol dye by visual titration method (Sadasivam and Manickam, 1992) and was expressed in milligram per 100 gram. The oleoresin was determined as per the method stipulated in the ASTA statistical methods (Anon, 2004) [1]. One hundreded mg of ground chilli powder was transferred quantitatively to 100 ml volumetric flask. The contents were diluted to 100 ml volume with acetone and shaken and then allowed to stand for 2 minutes. From this 10 ml of the extract was pipette out into and diluted to 100 ml in a volumetric flask using acetone and mixed vigorously. The absorbance of the sample was recorded at 460 nm in a UV visible spectrophotometer as per the following formula and expressed in ASTA units. 164 is a conversion factor to express the oleoresin content in American Spice Trade Association (ASTA) units. Oleoresin yield per ha was worked out by using the formula.

$$\text{ASTA oleoresin extractable colour} = \frac{\text{Absorbance at 460 nm}}{\text{Sample weight (g)}} \times 164$$

Results and Discussions

The data pertaining to yield and quality of chilli viz., fruit length, number of fruits per plant, weight of hundred dry chilli fruits, dry chilli yield per hectare, ascorbic acid, oleoresin content as influenced by manures (M) and organic solutions (O) and their interactions are present in table 1. Highest fruit length was recorded with FYM equivalent to RDN + RDFYM (M 3) and was at par with treatment RDF (M 2) lowest fruit length was obtained with RDN (M 1) Datt *et al.* (2003) also reported significantly higher number of pods per plant with 20: 26. 20: 25 kg N: P₂O₅: K₂O ha⁻¹ over FYM @ 10 t ha⁻¹ besides recording higher pod yield. Significantly higher number of fruits per plant, weight of hundred dry chilli fruits, dry chilli fruit yield were recorded with RDF (M2) and was at par with FYM equivalent to RDN + RDFYM (M3) and lowest number of fruits per plant was recorded with FYM equivalent to RDN (M1) these findings are in conformity with those of Harikrishna *et al.* (2002) [5] recorded significantly higher yield of tomato with RDF (115: 100: 60 kg N: P₂O₅: K₂O / ha) over FYM alone applied @ 25 t ha⁻¹. Singh *et al.* (1999) [10] observed higher fruit length, fruit weight and fruit yield of chilli with the combined application of N and K₂O over control. Quality parameters like ascorbic acid content and oleoresin content was recorded with FYM equivalent to RDN + RDFYM (M 3) and was at par with FYM equivalent to RDN (M1) lowest ascorbic acid content was recorded with RDF (M2) present in table 2. These results are in agreement with the findings of Pither and Hall (1990) [8] in tomatoes and Malawadi *et al.* (2003) [6] in chilli who have reported higher content of ascorbic acid and oleoresin with the application of FYM and micronutrients.

Whereas, in organic solutions, significantly highest fruit length was recorded with jeevamrut (O2) lowest fruit length was recorded with (O4). Higher number of fruits per plant, weight of hundred dry chilli fruits, dry chilli fruit yield was recorded with jeevamrut (O2) and was at par with beejamrut+jeevamrut+amrutpani (O3) lowest number of fruits was obtained with control (O4) these research findings are in accordance with Palekar (2006) [7], Vasanth kumar (2006) [13] and Devakumar *et al.* (2008) revealed the beneficial effects of Jeevamrut was attributed to higher microbial load and growth hormones which might have enhanced the soil biomass there by sustaining the availability and uptake of applied as well as native soil nutrients which ultimately resulted in better growth and yield of crop. Quality parameters like ascorbic acid and oleoresin content was recorded with jeevamrut (O2) and was at par with beejamrut + jeevamrut + amrutpani (O3) lowest number of fruits was obtained with control (O4) present in table 2. These research findings are in accordance with Chaudhari *et al.* (2016) [3], the liquid manures (*Panch gavya*, *Jeevamrut* and *Sanjeevak*) provide balanced nutrition to the crops and helped to improve the quality, of yield as it provides readily available nutrients, growth hormones and microbes.

Table 1: Yield parameters of chilli as influenced by manures and organic solutions

Treatments	Fruit length	Number of fruits per plant	Weight of hundred dry chilli fruits	Dry chilli Yield
Factor – 1 Manures (M)				
M1- FYM equivalent to RDN	9.89	46.85	119.93	5.24
M2- RDF (100:50:50) N,P,K	9.98	47.25	128.39	6.12
M3- FYM equivalent to RDN + RDFYM @ 25t	10.21	39.73	123.39	5.37
SE+ ₋	0.01	0.19	0.01	0.01
CD	0.04	0.55	0.04	0.02
Factor - 2 Organic solutions (O)				
O1- Beejamrut + Jeevamrut	9.80	37.35	120.15	4.69
O2- Jeevamrut	10.57	54.83	131.43	6.95
O3- Beejamrut + Jeevamrut + Amrutpani	10.37	52.22	129.92	6.48
O4- Control	9.36	34.04	114.11	4.19
SE+ ₋	0.01	0.22	0.02	0.01
CD	0.04	0.63	0.05	0.03
Interactions (M X O)				
M1O1	9.24	42.05	117.21	4.05
M1O2	10.97	57.24	125.05	7.03
M1O3	10.23	57.23	127.14	6.60
M1O4	9.12	31.05	110.30	3.23
M2O1	9.96	34.19	125.14	5.44
M2O2	10.31	61.06	135.98	7.17
M2O3	10.53	54.17	132.41	7.31
M2O4	8.98	40.40	120.04	5.15
M3O1	10.19	35.81	118.10	4.59
M3O2	10.44	47.19	130.26	5.81
M3O3	10.36	45.27	133.19	6.37
M3O4	9.97	30.66	111.99	4.19
SE+ ₋	0.02	0.37	0.03	0.02
CD	0.07	1.10	0.08	0.05

Table 2: Quality parameters of chilli as influenced by manures and organic solutions

Treatments	Ascorbic acid	Oleoresin content
Factor – 1 Manures (M)		
M1 - FYM equivalent to RDN	125.65	210.84
M2 - RDF (100:50:50) N,P,K	114.35	199.58
M3 - FYM equivalent to RDN + RDFYM @ 25t	131.61	212.49
SE+ ₋	0.01	0.02
CD	0.04	0.04
Factor – 2 Organic solutions (O)		
O1	121.34	200.98
O2	128.93	215.04
O3	126.49	214.73
O4	118.71	199.80
SE+ ₋	0.02	0.02
CD	0.04	0.05
Interaction (M X O)		
M1O1	123.13	205.34
M1O2	128.92	215.96
M1O3	128.92	217.12
M1O4	122.31	204.95
M2O1	109.95	193.17
M2O2	118.20	204.91
M2O3	121.38	208.13
M2O4	107.86	192.11
M3O1	130.93	204.41
M3O2	135.36	221.96
M3O3	134.17	221.24
M3O4	125.97	202.35
SE+ ₋	0.03	0.03
CD	0.08	0.09

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