Review Article

Effect of different organic manures on establishment of passion fruit (*Passiflora edulis Sims*.) cv. Coorg Purple and Coorg Yellow under Prayagraj Agro-climatic conditions

ABSTRACT

The experiment was carried out at Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj during the year 2020-2021.The experiment were laid out in Randomized Block Design comprising of 8 treatments *viz.*, T_1 Control, T_2 Poultry manure (100%), T_3 FYM (100%), T_4 Vermicompost (100%), T_5 Control, T_6 Poultry manure (100%), T_7 FYM (100%) and T_8 Vermicompost (100%), with three replications. Result showed that treatment T_4 performed best in terms of plant height (86.77cm), number of branches plant (3.99) , number of leaves plant (40.33), stem girth (4.69mm), leaf area (124 sq/cm) and Chlorophyll Content (92.39 µmol per m2) .

Keywords: Passion Fruit, Organic media, FYM, Vermicompost.

1.INTRODUCTION

Passion fruit (*Passiflora edulis*), a native of tropical America (Brazil), belonging to the family Passifloraceae, is a high value and export oriented crop. Passion fruit stands out not only for its exotic and unique flavour and aroma but also for its amazing nutritional and medicinal properties the juice of passion fruit is acidic in nature and has an excellent flavor and is quite delicious, nutritious and liked by most people for its blending quality. Passion fruit are good source of vitamin-A, absorbic acid, riboflavin and niacin and also contains fair amount of minerals sodium, magnesium, sulphur and chlorides. Passion fruit

In India, passion fruit cultivation is confined to Kerala, Tamil Nadu (Nilgiri hills and Kodaikanal), Karnataka (Coorg) and Northeastern states (Mizoram, Nagaland, Manipur and Sikkim) with an area and production of 9.11 thousand ha and 45.82 thousand tons. The fruit is rich in Vitamin A and Vitamin C. There are two recognized forms of edible passion fruit; purple (*Passiflora edulis* Sims.) and yellow (*Passiflora edulis* f. *flavicarpa* Deg.).

The two widely cultivated varieties: a purple colored fruit type, P. edulis f. edulis, and the yellow colored fruit type P. edulis f. flavicarpa. Passion fruit vines usually produces a single flower at each node of the plant with a width of 5-7.5cm. The flower of passion fruit have five oblong greens sepals and five white petals. The sepals and petals of passion fruit is purple and has five stamens, a branched style and ovary. The style of passion flower tends to bend and anthers of the flower are situated on top of the style with very distinct head on top.

Areas identified as requiring immediate attention includes fertilizer recommendation for optimum fruit yield and quality. Fertilizer recommendations in particular have been variable. As these medias are well suited, cheap & are easily available, these could be suitable for farmer's use. The use of organic manures as a potential means of maintaining and increasing soil fertility and crop yields has been advocated.

The use of organic manures as a potential means of maintaining and increasing soil fertility and crop yields has been advocated **(Titiloye, 1982; Agboola and Adeoye, 1990; Anikwe, 2000)**. Soil organic matter is the natural reservoir which furnishes large portions of soil with nitrogen, phosphorus and sulphur and protects it against erosion. Desirable aggregate formation substances are also supplies by organic matter which helps to loosens up the soil for easy movement of air and water **(Donahue *et al*., 1983)**. Research has recorded the importance of organic matter to maintain soil condition and productive capacity in cereal growing areas and pasture lands of Australia**. Aitken *et al.* (1990) and Fenton and Helyar (2007)**, reported that the presence of soil organic matter can buffer against strong acidification caused by nitrate leaching and the removal of exchangeable cations such as Ca and Mg in agricultural produce. Soil health and soil condition is important and the management of soil organic matter is an important part of managing soil health and maintaining soil condition.

Organic matter acts as a reservoir for plant nutrients and prevents leaching loss of nutrients which are vital for plant growth. Organic manure also creates an environment that encourages

beneficial soil organisms i.e. earthworms. Organic matter undergoes mineralization with the release of substantial quantities of nitrogen, phosphorus, sulfur and small amount of micronutrients.

Farmyard manure is rich in nutrients and improves soil fertility. It refers to the decomposed mixture of dung and urine and farm animals along with litter and left over material from roughages or fodder fed to the cattle. Well decomposed farmyard manure contains 0.5% N, 0.2% P2O5 and 0.5% K2O.

Application of vermicompost in crop production is an important aspect of organic farming. Vermicompost can be used as effective 22manure in crop production as well as biofertiliser in maintaining soil health. Vermicompost is a rich nutritive organic fertilizer due to rich in humus, micronutrients, and beneficial soil microbes- nitrogen fixing and phosphorus solubilizing bacteria and actinomycetes and growth hormones "auxins" , „gibberlins" and cytokinins". Vermicompost contains several nutrient elements such as N-1.9%, C:N- 13.6 %, P- 2%, K- 0.8%, Zn- 100ppm and Mn-500ppm. Hence, the experiment at the Horticulture Research Farm, Department of Horticulture, SHUATS, Prayagraj was carried out during 2020-2022 with the objectives.

To determine the effect of different organic manures (poultry, FYM, vermicompost) on growth and survival of passion fruit.

2.MATERIALS AND METHODS

The experiment entitled was carried out the Department of Horticulture, Naini Agriculture Institute, SamHigginbottom University of Agriculture, Technology and Sciences, Prayagraj. Prayagraj is situated in the agro climatic zone (Sub-tropical belt) of Uttar Pradesh state. Geographically, Allahabad is located at of 20^0 15" North latitude, 60^0 3" East longitudes and at an altitude of 678 meters above mean sea level (MSL). The maximum temperature of the location reaches up to 46 ^{0}C – 48 ^{0}C and seldom falls as low as 4 ^{0}C – 5 ^{0}C. The relative humidity ranged between 20 to 94 per cent. The average rainfall in this area is around 1013.4 mm annually.

The experiment was laid out in Randomized Block Design (RBD) with three replications. The treatment consisted of different levels of FYM, Poultry Manure and Vermicompost. Thus, there were eight treatment combination including control *viz*, T_1 Control, T_2 Poultry manure (100%), T_3 FYM (100%), T_4 Vermicompost (100%), T_5 Control, T_6 Poultry (100%), T_7 FYM (100%), T_8 Vermicompost (100%). The entire organic manures materials were applied as a basal dose. Then required doses of fertilizers were applied 1st the month of December 2021. For application organic manures the top soil around the plant (equal to the leaf canopy of the plant) was dug up to 30cm and the manures were uniformly mixed in to the soil, which was then leveled. Weeding was done on every 15 days interval and Irrigation was done every alternative day, mostly in evening. The data collected on different parameters during the course of investigation were subjected to statistical analysis as per method of analysis of variance (Fisher 1918). The significance and non-significance of the treatment effect were judged with the help of "F" variance ratio test. Calculated "F" value (variance ratio) was compared with the table value of „F" at 5% level of significance. If calculated value exceeded the table value, the effect was considered to be significant. The significant difference between the means was tested against the critical difference at 5% level of significance.

3.RESULTS AND DISCUSSION

The progressive increase in plant height (86.77cm) was recorded in T_4 Vermicompost 100% followed by (82.22cm) in T_6 poultry manure 100% and the minimum plant height was recorded in T_1 Control with a reading of (61.57cm). The present findings corroborate with those of **Athani *et al.*, (2007), Naik and Babu (2007), Ram *et al.*, (2007), Ram and Pathak (2007), Kumar *et al.*, (2007), Dutta *et al.*, (2009), Patel *et al.*, (2009), Shukla *et al.*, (2009), Dwivedi (2013) and Agnihotri *et al.*, (2013)**

The progressive increase in number of branches (3.99) was recorded in T_4 Vermicompost 100% followed by (3.11) in T_6 Poultry manure 100% and the minimum number of branches were recorded in T_1 Control (2.55) . The present findings corroborate with those of **Athani *et al.*, (2007), Naik and Babu (2007), Ram *et al.*, (2007), Ram and Pathak (2007), Kumar *et al.*, (2007), Dutta *et al.*, (2009), Patel *et al.*, (2009), Shukla *et al.*, (2009), Dwivedi (2013) and Agnihotri *et al.*, (2013)**.

The progressive increase in number of leaves (40.33) was recorded in T_4 Vermicompost 100% followed by (35.55) in T_7 FYM and the minimum number of leaves were recorded in T_1 Control (27.11). The present findings corroborate with those of **Athani *et al.*, (2007), Naik and Babu (2007), Ram *et al.*, (2007), Ram and Pathak (2007), Kumar *et al.*, (2007),Dutta *et al.*, (2009), Patel *et al.*, (2009), Shukla *et al.*, (2009), Dwivedi (2013) andAgnihotri *et al.*, (2013)**.

The progressive increase in stem girth (mm) (4.69mm) was recorded in T_6 Poultry manure 100% followed by (4.45mm) in T_4 Vermicompost 100% and the minimum was recorded in T_1 Control (3.63mm) The present findings corroborate with those of **Athani *et al.*, (2007), Naik and Babu (2007), Ram *et al.*, (2007), Ram and Pathak (2007), Kumar *et al.*, (2007), Dutta *et al.*, (2009), Patel *et al.*, (2009), Shukla *et al.*, (2009), Dwivedi (2013) and Agnihotri*etal.*,(2013)**

The maximum leaf area (124sq/cm) was recorded in T_4 Vermicompost 100% followed by (119.84sq/cm) in T_7 FYM and the minimum was recorded in T_1 Control (80.69sq/cm). The present findings corroborate with those of **Athani *et al.*, (2007), Naik and Babu (2007), Ram *et al.*, (2007), Ram and Pathak (2007),Kumar *et al.*, (2007), Dutta *et al.*, (2009), Patel *et al.*, (2009), Shukla *et al.*, (2009), Dwivedi (2013) and Agnihotri *et al.*, (2013)**.

The highest chlorophyll content (92.39 sq/cm) was recorded in T_4 Vermicompost 100% followed by (90.10 sq/cm) in T_6 Poultry manure 100% and the minimum was recorded in T_5 Control (71.74sq/cm). This finding correlates the findings of **Coronel et al., (2009)** in Lettuce and **Hokmalipour et al., (2012)** in Maize

The maximum survival (%) (100) was found in treatment with T4 Vermicompost (100%) followed by T8 Vermicompost (100%) ,T7 FYM (100%) , T6 Poultry manure (100%), T5 Control, ,T3 FYM (100%) and T2 Poultry manure (100%) and the minimum survival (%) (66.67) was recorded in T_1 Control.

Table 1. Effects of different organic manures on the growth of passion fruit plant.

Treatments		T1	T2	T3	T4	T5	T6	T7	T8
Treatment details		Control (Coorg Purple)	Poultry manure (100%)	FYM (100%)	Vermicompost (100%)	Control (Coorg Yellow)	Poultry (100%)	FYM (100%)	Vermicompost (100%)
Plant height	30 DAP	18.67	23.33	21.89	27.89	19.44	22.77	24.55	21.77
	60 DAP	24.19	35	34	40.55	32.55	37.66	37.33	32.88
	90 DAP	41.12	55.33	58.44	64.11	58.77	59.89	57	55.11
	120 DAP	61.57	79.11	78.33	89.77	77.33	82.22	78.11	76.78
No of leaves	30 DAP	0.55	1.89	2.33	1.77	2.22	2.11	1.88	1.44
	60 DAP	2	2.22	2.33	2.88	2.33	2.33	2.44	2
	90 DAP	2.44	2.66	2.77	3.77	2.66	3.22	2.88	2.22
	120 DAP	2.55	2.77	3	3.99	3	3.11	2.99	2.77
No o0f branches	30 DAP	5.99	6.55	6.55	9.11	6.11	7	7.89	6.44
	60 DAP	8.78	9.55	9.55	13.66	8.66	10.33	11.55	9.93
	90 DAP	14.11	14.44	15.55	21.11	13.88	16.66	18.22	15.11
	120 DAP	27.11	28.66	29.44	40.33	27.66	30.22	35.55	30.22
Stem girth	30 DAP	2.71	2.93	2.89	3.01	2.8	3.3	2.89	2.05
	60 DAP	2.77	3.26	3.29	3.44	3.22	3.67	3.32	3.2
	90 DAP	3.07	3.75	3.74	3.95	3.79	4.19	3.83	3.66
	120 DAP	3.63	4.25	4.26	4.45	4.28	4.69	4.01	4.2

Table 2. Effects of different organic manures on leaf area, chlorophyll content and survival per cent of a passion fruit plant.

Treatment	Treatment combinations	leaf area(cm^2)	Chlorophyll content (µmol per m2)	Survival (%)
T1	Control (Coorg purple)	80.69	75.67	66.67
T2	Poultry manure (100%)	104.97	90.18	100.00
T3	FYM (100%)	105.02	89.03	100.00
T4	Vermicompost (100%)	124	92.39	100.00
T5	Control (Coorg yellow)	100.84	71.74	100.00
T6	Poultry (100%)	115.37	90.10	100.00
T7	FYM (100%)	119.84	86.41	100.00
T8	Vermicompost (100%)	103.54	77.81	100.00

4.CONCLUSION

On the basis of the investigation it is concluded that T4 Vermicompost 100% (Coorg Purple) performed best in terms of plant height (86.77cm), number of branches plant (3.99) , number of leaves plant (40.33), stem girth (4.69mm), leaf area (124 sq/cm) and Chlorophyll Content (92.39 µmol per m2) . The cost of establishment was found lowest in T1 (Rs 46,060 ha-1)

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