Effect of different growing media on growth, Establishment and survival of Passion fruit (*Passiflora edulis* Sims.*)* cv. Coorg purple

ABSTRACT

The present experiment was carried out during 2020 to 2021 in Research Field, Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Randomized Block Design (RBD), with seven treatments, replicated thrice with growing media (Farm yard manure, Vermicompost and Poultry manure) on Passion fruit. the treatments were T_1 Control (RDF 100% NPK)/ Plant, T_2 Vermicompost (50%) +Poultry Manure (25%) + FYM (25%), T_3 Vermicompost (25%) +Poultry Manure (50%) + FYM (25%), T_4 Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%), T_5 Poultry Manure (50%) + FYM (50%), T_6 Poultry Manure (50%) + Vermicompost (50%) and T_7 FYM (50%) + Vermicompost (50%). The results from the present investigation revealed that treatment T_7 followed by T_4 and T_5 was found superior in terms of Survival percentage and growth parameters of Passion fruit in growing media *i.e.* (Vermicompost, Poultry manures and Farm yard manures), in agro-climatic condition of Prayagraj in terms of cost of cultivation maximum cost was recorded in treatment T_3 and minimum in treatment T_1.

Keywords: Passion fruit, Growing media, FYM, Vermicompost and Poultry manure.

INTRODUCTION

Passion Fruit *(Passiflora edulis* Sims) is a native of Brazil. It belongs to the family *Passifloraceae*. It is grown mostly in tropical and sub-tropical parts of the world from South America to Australia, Asia and Africa.

Passion fruit prefers a tropical and sub-tropical climate with moderate rainfall ranging between 100 and 250 cm. It is found growing at an altitude of 800-1500 m above sea level. In purple passion fruit, cool temperatures are favorable for flower initiation and fruit set (18-23O C), while relatively high temperatures are necessary for promoting juice production (18-23O C) and improvement in quality.

In India, though passion fruit was introduced in early part of twentieth century but its cultivation was limited to few districts of Karnataka, Kerala and Tamil Nadu. Since last one decade passion fruit

cultivation started in some parts of northern India, especially North - Eastern states (Isutsa, 2004; Huh et al., 2017).

The total global supply of passion fruit is estimated at 8.52 lakh tons, with major producing countries comprising of Brazil, Mexico, Ecuador, Australia, Zimbabwe, Kenya and Columbia.

Growth media is a critical factor in seedling performance in nursery and subsequently (**Baiyeri, 2005**). The use of appropriate growing medium has been an important factor influencing growth and survival of seedlings in the nursery as well as field. Increase in passion fruit production will also encourage going for production of different post-harvest products and increasing in export amount will give us more foreign dollars. Increase in awareness and consumption of passion fruit among people will increase the health status of people staying in subtropical and tropical climates of India. Generally tropical and subtropical fruit plants start bearing in a 4 to 5 years' time period after planting. But a passion fruit plant starts bearing in 2-3 years whether propagated from seeds or cuttings. To check this research trail on **"To assess the effect of growing medias on growth, Establishment and Survival of passion fruit."** was conducted in Research field, Department of Horticulture, SHUATS, Prayagraj.

Fig 1: Location of Prayagraj district in Uttar Pradesh (India)

MATERIALS AND METHODS

The Experimental was conducted in Randomized Block Design (RBD) with 7 treatments and 3 replications in Research field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during the year 2020 - 2021. Total number of treatments were seven *viz.* T_1 Control (RDF 100% NPK)/ Plant, T_2 Vermicompost (50%) +Poultry Manure (25%) + FYM (25%), T_3 Vermicompost (25%) +Poultry Manure (50%) + FYM (25%), T_4 Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%), T_5 Poultry Manure (50%) + FYM (50%), T_6 Poultry Manure (50%) + Vermicompost (50%) and T_7 FYM (50%) + Vermicompost (50%).

Climatic condition in the experimental site

The area of Prayagraj district comes under subtropical belt in the south east of Utter Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46° C- 48° C and seldom falls as low as 4°C- 5°C. The relative humidity ranges between 20 to 94 %. The average rainfall in this area is around 1013.4 mm annually. However, occasional precipitation is also not uncommon during winter months.

Results and Discussion:

The present investigation was conducted on Passion fruit cultivar Coorg purple. Planted at a spacing of 2m x 2m

were tagged for the recording observations. The findings of the experiment are summarized in following heads.

(A.) Growth Parameters:

In parameter like Number of leaves/vine maximum number of leaves (18.10, 31.11, 46.77 and 59.30 leaves) at 30, 60, 90 and 120 days respectively was recorded in T_7 (FYM (50%) + Vermicompost (50%) followed by T_5 (Poultry Manure (50%) + FYM (50%) with (16.85, 28.88, 43.10 and 55.08 leaves/vines) at 30, 60, 90 and 120 days respectively whereas minimum number of leaves (11.37, 19.52, 29.16 and 37.18) at 30, 60, 90 and 120 days respectively was recorded in T_1 (Control). This increase might be due to the use of increased volume of farm yard manure with vermicompost as a media enhances the vegetative growth of Passion fruit. Similar findings were reported by **Saha *et al*., (2010), Grzyb *et al*., (2012)** and **Gupta *et al*., (2019).** Similarly in terms of Number of branches/vine maximum number of branches (1.49, 2.40, 3.27 and 4.73 branches/vines) at 30, 60, 90 and 120 days respectively was recorded in T_7 (FYM (50%) + Vermicompost (50%) followed by T_5 (Poultry Manure (50%) + FYM (50%) with (1.34, 2.19, 3.17 and 4.53 branches/vines) at 30, 60, 90 and 120 days respectively whereas minimum number of branches (1.03, 1.62, 2.15 and 3.30) at 30, 60, 90 and 120 days respectively was recorded in T_1 (Control). This might be due to better vegetative growth of the plants with supplemented of higher levels of N, P & K from farm yard manure and vermicompost which resulted in better accumulation of nutrients which enhance the growth of the plants. This finding correlates the findings of **Saha *et al*., (2010), Grzyb *et al*., (2012), Mahmud *et al*., (2018)** and **Gupta *et al*., (2019).**

In Vine spread maximum vine spread (16.70, 20.86, 29.54 and 37.33 cm) at 30, 60, 90 and 120 days respectively was recorded in T_7 (FYM (50%) + Vermicompost (50%) followed by T_4 (Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%) with (15.15, 18.93, 27.05 and 33.45 cm) at 30, 60, 90 and 120 days respectively whereas minimum vine spread (8.87, 12.34, 16.43 and 20.96 cm) at 30, 60, 90 and 120 days respectively was recorded in T_1 (Control). This might be due to better vegetative growth of the plants with supplemented of higher levels of N, P & K from farm yard manure and vermicompost which resulted in better accumulation of nutrients which enhance the growth of the plants. This finding correlates the findings of **Saha *et al*., (2010), Kumar *et al*., (2013), Mahmud *et al*., (2018)** and **Gupta *et al*., (2019).** Similarly in Number of tendrils/vines maximum number of tendrils/vines 11.80 was recorded in treatment T_7 (FYM (50%) + Vermicompost (50%), followed by T_5 (Poultry Manure (50%) + FYM (50%) with 10.96 tendrils/vines, whereas minimum 7.40 tendrils/vines were observed in treatment T_1 (Control). The improvement in number of tendrils/vines as a result of feeding of Farm yard manure, vermicompost and poultry manure might be due to enhanced photosynthetic and other metabolic activities which lead to increase in various plant metabolites responsible for cell division and elongation. This finding correlates the findings of **Saha *et al*., (2010).**

In terms of Stem girth (mm) maximum stem girth 2.93 mm, was recorded in treatment T_7 (FYM (50%) + Vermicompost (50%), followed by T_4 (Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%) with 2.90 mm, whereas

minimum 2.10 mm, was observed in treatment T_1 (Control). This might be due to enhanced photosynthesis, accumulation of carbohydrates, and development of cell wall and cell differentiations as they boost up overall vegetative growth, biological activity of the plants and retention of more leaves which increased plant size, besides increasing the stem diameter. This finding correlates the findings of **Arancon *et al.*, (2004)** in Strawberry, **Archana (2008)** in Guava and **Ram *et al.*, (2007)** in Plum.

In terms of Leaf area maximum Leaf area 157.89 cm^2, was recorded in treatment T_7 (FYM (50%) + Vermicompost (50%), followed by T_5 (Poultry Manure (50%) + FYM (50%) with 131.58 cm^2, whereas minimum 114.74 cm^2, was observed in treatment T_1 (Control). The maximum Leaf area in treatment T_7 after application of Farm yard manure and vermicompost might be due to enhanced photosynthetic and other metabolic activities which lead to increase in various plant metabolites responsible for cell division and elongation. This finding correlates the findings of **Arancon *et al.*, (2004)**, **Kai *et al.*, (2013)** and **Jain *et al.*, (2017).**

In terms of survival percentage maximum Survival percentage 90.49% was recorded in treatment T_7 (FYM (50%) + Vermicompost (50%)), followed by T_3 (Vermicompost (25%) +Poultry Manure (50%) +FYM (25%) with 82.70%, whereas minimum 73.52%, was observed in treatment T_1 (Control). The results of the present investigation showed that all the plants were survived with the application of NPK, Vermicompost, Poultry manure and Farm Yard Manure maximum survival percentage 90.49% was recorded in treatment T_7 (FYM (50%) + Vermicompost (50%)), followed by T_3 (Vermicompost (25%) +Poultry Manure (50%) +FYM (25%) while minimum survival percent (73.52%) observed with treatment T_1 (control). These results are in support with **Jain *et al.*, (2017)** and **Dwivedi and Agnihotri (2018).**

Similar trends were noticed in vine length where treatment T_7 (FYM (50%) + Vermicompost (50%) recorded maximum (40.20, 50.54, 60.52 and 69.74 cm) vine length at 30, 60, 90 and 120 days respectively followed by T_4 (Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%) with (33.77, 43.34, 52.53 and 60.75 cm), at 30, 60, 90 and 120 days respectively whereas minimum Vine length (16.22, 24.08, 30.43 and 36.75 cm) was recorded in T_1 (Control). This might be due to abundant supply of Nitrogen, Phosphorus and potash from vermicompost and farm yard manure, which helped the plants in better photosynthesis to attain vigor and ultimately growth parameters Vine length. This finding correlates the findings of **Saha *et al.*, (2010), Verma *et al.*, (2010), Singh *et al.*, (2011) and Kamatyanatti *et al.*, (2019).**

In terms of Economics the maximum Cost of cultivation (Rs. 128000.00)/ha is recorded in T_3 (Vermicompost (25%) + Poultry Manure (50%) + FYM (25%) followed by T_2 (Vermicompost (50%) + Poultry Manure (25%) + FYM (25%) with (Rs. 125000.00)/ha, minimum cost of cultivation (Rs. 110225.00) was recorded in T_1 (Control (RDF 100% NPK)/ Plant).

Table 1: Effect of different growing media on Vine spread, Number of tendrils/vines, Stem girth (mm), Leaf area (cm^2) and Total cost of cultivation of Passion fruit

Treatment Symbol	Treatment Combination	Vine Spread (cm)				Number of Tendrils/Vine	Stem girth (mm)	Leaf area (cm^2)	Total Cost (Rs/ha)
		30 DAT	60 DAT	90 DAT	120 DAT				
T_1	Control (RDF 100% NPK)/ Plant	8.87	12.34	16.43	20.96	7.40	2.10	119.70	110225
T_2	Vermicompost (50%) +Poultry Manure (25%) +FYM (25%)	12.10	16.03	22.06	27.59	8.14	2.46	114.74	125000
T_3	Vermicompost (25%) +Poultry Manure (50%) +FYM (25%)	13.28	16.75	23.83	29.46	9.76	2.62	120.70	128000
T_4	Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%)	15.15	18.93	27.05	33.45	10.72	2.90	125.22	123500
T_5	Poultry Manure (50%) + FYM (50%)	11.81	15.54	21.51	27.03	10.96	2.75	131.58	123000
T_6	Poultry Manure (50%) + Vermicompost (50%)	13.67	17.48	24.71	31.12	9.05	2.41	127.20	124000
T_7	FYM (50%) + Vermicompost (50%)	16.70	20.86	29.54	37.33	11.80	2.93	157.89	122000
F-Test		S	S	S	S	S	S	S	
SE(d)		0.278	0.338	0.505	0.639	0.115	0.028	1.403	
C.V.		2.606	2.459	2.620	2.646	1.452	1.343	1.341	
C.D. at 5%		0.613	0.745	1.112	1.407	0.253	0.063	3.090	

Table 2: Effect of different growing media on Survival percentage, Vine length, Number of leaves/vine and Number of branches/vines of Passion fruit

Treatment Symbol	Treatment Combination	Survival (%)	Vine Length (cm)				Number of leaves/vines				Number of Branches/Vine			
			30 DAT	60 DAT	90 DAT	120 DAT	30 DAT	60 DAT	90 DAT	120 DAT	30 DAT	60 DAT	90 DAT	120 DAT
T_1	Control (RDF 100% NPK)/ Plant	73.52	16.22	24.08	30.43	36.75	11.37	19.52	29.16	37.18	1.03	1.62	2.15	3.30
T_2	Vermicompost (50%) +Poultry Manure (25%) +FYM (25%)	78.12	23.50	31.55	40.50	47.56	12.51	21.44	32.07	40.84	1.08	1.75	2.42	3.51
T_3	Vermicompost (25%) +Poultry Manure (50%) +FYM (25%)	82.70	28.80	37.01	45.84	53.71	14 .97	25.76	38.53	49.05	1.14	1.85	2.56	3.77
T_4	Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%)	80.91	33.77	43.34	52.53	60.75	16.46	28.20	42.28	53.82	1.20	2.09	3.17	4.44
T_5	Poultry Manure (50%) + FYM (50%)	79.71	31.11	40.43	48.35	55.84	16.85	28.88	43.10	55.08	1.34	2.19	3.06	4.53
T_6	Poultry Manure (50%) + Vermicompost (50%)	82.08	24.88	33.59	41.97	50.14	13.99	23.97	35.85	45.49	1.06	1.80	2.65	3.54
T_7	FYM (50%) + Vermicompost (50%)	90.49	40.20	50.54	60.52	69.74	18.10	31.11	46.77	59.30	1.49	2.40	3.27	4.73
F-Test		S	S	S	S	S	S	S	S	S	S	S	S	S
SE(d)		0.502	0.520	0.493	0.484	0.485	0.195	0.329	0.404	0.585	0.020	0.024	0.024	0.107
C.V.		0.759	2.246	1.622	1.297	1.110	1.600	1.578	1.295	1.471	2.085	1.478	1.066	3.294
C.D. at 5%		1.106	1.146	1.086	1.067	1.068	0.429	0.725	0.891	1.288	0.045	0.052	0.053	0.235

CONCLUSION

Based on the present investigation it is concluded that treatment T_7 followed by T_4 and T_5 was found superior in terms of Survival percentage and growth parameters of Passion fruit in growing media *i.e.* (Vermicompost, Poultry manures and Farm yard manures), in agro-climatic condition of Prayagraj in terms of cost of cultivation maximum cost was recorded in treatment T_3 and minimum in treatment T_1.

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