

# 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<sub>1</sub> Control (RDF 100% NPK)/ Plant, T<sub>2</sub> Vermicompost (50%) +Poultry Manure (25%) + FYM (25%), T<sub>3</sub> Vermicompost (25%) +Poultry Manure (50%) + FYM (25%), T<sub>4</sub> Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%), T<sub>5</sub> Poultry Manure (50%) + FYM (50%), T<sub>6</sub> Poultry Manure (50%) + Vermicompost (50%) and T<sub>7</sub> FYM (50%) + Vermicompost (50%). The results from the present investigation revealed that treatment T<sub>7</sub> followed by T<sub>4</sub> and T<sub>5</sub> 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<sub>3</sub> and minimum in treatment T<sub>1</sub>.

**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.

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<sub>1</sub> Control (RDF 100% NPK)/ Plant, T<sub>2</sub> Vermicompost (50%) +Poultry Manure (25%) + FYM (25%), T<sub>3</sub> Vermicompost (25%) +Poultry Manure (50%) + FYM (25%), T<sub>4</sub> Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%), T<sub>5</sub> Poultry Manure (50%) + FYM (50%), T<sub>6</sub> Poultry Manure (50%) + Vermicompost (50%) and T<sub>7</sub> 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<sub>7</sub> (FYM (50%) + Vermicompost (50%)) followed by T<sub>5</sub> (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<sub>1</sub> (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<sub>7</sub> (FYM (50%) + Vermicompost (50%)) followed by T<sub>5</sub> (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<sub>1</sub> (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<sub>7</sub> (FYM (50%) + Vermicompost (50%)) followed by T<sub>4</sub> (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<sub>1</sub> (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<sub>7</sub> (FYM (50%) + Vermicompost (50%)), followed by T<sub>5</sub> (Poultry Manure (50%) + FYM (50%)) with 10.96 tendrils/vines, whereas minimum 7.40 tendrils/vines were observed in treatment T<sub>1</sub> (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<sub>7</sub> (FYM (50%) + Vermicompost (50%)), followed by T<sub>4</sub> (Vermicompost (25%) + Poultry Manure (25%) + FYM (50%)) with 2.90 mm, whereas minimum 2.10 mm, was observed in treatment T<sub>1</sub> (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<sup>2</sup>, was recorded in treatment T<sub>7</sub> (FYM (50%) + Vermicompost (50%)), followed by T<sub>5</sub> (Poultry Manure (50%) + FYM (50%)) with 131.58 cm<sup>2</sup>, whereas minimum 114.74 cm<sup>2</sup>, was observed in treatment T<sub>1</sub> (Control). The maximum Leaf area in treatment T<sub>7</sub> 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<sub>7</sub> (FYM (50%) + Vermicompost (50%)), followed by T<sub>3</sub> (Vermicompost (25%) + Poultry Manure (50%) + FYM (25%)) with 82.70%, whereas

minimum 73.52%, was observed in treatment T<sub>1</sub> (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<sub>7</sub> (FYM (50%) + Vermicompost (50%)), followed by T<sub>3</sub> (Vermicompost (25%) + Poultry Manure (50%) + FYM (25%)) while minimum survival percent (73.52%) observed with treatment T<sub>1</sub> (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<sub>7</sub> (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<sub>4</sub> (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<sub>1</sub> (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<sub>3</sub> (Vermicompost (25%) + Poultry Manure (50%) + FYM (25%)) followed by T<sub>2</sub> (Vermicompost (50%) + Poultry Manure (25%) + FYM (25%)) with

(Rs. 125000.00)/ha, minimum cost of cultivation (Rs. 110225.00) was recorded in T<sub>1</sub> (Control (RDF 100% NPK)/ Plant).

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**Table 1:** Effect of different growing media on Vine spread, Number of tendrils/vines, Stem girth (mm), Leaf area (cm<sup>2</sup>) 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 <sup>2</sup> )	Total Cost (Rs/ha)
		30 DAT	60 DAT	90 DAT	120 DAT				
T <sub>1</sub>	Control (RDF 100% NPK)/ Plant	8.87	12.34	16.43	20.96	7.40	2.10	119.70	110225
T <sub>2</sub>	Vermicompost (50%) +Poultry Manure (25%) +FYM (25%)	12.10	16.03	22.06	27.59	8.14	2.46	114.74	125000
T <sub>3</sub>	Vermicompost (25%) +Poultry Manure (50%) +FYM (25%)	13.28	16.75	23.83	29.46	9.76	2.62	120.70	128000
T <sub>4</sub>	Vermicompost (25%) + Poultry Manure (25 %) + FYM (50%)	15.15	18.93	27.05	33.45	10.72	2.90	125.22	123500
T <sub>5</sub>	Poultry Manure (50%) + FYM (50%)	11.81	15.54	21.51	27.03	10.96	2.75	131.58	123000
T <sub>6</sub>	Poultry Manure (50%) + Vermicompost (50%)	13.67	17.48	24.71	31.12	9.05	2.41	127.20	124000
T <sub>7</sub>	FYM (50%) + Vermicompost (50%)	16.70	20.86	29.54	37.33	11.80	2.93	157.89	122000
<b>F-Test</b>		S	S	S	S	S	S	S	
<b>SE(d)</b>		0.278	0.338	0.505	0.639	0.115	0.028	1.403	
<b>C.V.</b>		2.606	2.459	2.620	2.646	1.452	1.343	1.341	
<b>C.D. at 5%</b>		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 <sub>1</sub>	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 <sub>2</sub>	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 <sub>3</sub>	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 <sub>4</sub>	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 <sub>5</sub>	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 <sub>6</sub>	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 <sub>7</sub>	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
<b>F-Test</b>		S	S	S	S	S	S	S	S	S	S	S	S	S
<b>SE(d)</b>		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
<b>C.V.</b>		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
<b>C.D. at 5%</b>		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<sub>7</sub> followed by T<sub>4</sub> and T<sub>5</sub> 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<sub>3</sub> and minimum in treatment T<sub>1</sub>.

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