Effect of different levels of Panchgavya and FYM on growth and establishment of papaya (*Carica papaya* L.) cv. Red lady

ABSTRACT

The present investigation was carried out at Central Research Field (CRF), Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, during the period 2023. The experiment was laid in completely randomized block design with 10 treatments and was replicated three times. Papaya c.v. Red lady were collected from Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Science, Praygaraj. Seedling were raised in polybag and 45 days old seedling were transplanted to the main field. Manure and fertilizer were applied as per treatment in ten equal split doses at 30,60 and 90days intervals. The treatment T_9(RDF) FYM+ Panchgavya (90ml/l) registered significantly maximum vegetative growth, chlorophyll content and survivality %. On the basis of our experimental findings it can be concluded that the best result was found in treatment T_9(RDF) FYM+ Panchgavya (90ml/l) in term of vegetative growth parameters viz., plant height (cm), Number of leaves per plant, stem diameter (mm), leaf area (cm^2) and root to shoot ratio, leaf area index (LAI), chlorophyll content and survivality % of papaya (Carica papaya L.) cv. Red lady; the minimum cost of cultivation was found in Treatment T0 which was 57,800/-.

Key words:-Panchgavya, organic manure, NPK, growth, and survival and papaya

INTRODUCTION

Papaya (*Carica papaya* L.) is an evergreen herbaceous commercial fruit crop of tropical and subtropical regions and belongs to the family Caricaceae. Papaya is one among the fruits which has attained a great popularity in recent years because of gynodioecious nature, its easy cultivation, quick returns, adoptability to diverse soil and climatic conditions and above all its attractive delicious wholesome fruits having multifarious uses **Agrawal and Sahu (2021).** Organic manure binds soil particles into structural units called aggregates. These aggregates help to maintain a loose, open, granular condition. Organic matter increased water-holding capacity of soil and reduced surface run off and erosion due to infiltration. Organic matter serves as a reservoir of chemical elements that are essential for plant growth. Most of the soil nitrogen occurs in organic combination. Also, a considerable quantity of phosphorus and sulfur exist in organic forms upon decomposition, organic matter supplied the nutrients needed by growing plants, as well as many hormones and antibiotics **Devi and Singh (2023).** FYM being a bulky organic manure improves soil aeration in addition to the supply of essential plant nutrients and organic matter thereby increasing the soils biological activities. FYM also provided room for better microbial establishment along with the accumulation of excess humus content **Mohapatra *et al.*, (2016).** So, conjunctive use of chemical fertilizers, cow-based bio-enhancers and organic fertilizers sustain crop production and maintain soil health. Cow based bio-enhancers like panchagavya **Patel and Ramdevputra (2021).** This experiment was carried to study the objectives which are; To find out the suitable treatment in relation to establish Papaya and to estimate the cost of

establishment. In the text, citations should be indicated by the reference number in brackets [3]. https://journaljabb.com/index.php/JABB/about/submissions

MATERIALS AND METHODS

The experiment was carried out at Horticulture Research Field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, during the period May to August 2023. Prayagraj comes under subtropical climate zone prevailing in the winter and summer. It is situated at latitude of 25.85^0C N and longitude of 81.15^0E. The altitude of this place is 78 m from MSL. During the winter months, the temperature drops down as low as 2^0C while in the summer the temperature reaches above 48^0C hot desiccating winds are regular feature during summers whereas there may be occasional spell of frost during the winters. Papaya c.v. Red lady were collected from Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Science, Praygaraj. Seedling were raised in plogybag and 45 days old seedling were transplanted to the main field. The experiment was laid out in Randomized Block Design with tenth treatments and three replications. The treatment comprised of tenth FYM and Panchgavya. Likewise, T_0 Control, T_1 (RDF) FYM+ Panchgavya (10ml/l), T_2 (RDF) FYM+ Panchgavya (20ml/l), T_3 (RDF) FYM+ Panchgavya (30ml/l), T_4 (RDF) FYM+ Panchgavya (40ml/l), T_5 (RDF) FYM+ Panchgavya (50ml/l), T_6 (RDF) FYM+ Panchgavya (60ml/l), T_7 (RDF) FYM+ Panchgavya (70ml/l), T_8 (RDF) FYM+ Panchgavya (80ml/l) and T_9 (RDF) FYM+ Panchgavya (90ml/l). The seedlings of papaya were transplanted in the field adopting a spacing of 2 x 2 m. The data recorded on vegetative growth viz., plant height (cm), number of leaves per plant, stem diameter (mm), leaf area (cm^2), leaf area index (LAI), chlorophyll content and root to shoot ratio were analyzed statistically **(Panse and Sukhatme, 1967).** In the text, citations should be indicated by the reference number in brackets [3].

RESULTS AND DISCUSSION

1. **Plant Height.**

Data of vegetative growth parameters of papaya influenced by application of different levels of RDF, FYM and panchgavya are presented in table 1. Tables and figures should be presented as per their appearance in the text. Observation on plant height (cm), Number of leaves per plant, stem diameter (cm), leaf area (cm^2) and leaf area index LAI recorded at 30 DAT intervals from 30 to 90 DAT showed significant variation among the treatment. Statistical analysis at 90 DAT revealed a highest plant height of (59.56cm) was found in treatment T_9 (RDF) FYM+ Panchgavya (90ml/l), which was on par withT_8(RDF) FYM+ Panchgavya (80ml/l) and differed significantly from other treatments. It was followed by (RDF) FYM+ Panchgavya (60ml/l), (RDF) FYM+ Panchgavya (70ml/l), (RDF) FYM+ Panchgavya (40ml/l) and (RDF) FYM+ Panchgavya (50ml/l). Whereas the minimum plant height (38.87) was found in treatment T_0Control. **Shrivastava, 2008.** In the text, citations should be indicated by the reference number in brackets [3].

2. **Number of leaves per plant.**

Statistical analysis at 90 DAT revealed a highest numbere of leaves per plant of (18.76) was found in treatment T_9(RDF) FYM+ Panchgavya (90ml/l), which was on par withT_8(RDF) FYM+ Panchgavya (80ml/l) and differed significantly from other treatments. It was followed by (RDF) FYM+

Panchgavya (70ml/l),(RDF) FYM+ Panchgavya (60ml/l) and (RDF) FYM+ Panchgavya (50ml/l). Where as the minimum numbere of leaves per plant (12.68) was found in treatment T_0Control. **Shrivastava, 2008.** In the text, citations should be indicated by the reference number in brackets [3].

3. **Stem Diameter**

Statistical analysis at 90 DAT revealed a highest stem diameter (cm)of (2.64) was found in treatment T_9(RDF) FYM+ Panchgavya (90ml/l), which was on par withT_8(RDF) FYM+ Panchgavya (80ml/l) and differed significantly from other treatments. It was followed by (RDF) FYM+ Panchgavya (50ml/l), (RDF) FYM+ Panchgavya (60ml/l), (RDF) FYM+ Panchgavya (70ml/l). Where as the minimum stem diameter (mm) (2.02) was found in treatment T_0Control. **Shrivastava, 2008.** In the text, citations should be indicated by the reference number in brackets [3].

4. **Leaf Area**

Statistical analysis at 90 DAT revealed a highest leaf area (cm^2) of (143.72) was found in treatment T_9(RDF) FYM+ Panchgavya (90ml/l), which was on par withT_8(RDF) FYM+ Panchgavya (80ml/l) and differed significantly from other treatments. It was followed by (RDF) FYM+ Panchgavya (50ml/l), (RDF) FYM+ Panchgavya (60ml/l), (RDF) FYM+ Panchgavya (70ml/l). Where as the minimum leaf area (cm^2) (106.55) was found in treatment T_0Control. **Shrivastava, 2008.** In the text, citations should be indicated by the reference number in brackets [3].

5. **Leaf Area Index (LAI)**

Statistical analysis at 90 DAT revealed a highest leaf area index (LAI) of (3.59) was found in treatment T_9(RDF) FYM+ Panchgavya (90ml/l), which was on par withT_8(RDF) FYM+ Panchgavya (80ml/l) and differed significantly from other treatments. It was followed by (RDF) FYM+ Panchgavya (50ml/l), (RDF) FYM+ Panchgavya (60ml/l), (RDF) FYM+ Panchgavya (70ml/l). Where as the minimum leaf area index (LAI) (2.66) was found in treatment T_0Control. **Shrivastava, 2008.** In the text, citations should be indicated by the reference number in brackets [3].

The higher nutrient content and metabolic levels enhanced the growth parameters, ultimately leading to higher yield. The results are also in close conformity with the findings of **Ravishanker *et al.* (2010) and Chaudhri *et al.* (2001)** in papaya. In the text, citations should be indicated by the reference number in brackets [3].

6. **Chlorophyll content**

The data obtained on chlorophyll content (spad value), root to shoot ratio and survival (%) in papaya after application of different levels of RDF, FYM and panchgavya are illustrated in table 2. Statistical analysis of the results indicated that the Chlorophyll content (SPAD value) in papaya leaf provided with different levels of panchgavya and FYM differed significantly. The treatment T_9(RDF) FYM+ Panchgavya (90ml/l) registered significantly maximum Chlorophyll content (53.78 SPAD value). It was foud to be on par with (RDF) FYM+ Panchgavya (60ml/l), (RDF) FYM+ Panchgavya (70ml/l). Where as the minimum Chlorophyll content (SPAD value) (49.10) was found in treatment

T_0Control. **Reddy *et al.* (2013)** In the text, citations should be indicated by the reference number in brackets [3].

7. **Root to Shoot Ratio**

The treatment T_9(RDF) FYM+ Panchgavya (90ml/l) registered significantly maximum root to shoot ratio (0.245). It was found to be on par with (RDF) FYM+ Panchgavya (60ml/l), (RDF) FYM+ Panchgavya (70ml/l). Where as the minimum root to shoot ratio (0.210) was found in treatment T_0Control. **Reddy *et al.* (2013)** In the text, citations should be indicated by the reference number in brackets [3].

8. **Survival percentage**

The treatment T_9(RDF) FYM+ Panchgavya (90ml/l) registered significantly maximum survival (%) (93.33). It was followed by (RDF) FYM+ Panchgavya (60ml/l), (RDF) FYM+ Panchgavya (70ml/l) and(RDF) FYM+ Panchgavya (80ml/l). Where as the minimum survival (%) (46.67) was found in treatment T_0Control. The findings of current investigation are in agreement with that of **Reddy *et al.* (2013)** where they reported that in papaya cv Surya, crop growth was better with 75% recommended dose of fertilizer applied as farm yard manure + vermicompost, which was significantly superior that in 100% recommended dose of fertilizer and no manure/fertilizer treatment and in conformation with that of **Nanaso and Pawar (2020)** in sweet orange (*Citrus sinensis* L.) Osbeck) cv Mosambi. In the text, citations should be indicated by the reference number in brackets [3].

CONCLUSION

From the present investigation it is concluded that treatment (T_9 : RDF FYM+ Panchgavya 90ml/l) performed best in terms of growth parameters viz., plant height, number of leaves, stem diameter, leaf area and leaf area index, chlorophyll content, root to shoot ratio and survival percentage of Papaya c.v. Red Lady.

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Table 1: Effect of different levels of RDF, FYM and panchgavya on vegetative growth parameters of papaya (*Carica papaya* L.) cv. Red lady Tables and figures should be presented as per their appearance in the text. https://journaljabb.com/index.php/JABB/about/submissions

Treatment No.		Vegetative growth parameters											
		Plant height (cm)				Number of leaves per plant				Stem diameter (cm)			
	Treatment details	Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS
T_0	Control	15.43	22.51	31.62	38.87	4.47	6.24	9.04	12.68	1.06	1.24	1.48	2.02
T_1	(RDF) FYM+ Panchgavya (10ml/l)	18.73	30.06	42.41	48.48	5.72	7.11	11.10	13.07	1.11	1.29	1.76	2.25
T_2	(RDF) FYM+ Panchgavya (20ml/l)	20.27	29.63	38.34	46.76	5.48	7.23	11.53	13.81	1.13	1.33	1.77	2.30
T_3	(RDF) FYM+ Panchgavya (30ml/l)	19.76	30.73	42.43	48.74	5.86	7.28	12.09	15.36	1.16	1.37	1.81	2.34
T_4	(RDF) FYM+ Panchgavya (40ml/l)	18.10	30.49	46.67	51.83	5.90	7.43	12.34	15.75	1.21	1.42	1.83	2.37
T_5	(RDF) FYM+ Panchgavya (50ml/l)	20.11	27.33	42.41	51.08	6.07	8.16	12.57	16.03	1.26	1.52	1.87	2.45
T_6	(RDF) FYM+ Panchgavya (60ml/l)	19.23	32.49	45.01	55.31	5.27	8.27	13.20	16.40	1.31	1.57	1.92	2.50
T_7	(RDF) FYM+ Panchgavya (70ml/l)	18.51	32.40	44.02	52.56	6.06	8.38	13.84	17.19	1.35	1.64	1.96	2.55
T_8	(RDF) FYM+ Panchgavya (80ml/l)	21.73	34.73	49.29	57.53	6.22	8.51	15.37	18.24	1.41	1.74	2.05	2.60
T_9	(RDF) FYM+ Panchgavya (90ml/l)	23.97	36.47	50.13	59.56	6.42	9.01	15.53	18.76	1.58	1.83	2.09	2.64
	F-Test	-	**S**	**S**	**S**	-	**S**	**S**	**S**	-	**S**	**S**	**S**
	S.Ed.(+)	-	**1.24**	**0.92**	**1.11**	-	**0.22**	**0.23**	**0.28**	-	**0.03**	**0.03**	**0.03**
	C.D at 0.5%	-	**2.61**	**1.93**	**2.32**	-	**0.45**	**0.48**	**0.59**	-	**0.06**	**0.05**	**0.06**
	CV		**4.956**	**2.606**	**2.653**		**3.414**	**2.208**	**2.174**		**2.343**	**1.707**	**1.501**

Table 2: Effect of different levels of RDF, FYM and panchgavya on vegetative growth parameters of papaya (*Carica papaya* L.) cv. Red lady Tables and figures should be presented as per their appearance in the text.

Treatment No.		Vegetative growth parameters										
		Leaf area (cm^2)				LAI (Leaf area index)				Chlorophyll content (SPAD value)	root to shoot ratio	Survival (%)
	Treatment details	Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS			
T_0	Control	28.50	57.43	77.45	106.55	0.71	1.44	1.94	2.66	49.10	0.210	46.67
T_1	(RDF) FYM+ Panchgavya (10ml/l)	29.19	62.63	85.18	125.22	0.73	1.57	2.13	3.13	50.18	0.225	66.67
T_2	(RDF) FYM+ Panchgavya (20ml/l)	30.57	63.78	85.11	127.50	0.76	1.59	2.13	3.19	50.51	0.241	60.00
T_3	(RDF) FYM+ Panchgavya (30ml/l)	34.30	61.65	91.08	129.73	0.86	1.54	2.28	3.24	50.43	0.231	66.67
T_4	(RDF) FYM+ Panchgavya (40ml/l)	34.63	63.36	92.20	131.91	0.87	1.58	2.31	3.30	50.22	0.237	73.33
T_5	(RDF) FYM+ Panchgavya (50ml/l)	35.07	61.78	97.45	133.28	0.88	1.54	2.44	3.33	50.38	0.229	73.33
T_6	(RDF) FYM+ Panchgavya (60ml/l)	35.40	64.26	98.54	136.49	0.88	1.61	2.46	3.41	51.49	0.218	73.33
T_7	(RDF) FYM+ Panchgavya (70ml/l)	36.10	66.70	101.54	137.04	0.90	1.67	2.54	3.43	53.46	0.233	80.00
T_8	(RDF) FYM+ Panchgavya (80ml/l)	36.64	68.76	103.69	140.43	0.92	1.72	2.59	3.51	53.78	0.232	80.00
T_9	(RDF) FYM+ Panchgavya (90ml/l)	37.91	70.67	105.53	143.72	0.95	1.77	2.64	3.59	54.39	0.245	93.33
	F-Test	-	S	S	S	-	S	S	S	S	S	S
	S.Ed.(+)	-	1.29	1.28	1.31	-	0.03	0.03	0.03	0.465	0.008	11.62586
	C.D at 0.5%	-	2.71	2.68	2.76	-	0.07	0.07	0.07	0.977	0.017	24.42504
	CV		2.469	1.668	1.224		2.542	1.604	1.184	1.109	4.270	21.312