



EFFECT OF DIFFERENT ORGANIC MANURES ON GROWTH CONTRIBUTING CHARACTERS IN PADDY

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Abstract: The growth parameters of paddy in terms of plant height and number of tillers plant⁻¹ were maximum and statistically higher with the application of 2.5 t FYM ha⁻¹ + 0.750 t vermicompost ha⁻¹ + 0.375 t green leaves of glyricidia ha⁻¹ + 0.250 t neem cake ha⁻¹ (T₈). The next best treatment was application of 5 t FYM ha⁻¹ + 1.5 t vermicompost ha⁻¹ (T₅) were applied. The corresponding values were 93.7 cm and 11.3, respectively at harvest. However, the lowest values of different growth characters were observed under absolute control (T₀).

Key words: Organic manures, growth contributing characters, paddy.

Introduction

Oryza sativa is grown all over the world while *Oryza glaberrima* has been cultivated in West Africa for the last 3500 years. Rice (*Oryza sativa* L.) is one of the chief food grains of India. It is a staple food for about 2.8 billion of world population and determined 20 per cent of total human energy indeed (Lampe, 1995). Rice belongs to the genus *Oryza*, perennial grass in the Poaceae (grass family).

Organic farming is a production system which favors maximum use of organic material (crop residues, animal excreta, legumes, on and off farm organic wastes, growth regulators, biopesticides, etc.) and discourages use of synthetically produced agro-inputs for maintaining soil productivity and fertility and pest management under conditions of sustainable natural resources and healthy environment.

Currently, India ranks 33rd in terms of total land under organic cultivation and 88th position for agriculture land under organic crops to total farming area. In India about 2.8 million hectares area was under certified organic farming (this includes wild herb collection area of MP and UP) with about 1,95,741 farmers engaged in organic farming.

Use of organic sources is the solution, which aims at cooperating rather than confronting with nature eco friendly. Organic sources of nitrogen like

FYM, vermicompost, neem cake and glyricidia leaves helps to improve the soil health and also sustain the productivity.

Well decomposed farm yard manure, in addition to supplying plant nutrients, acts as binding material and improves the soil physical properties. FYM improves the physical condition of the soil by increasing water holding capacity for maximum utilization of water. It also improves the chemical and biological condition of soil by increasing cation exchange capacity and providing various vitamins, hormones and organic acids which are very important for soil aggregation and for beneficial micro-organisms which are involved in various biochemical processes and release of nutrients.

Vermicompost is rich in humus forming microbes and nitrogen fixers. Hence, these characters recognize the vermicompost as biofertilizer (Kale and Bano, 1986). Curry and Byrne (1992) found that earthworm derived nitrogen could supply 30 per cent of the total crop requirement as it is a potential source of readily available nutrients for plant growth.

Neem cake is an excellent organic fertilizer. Being a totally botanical product it contains 100 per cent natural NPK content and other essential micro nutrients. Neem cake acts as a nitrification inhibitor that reduces alkalinity in soil. As it produces organic acids on decomposition, it is compatible with soil

microbes and rhizosphere microflora and hence ensure fertility of soil. Neem cake improves the organic matter content of soil, helping improvement in soil texture, water holding capacity, soil aeration for better root development (Puri, 1999).

Green manuring is an age old agricultural practice of incorporating the succulent green portions of plants such as leaves, twigs and loppings of trees into soil. Unlike, FYM or compost, green manures have a narrow C/N ratio of 10 to 15 and therefore decompose quickly thus making available nitrogen present in them early. To study influence of

these manures on growth contributing characters of paddy, following experiment was conducted.

Material and Methods

The experiment was laid out in randomized block design with nine treatment combinations and three replications during *Kharif* Season 2013 at A.R.S. Farm, VadgaonMaval, Tal. Maval, Dist. Pune. The treatments comprising of FYM, vermicompost, neem cake, glyricidia leaves and their treatment combinations. The gross plot size was 4.80 m x 3.60 m and net plot size was 4.00 m x 3.00 m respectively. Variety VDN99-29 (Phule Samruddhi) of Paddy crop was selected for experiment.

Table 1: Treatment details

Treatment symbol	Description
T ₁	Application of 10 t FYM ha ⁻¹
T ₂	Application of 3 t vermicompostha ⁻¹
T ₃	Application of 1 t neem cake ha ⁻¹
T ₄	Application of 1.5 t green leaves of glyricidiaha ⁻¹
T ₅	Application of 5 t FYM ha ⁻¹ + 1.5 t vermicompostha ⁻¹
T ₆	Application of 5 t FYM ha ⁻¹ + 0.5 t neem cake ha ⁻¹
T ₇	Application of 5 t FYM ha ⁻¹ + 0.750 t glyricidiaha ⁻¹
T ₈	Application of 2.5 t FYM ha ⁻¹ + 0.750 t vermicompostha ⁻¹ + 0.375 t glyricidiaha ⁻¹ + 0.250 t neem cake ha ⁻¹
T ₉	Absolute control (No fertilizer application)

For recording growth observations, five plants were selected randomly from each net plot. The selected plants were labeled and were marked by fixing pegs near them. All periodical observations on the growth were recorded on selected plants. These selected plants were harvested separately for assessing the individual plant yield and yield attributes at harvest.

The initial and final plant count were recorded at 15th days after sowing and at harvest from randomly selected line of one meter row length from every net plots and converted on hectare basis.

The plant height generally indicates the growth of crop. Five randomly selected plants from each net plot were used for recording the plant height. The periodical plant height at 15 days interval from 15th day onwards till harvest was measured from ground level to the base of panicle in cm.

The total number of tillers from five randomly selected plants from each net plot was counted. The tillers recorded on 30th, 45th, 60th, 75th and 90th days of crop growth and at harvest.

Results and Discussion

The data with respect to mean initial and final plant count per hectare as influenced by different treatments are presented in Table 2

The mean initial plant count recorded on 15th day was 3.84 lakh ha⁻¹, while mean final plant count at harvest was 3.81 lakh ha⁻¹. From the Table 2, it was observed that the initial and final plant population was not significantly affected due to different treatments under study.

The biometric observations of organically grown paddy were recorded on various growth parameters viz., plant height were recorded at 15 days interval with effect from 15 DAT till harvest and number of tillers plant⁻¹ with effect from 30 DAT till harvest, days to 50% flowering and days to maturity were recorded at the time of their occurrence.

The data pertaining to mean plant height of paddy as influenced periodically by different treatments are presented in Table 3.

Table 2: Mean initial and final plant count (lakh ha⁻¹) as influenced by different treatments

Sr. No.	Treatment	Plant count (lakh ha ⁻¹)	
		Initial	Final
1.	T ₁ : 10 t FYM ha ⁻¹	3.83	3.80
2	T ₂ : 3 t vermicompost ha ⁻¹	3.84	3.81
3	T ₃ : 1t neem cake ha ⁻¹	3.84	3.80
4	T ₄ : 1.5 t green leaves of glyricidia ha ⁻¹	3.83	3.80
5	T ₅ : 5 t FYM ha ⁻¹ + 1.5 t vermicompost ha ⁻¹	3.83	3.82
6	T ₆ : 5 t FYM ha ⁻¹ + 0.5 t neem cake ha ⁻¹	3.85	3.82
7	T ₇ : 5 t FYM ha ⁻¹ + 0.750 t green leaves of glyricidia ha ⁻¹	3.84	3.81
8	T ₈ : 2.5 t FYM ha ⁻¹ + 0.750 t vermicompost ha ⁻¹ + 0.375 t green leaves of glyricidia ha ⁻¹ + 0.250 t neem cake ha ⁻¹	3.84	3.82
9	T ₉ : Absolute control	3.82	3.79
	S.E.m ±	0.01	0.01
	C.D. at 5%	NS	NS
	General mean	3.84	3.81

From the data in Table 3, it was revealed that the mean plant height increased with advancement in the age of the crop till harvest. The mean initial plant height was 26.1 cm at 15 DAT and increased up to 85.9 cm at harvest.

The mean plant height was significantly influenced by various treatments in paddy. The significantly higher plant height (29.3, 48.7, 62.4, 71.1, 84.2, 95.6 and 93.7cm) were recorded with the application of 2.5 t FYM ha⁻¹ + 0.750 t vermicompost ha⁻¹ + 0.375 t green leaves of glyricidia ha⁻¹ + 0.250 t neem cake ha⁻¹ (T₈) at all the growth stages except with the application of 5 t FYM ha⁻¹ + 1.5 t vermicompost ha⁻¹ (T₅) and the

application of 5 t FYM ha⁻¹ + 0.5 t neem cake ha⁻¹ (T₆), which was found at par at all the growth stages. Whereas, absolute control (T₉) recorded minimum plant height at all the growth stages. This was due to optimum temperature and relative humidity right from initial stage till harvest.

From the data, it revealed that all the treatments produced significantly taller plants compared to the control. The treatment T₈ recorded maximum plant height due to combined application of organic manures *i.e.*, FYM, vermicompost, neem cake and glyricidia compared to single application of anyone. These results were confirmed by Kler and Walia (2006).

Table 3: Mean plant height (cm) as influenced periodically by different treatments

Treatment	Days after transplanting						At harvest
	15	30	45	60	75	90	
T ₁ : 10 t FYM ha ⁻¹	23.7	37.3	51.7	61.4	73.1	80.3	80.0
T ₂ : 3 t vermicompost ha ⁻¹	24.3	40.2	54	63.5	75.2	85.7	84.3
T ₃ : 1 t neem cake ha ⁻¹	26.7	41.3	55.3	65.1	78.3	88.1	85.3
T ₄ : 1.5 t green leaves of glyricidia ha ⁻¹	24.7	39.7	53.7	62.6	74.0	83.7	83.0
T ₅ : 5 t FYM ha ⁻¹ + 1.5 t vermicompost ha ⁻¹	29.0	45.5	60.3	69.3	81.3	93.3	90.0
T ₆ : 5 t FYM ha ⁻¹ + 0.5 t neem cake ha ⁻¹	28.0	43.7	59.0	68.1	81.3	92.1	89.7
T ₇ : 5 t FYM ha ⁻¹ + 0.750 t green leaves of glyricidia ha ⁻¹	27.7	41.9	57.4	65.5	77.7	89.1	87.3
T ₈ : 2.5 t FYM ha ⁻¹ + 0.750 t vermicompost ha ⁻¹ + 0.375 t green leaves of glyricidia ha ⁻¹ + 0.250 t neem cake	29.3	48.7	62.4	71.1	84.2	95.6	93.7

ha ⁻¹							
T ₉ : Absolute control	21.0	39.3	51.1	61	72.0	80.7	79.7
S.E.m ±	1.7	1.7	2.1	2.0	1.5	1.7	1.8
C.D. at 5%	5.1	5.1	6.4	5.9	4.4	5.3	5.5
General mean	26.1	41.9	56.1	65.3	77.5	87.6	85.9

The data regarding mean number of tillers plant⁻¹ as influenced periodically by different treatments are presented in Table 4.

The mean number of tillers plant⁻¹ at 30, 45, 60, 75, 90 DAT and at harvest were 5.5, 7.4, 8.9, 10.4, 9.6 and 9.8 respectively. It was observed that the number of tillers plant⁻¹ was increased with advancement of the age of the crop up to 90 DAT and remained constant up to harvest.

The mean number of tillers plant⁻¹ were significantly influenced by different organic resources in paddy at all the growth stages. The significantly

higher number of tillers plant⁻¹ (6.8, 8.8, 10.4, 10.7, 11.1 and 11.3) were recorded with the application of 2.5 t FYM ha⁻¹ + 0.750 t vermicompost ha⁻¹ + 0.375 t green leaves of glyricidia ha⁻¹ + 0.250 t neem cake ha⁻¹ (T₈) at 30, 45, 60, 75, 90 DAT and at harvest, respectively, than rest of the treatments. The next best treatments were the application of 5 t FYM ha⁻¹ + 1.5 t vermicompost ha⁻¹ (T₅) and the application of 5 t FYM ha⁻¹ + 0.5 t neem cake ha⁻¹ (T₆) was found to be at par. Statistically minimum number of tillers plant⁻¹ was registered with absolute control (T₉) at all growth stages among all the treatments.

Table 4: Mean number of tillers plant⁻¹ as influenced periodically by different treatments

Treatment	Days after transplanting					At harvest
	30	45	60	75	90	
T ₁ : 10 t FYM ha ⁻¹	4.7	6.6	8.0	8.4	8.6	8.8
T ₂ : 3 t vermicompost ha ⁻¹	5.1	7.0	8.4	8.7	9.1	9.3
T ₃ : 1 t neem cake ha ⁻¹	5.7	7.6	8.8	9.3	9.7	9.9
T ₄ : 1.5 t green leaves of glyricidia ha ⁻¹	5.1	6.9	8.3	8.6	8.7	9.0
T ₅ : 5 t FYM ha ⁻¹ + 1.5 t vermicompost ha ⁻¹	6.3	8.1	9.4	9.9	10.3	10.5
T ₆ : 5 t FYM ha ⁻¹ + 0.5 t neem cake ha ⁻¹	6.07	8.1	10.1	10.2	10.5	10.7
T ₇ : 5 t FYM ha ⁻¹ + 0.750 t green leaves of glyricidia ha ⁻¹	5.7	7.4	9.2	9.5	9.7	9.9
T ₈ : 2.5 t FYM ha ⁻¹ + 0.750 t vermicompost ha ⁻¹ + 0.375 t green leaves of glyricidia ha ⁻¹ + 0.250 t neem cake ha ⁻¹	6.8	8.8	10.4	10.7	11.1	11.3
T ₉ : Absolute control	4.3	6.2	7.8	8.4	8.7	8.8
S.E.m ±	0.08	0.09	0.09	3.35	0.07	0.08
C.D. at 5%	0.23	0.28	0.26	10.04	0.21	0.23
General mean	5.5	7.4	8.9	10.4	9.6	9.8

The increase in number of tillers plant⁻¹ with T₈ might be due to enhanced and continuous supply of nutrients by the enriched organics and weather conditions during that period. These results are in conformity with the findings of Mohandas *et al.* (2008) and Dixit and Thorat (2005).

The observation on days to 50% flowering as influenced by different treatments in paddy are

recorded when paddy put forth 50% flowers compared to whole net plot. The data is presented in Table 5. The mean number of days to 50% flowering was significantly differed by influence of various treatments.

The lowest days to 50% flowering (94 days) was recorded with the control (T₉), whereas, the application of 2.5 t FYM ha⁻¹ + 0.750 t

vermicompost ha⁻¹ + 0.375 t glyricidia ha⁻¹ + 0.250 t neem cake ha⁻¹ (T₈) recorded the highest days to 50% flowering (97 days).

The observation on days to maturity as influenced by different treatments in paddy were recorded when paddy put forth to maturity. The data is presented in Table 5. The mean number of days to

maturity was significantly influenced by various treatments. The lowest days to maturity (124 days) was recorded with the control (T₉) whereas, the application of 2.5 t FYM ha⁻¹ + 0.750 t vermicompost ha⁻¹ + 0.375 t glyricidia ha⁻¹ + 0.250 t neem cake ha⁻¹ (T₈) was recorded the highest (128 days) days to maturity.

Table 5: Days to 50% flowering and days to maturity as influenced by different treatments

Treatment	Days to 50% flowering	Days to maturity
T ₁ : 10 t FYM ha ⁻¹	95	124
T ₂ : 3 t vermicompost ha ⁻¹	96	125
T ₃ : 1 t neem cake ha ⁻¹	96	126
T ₄ : 1.5 t green leaves of glyricidia ha ⁻¹	95	125
T ₅ : 5 t FYM ha ⁻¹ + 1.5 t vermicompost ha ⁻¹	97	127
T ₆ : 5 t FYM ha ⁻¹ + 0.5 t neem cake ha ⁻¹	96	126
T ₇ : 5 t FYM ha ⁻¹ + 0.750 t green leaves of glyricidia ha ⁻¹	96	126
T ₈ : 2.5 t FYM ha ⁻¹ + 0.750 t vermicompost ha ⁻¹ + 0.375 t green leaves of glyricidia ha ⁻¹ + 0.250 t neem cake ha ⁻¹	97	128
T ₉ : Absolute control	94	124
S.E.m ±	0.72	1.00
C.D. at 5%	2.18	2.98
General mean	96	126

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