E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; SP-7(9): 392-397
Received: 13-06-2024
Accepted: 17-07-2024

Neha Nevendra
M.Sc. (Agriculture), Department of Agronomy, Collage of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Dr. MC Bhambri
Professor, Department of Agronomy, Collage of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Dr. Sunil Kumar
Principal Scientist, Department of Agronomy, Collage of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Mukesh Chandrakar
M.Sc. (Ag.), Department of Agronomy, Collage of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Varun Kumar Diwakar
M.Sc. (Ag.), Department of Soil Science and Agricultural Chemistry, Institute of Agricultural Sciences, BHU, Varanasi, Uttar Pradesh India

Corresponding Author:
Neha Nevendra
M.Sc. (Agriculture), Department of Agronomy, Collage of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Effect of organic nutrient sources on growth and yield of traditional scented rice (*Oryza sativa* L.) variety Lokti Machhi Selection -1

Neha Nevendra, Dr. MC Bhambri, Dr. Sunil Kumar, Mukesh Chandrakar and Varun Kumar Diwakar

DOI: https://doi.org/10.33545/2618060X.2024.v7.i9Sf.1506

Abstract
A field experiment was carried out during *kharif* seasons of 2023 at Research cum Instructional Farm, I.G.K.V., Raipur (C.G.), to study the effect of organic nutrient sources on growth and yield of traditional scented rice (*Oryza sativa* L.) variety Lokti Machhi Selection -1. The experiment was laid out in Randomized Block Design with 3 replications. The treatment consisting of eight organic nutrient sources. Growth parameters of rice like, Number of tillers hill^{-1}, dry matter accumulation hill^{-1}, leaf area index, CGR, RGR, and yield attributing characters *viz*; Number of effective tillers hill^{-1}, panicle length, panicle weight, test weight, number of sound grains panicle^{-1}, grain and straw yield showed significant response towards organic nutrient sources. Significantly higher growth parameters, yield attributes and yield was observed under application of 100% RDN (45% GM + 55% FYM) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT as compared to application of other organic nutrient sources.

Keywords: Scented rice, GM (Green Manure), FYM (Farm Yard Manure), *Ghanjeevamrit, Jeevamrit*, growth, yield attributes and yield

Introduction
Rice (*Oryza sativa* L.) is the most important cereal crop in the developing world and is the staple food of over half of world's population. Globally, rice is cultivated in 165.25 million ha area with an annual production of around 503.27 million tonnes with average productivity of 2.76 t ha^{-1} (Anonymous, 2019) [2]. Rice is considered to be the backbone of Indian food security system. India is the second largest producer and consumer of rice in the world. Area under rice crop in India is about 46.37 million hectares with production of 130.29 million tonnes and productivity of 2.8 t ha^{-1} (Anonymous, 2021) [4].

Organic agriculture is one of the many diverse and environmentally friendly production methods. The demand for organic food is progressively increasing in both industrialized and developing countries, with an annual growth rate of 20–25% (Ramesh *et al*., 2005) [10]. In organic systems, no synthetic fertilizers, growth regulators, or insecticides are used. Rather, they depend on crop leftovers, legumes, green manures, farm wastes, mechanical cultivation, and biological pest management to maintain soil health, feed plant nutrients, and inhibit insects, weeds, and other inputs. Organic farming improves crop quality and reduces environmental pollution. It increases the likelihood of exporting organic produce. There are at present signs that the agricultural landscape of the country is moving toward more organic farming. Organic rice produced higher-quality grains (Mendoza, 2004) [7].

Due to their numerous special properties, scented rice varieties have an important place in the national as well as global markets. Still, less than 20 percent of the total area is occupied by scented rice varieties. These rice cultivars are widely used by consumers because of their flavor, aroma, cooking qualities, and palatability. The state of Chhattisgarh, having an ideal climate, is an excellent geographic center of biodiversity, especially for rice, especially scented varieties. These varieties are sold at high price in market due to their special aroma and adaptability. Lokti Machhi is a traditional variety of rice named after a fly that is famous for its aroma and delicate

pearl-like grains. It is very aromatic and great in taste. Additionally, Lokti Machhi rice is rich in essential nutrients such as zinc, iron, manganese, and magnesium.

Jeevamrit is the traditional Indian bio pesticide and organic manure that is prepared by the unique technique of fermentation of the combined mixture of cow dung, cow urine, jaggery, pulse flour, soil and water. It is not only cost effective but also beneficial for both plants and soil. It provides nutrient to the plants and improves the activity of beneficial microorganisms and earthworm in soil. *Jeevamrit* provides plants with 13 nutrients which ultimately help in proper growth and development of crop. It is a very good source of biomass, natural carbon, nitrogen, phosphorus, calcium, and other nutrients. The microorganisms that are found in the soil, make it more fertile and increase crop output. *Ghanjeevamrit* is a solid form of *jeevamrit*, it improves soil fertility and provides essential nutrients for plant growth. In the field, it promotes the growth of soil earthworms and soil microorganisms. Inorganic fertilizer is not only more expensive, but it also pollutes the environment through the processes of denitrification, volatilization, leaching, and runoff losses, decreasing its effectiveness of usage. The inorganic fertilizer industries, such as urea, superphosphate, and muriate of potash, serve a useful purpose while polluting the environment. Organic nutrient management must be used to solve this issue for greater production and a pollution-free environment. Now a days the concept of healthy food and organic farming is catching up very fast, the world over. Consumers in the developed countries are prepared to pay a premium for the organic food free from pollution.

Materials and Methods

The experiment was conducted at Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, (C.G.) during *kharif* season, 2023. Raipur is situated at Central - East of Chhattisgarh and lies at 21º 16‟ Latitude and 81º 36‟ E Longitude with an altitude of 298.15 above the mean sea level. The soil of the experimental site was clay loam with neutral pH, normal EC (0.17 ds m^{-2}), medium organic carbon (0.62 %), low available nitrogen (220.5 kg ha^{-1}), medium available phosphorus (16.4 kg ha^{-1}) and high available potassium (328 kg ha^{-1}). The experiment was laid out in Randomized Block Design with 3 replications. The treatment consisting of eight organic nutrient sources *viz.* T_1 - 100% RDN (45% GM + 55% FYM), T_2 - 75% RDN (60% GM + 40% FYM + 250 kg Gj) + seedling treatment (*Azospirillum* + PSB), T_3 - 75% RDN (60% GM + 40% FYM + 500 kg Gj) + seedling treatment (*Azospirillum* + PSB), T_4 - 75% RDN (60% GM + 40% FYM + 1000 kg Gj) + seedling treatment (*Azospirillum* + PSB), T_5 - 100% RDN (45% GM + 55% FYM)+ *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT, T_6 - 75% RDN (60% GM + 40% FYM + 250 kg Gj) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT, T_7 - 75% RDN (60% GM + 40% FYM + 500 kg Gj) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT T_8 - 75% RDN (60% GM + 40% FYM + 1000 kg Gj) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT. The plant protection measures were also carried out organically. Seedling treatment was carried out by soaking the rice seedling half an hour, in a solution of *Azospirillum* 250 ml ha^{-1} and PSB 250 ml ha^{-1}. Green manure was incorporated five day before transplanting of rice. The nutrient composition of these organic manures (FYM, *Ghnajeevamrit* and *Jeevamrit*) are 0.4%, 1.65% and 1.25% nitrogen respectively. From these organic manures, FYM and *Ghanjrrvamrit* were incorporated as per the standard treatments i.e. one day before transplanting in the puddle field. Twenty-five days old seedlings of Lokti Machhi Selection- 1 was transplanted in the main experimental field on 14 July 2023, at a spacing of 20 cm x 10 cm. Under growth parameters, Number of tillers $hill^{-1}$, dry matter production, CGR, RGR and leaf area index were recorded at 30, 60, 90, 120 DAT and at harvest. After harvest of the crop, grain yield and yield attributing characters viz. number of effective tillers $hill^{-1}$, panicle length, panicle weight, number of sound grains $panicle^{-1}$, sterility percentage, test weight were determined. The data were statistically analyzed for various characters as described by Gomez and Gomez (1984) [5].

Results and Discussion

The impact of organic nitrogen sources on growth, yield attributes and yield of traditional scented rice variety Lokti Machhi Selection-1 are summarized below.

Growth parameters

- **Number of tillers $hill^{-1}$:** It is evident from the data presented in Table 1 that the number of tillers $hill^{-1}$ was significantly influenced by different organic nutrient sources. In general, number of tillers $hill^{-1}$ increased with the crop age and the maximum number of tillers was observed at 90 DAT and it was slightly reduced at maturity. This decline may be ascribed to the mortality rate of formed tillers due to shading of upper tillers. Among different organic nutrient sources, application of 100% RDN (45% GM + 55% FYM) + *Jeevamrit* @ 500 liters at a 15 days interval from 10 DAT produced significantly higher number of tillers at all growth stages over rest of the treatments except 100% RDN through (45% GM + 55% FYM) and 75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT. This finding was supported by Patel *et al.* (2012) [9] and Balasubramaniam *et al.* (2002) reported that tiller number was significantly influenced by organic manure and their combinations.
- **Dry matter accumulation (g $hill^{-1}$):** Dry matter accumulation is directly related with the growth pattern of the crop, which linearly influences the biological yield and increased with the advancement of crop age. Dry matter accumulation of rice was recorded at 30, 60, 90,120 DAT and at harvest and presented in Table 2. It is obvious from data that the dry matter production (g $hill^{-1}$) was increased with the advancement in growth stage till harvest under all treatments but rate of increment in dry matter was most rapid during 30 DAT to 120 DAT. The vegetative phase of crop was almost completed up to 90 DAT and then plants entered into their reproductive phase, therefore accumulated photosynthates and food materials were utilized mainly for the development of grains so the dry matter production was also increased during 90 DAT to harvest. As regards to different organic nutrient sources, the treatment 100% RDN (45% GM + 55% FYM) + *Jeevamrit* @ 500 liters at 15 days interval from 10 DAT excelled in dry matter acumulation at all the observational stages, but it was at par with the treatments of 100% RDN (45% GM + 55% FYM), 75% RDN (60% GM + 40% FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB) and 75% RDN (60% GM + 40% FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT at 30, 60, 90, 120 DAT and at harvest. Agrawal (2000) [1] and Rao *et al.* (2006) [11] also

reported that the increase in dry matter was due to increase in number of tillers, number of leaves and plant height.

- **Crop growth rate (CGR)**: The data on crop growth rate was calculated by taking the rate of change in dry matter production between 0-30 DAT, 30-60 DAT, 60-90 DAT, 90-120 DAT and from at 120 DAT to at harvest and are presented in Fig. 1. The Maximum CGR was noticed between 90 -120 DAT and the lowest CGR was noticed during 0-30 DAT. The improvement in dry matter accumulation at the relevant period was primarily responsible for the increase in CGR. Application of 100% RDN (45% GM + 55% FYM) + *Jeevamrit* @ 500 liters at a 15 day interval from 10 DAT (T_5) calculated higher value of crop growth rate at 30 DAT to 120 DAT while, at harvest highest CGR calculated under 75% RDN (60% GM + 40% FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT.
- **Relative growth rate (RGR):** The relative growth rate was observed during various crop growth intervals i.e. 30-60, 60-90 DAT, 90-120 DAT and 120DAT to at harvest are depicted in fig. 2 and revealed that it was maximum at 30-60 DAS gradually decreased till harvest. It is also clear from the data that relative growth rate progress decreased with crop growth and development. Relative growth rate at different periods of observation remained unaffected due to various organic nutrient sources.
- **Leaf area index:** Leaf area index is the ultimate expression of the photosynthetic activity of the plant, which may have a direct effect on growth and yield parameters on later stage. The data presented in Table 3 revealed that LAI was significantly influenced by organic nutrient sources. The leaf area index was increased with the advancement of crop age.
- From the data it is evident that LAI continued to increase up to 90 DAT. The rate of increase was however maximum between the crop growth period of 60-90 DAT. Among the different organic nutrient sources, application of 100% RDN (45% GM + 55%FYM) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT had resulted in significantly higher LAI in comparison to rest of the treatments at all the growth intervals.

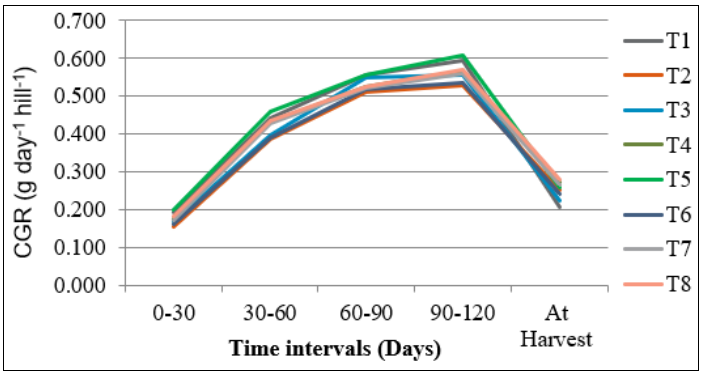

Fig 1: Crop Growth Rate (g day^{-1} hill^{-1}) of traditional scented rice variety Lokti Machhi Selection -1 at different time interval.

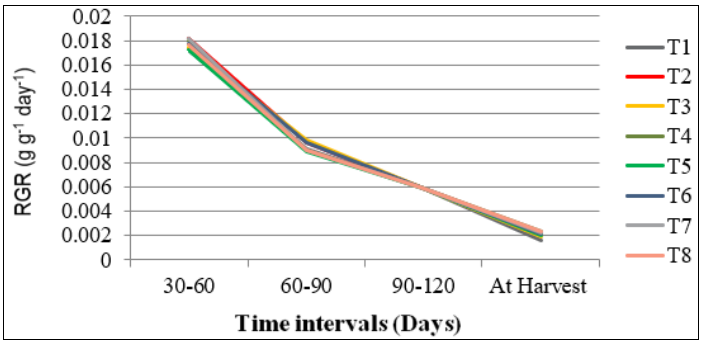

Fig 2: Relative growth rate (g g^{-1} day^{-1}) of traditional scented rice variety Lokti Machhi Selection -1 at different time interval.

Yield Attributes and yield

- **Number of effective tillers hill^{-1}:** Number of effective tillers hill^{-1} were counted at harvest and presented in Table 4 It is an important yield attributing character which contributes to grain yield as the number of effective tillers equals to the number of panicles. It was significantly influenced due to organic nutrient sources. The highest number of effective tillers hill^{-1} (8.07) was recorded in 100% RDN (45% GM + 55% FYM) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT over other organic nutrient sources tested it might be due to the greater availability of nutrients from the combined application of organics, which increased the nitrogen level and sink capacity, which ultimately resulted in increasing the effective tillers. However, it was found to be at par with the treatments of 100% RDN (45% GM + 55% FYM), 75% RDN (60% GM + 40% FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB), 75% RDN (60% GM + 40% FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT and 75% RDN (60% GM + 40% FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT. Similarly, Patel *et al.* (2012) [9] reported that the combined application of different organic nutrient sources significantly increased the number of effective tillers hill^{-1}.
- **Panicle length (cm):** Length of panicle is very important factor which decides how many grains would be carried,

because the number of grains is precursor of grain yield. However, it was found unaffected due to different organic nutrient sources.

- **Panicle weight (g):** Panicle weight is also an important yield contributing character that influences rice yield. It is evident from the data represented in Table 4 that panicle weight was significantly influenced due to different organic nutrient sources. However, the heaviest panicle (16.25g) was obtained under 100% RDN (45% GM + 55%FYM) + *Jeevamrit* @ 500 litre a$T_1$5 days interval from 10 DAT.
- **Number of sound grains panicle^{-1}:** The application of varying levels of treatments brought a significant effect on the number of sound grains panicle^{-1} of rice variety Lokti Machhi selection-1 (Table 4). Significantly higher number of sound grains panicle^{-1} (286.4) was noted with the application of 100% RDN (45% GM + 55%FYM) + *Jeevamrit* @ 500 litre a$T_1$5 days interval from 10 DAT it might be due to the better supply of combined application of FYM, Green manure as well as *Jeevamrit* helped for availability of macro and micro nutrients, enzymatic activity and physiological process of the plant, which results in better translocation of the photosynthates and partitioning of the dry matter to the sink (grain).
- **Sterility percentage** Chaffiness in grains is an undesired character which influences the grain yield. On perusal of data presented in Table 4, it is clearly revealed that the sterility percentage influenced significantly due to different organic nutrient sources. The minimum sterility percent (4.41%) recorded in 100% RDN (45% GM + 55% FYM) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT. While, the highest sterility percent (8.62) was recorded in 75% RDN (60% GM + 40% FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB).
- **Test weight (g)**: The weight of thousand grains, or the test weight of the desired crop, is one of the most significant agronomic characteristics that influence the possible production of grain yield. The data presented in Table 4 clearly shows that the different organic nutrient sources did not exert any effect on the test weight.
- **Grain yield (q ha^{-1}):** The data on grain yield of rice are presented in Table 5. The data indicate that the different organic nutrient sources significantly influenced the grain yield of rice variety Lokti Machhi selection-1. The significantly higher grain yield was observed (38.8 q ha^{-1}) in 100% RDN (45% GM + 55% FYM) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT over the rest of the other treatments except 100% RDN (45% GM + 55% FYM). Since, the growth and yield parameter like plant height, dry matter production, number of effective tillers hill^{-1}, number sound of grains panicle^{-1} and test weight found highest in this treatment which ultimately resulted in higher grain yield. The basal application of organic manures FYM, incorporation of green manure and application of *Jeevamrit* with irrigation water is expected to increase microbial activity into the soil, supply of nutrients and growth hormones in a more continuous manner which increased the availability and uptake of macro and micronutrients by plant roots, translocation of water and nutrient, photosynthesis, formation of starch and synthesis of protein etc. and also enhanced the process of differentiations of tissues i.e. from vegetative to reproductive phase leading to higher grain yield. Similar findings were also reported by Pandey *et al*. (1999) [8], Sarawgi and Sarawgi (2004) [12] and Lal *et al*. (2009) [6].
- **Straw yield (q ha^{-1}):** The straw yield of rice was also significantly affected due to different organic nutrient sources (Table 5). As regards of the different organic nutrient sources, the treatment 100% RDN (45% GM + 55% FYM) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT produced higher straw yield (113.34 q ha^{-1}) which was found at par with 100% RDN (45% GM + 55% FYM), 75% RDN (60% GM + 40% FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT, 75% RDN (60% GM + 40% FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT and 75% RDN (60% GM + 40% FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB) + Jeevamrit @ 500 litre at 15 days interval from 10 DAT.
- **Harvest Index (%):** Harvest index is the ratio of economic yield with biological yield. The results revealed that it was not significantly influenced by the application of organic nutrient sources (Table 5).

Table 1: Effect of organic nutrient sources on number of tillers hill^{-1} of traditional scented rice variety Lokti Machhi Selection -1 at different time intervals

	Treatment	Number of tillers hill^{-1}				
		30 DAT	60 DAT	90 DAT	120 DAT	At harvest
T_1	100% RDN (45% GM + 55% FYM)	6.7	8.3	12.5	10.7	10.4
T_2	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB)	4.5	7.2	10.6	9.6	9.2
T_3	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB)	5.4	7.7	11.4	10.1	9.6
T_4	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)	5.6	8.1	12.2	10.7	10.2
T_5	100%RDN (45% GM + 55% FYM)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	7.2	9.2	13.2	12.1	11.6
T_6	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	5.4	7.3	11.0	9.9	9.4
T_7	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	5.5	8.0	11.9	10.1	9.6
T_8	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	6.5	8.2	12.4	10.6	10.3
	SEm±	0.23	0.16	0.38	0.33	0.34
	CD(P = 0.05)	0.69	0.48	1.16	1.00	1.05

RDN – Recommended Dose of Nitrogen, GM – Green Manure, FYM – Farm Yard Manure, GJ – *Ghanjeevamarit*, PSB – Phosphorus Solubilizing Bacteria.

Table 2 - Effect of organic nutrient sources on dry matter accumulation of traditional scented rice variety Lokti Machhi Selection -1 at different time intervals

	Treatment	Dry matter accumulation (g)				
		30 DAT	60 DAT	90 DAT	120 DAT	At Harvest
T_1	100% RDN (45% GM + 55% FYM)	5.7	19.0	35.7	53.6	55.6
T_2	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB)	4.6	16.2	31.5	47.3	49.8
T_3	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB)	5.0	17.0	33.4	50.1	52.4
T_4	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)	5.3	18.3	34.0	51.0	53.7
T_5	100%RDN (45% GM + 55% FYM)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	**6.0**	**19.8**	**36.5**	**54.8**	**57.4**
T_6	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	4.8	16.5	32.0	48.1	50.5
T_7	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	5.1	17.9	33.6	50.4	53.0
T_8	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	5.4	18.5	34.2	51.4	54.2
	SEm±	0.24	0.70	0.94	1.41	1.19
	CD(P = 0.05)	0.72	2.13	2.85	4.27	3.62

RDN – Recommended Dose of Nitrogen, GM – Green Manure, FYM – Farm Yard Manure, GJ – *Ghanjeevamarit*, PSB – Phosphorus Solubilizing Bacteria.

Table 3: Effect of organic nutrient sources on leaf area index of traditional scented rice (*Oryza sativa* L.) variety Lokti Machhi Selection -1

	Treatment	Leaf Area Index		
		30 DAT	60 DAT	90 DAT
T_1	100% RDN (45% GM + 55% FYM)	1.57	3.82	7.07
T_2	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB)	1.07	3.16	5.83
T_3	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB)	1.16	3.35	6.33
T_4	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)	1.41	3.73	7.06
T_5	100%RDN (45% GM + 55% FYM)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	1.70	4.08	7.64
T_6	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	1.14	3.29	6.07
T_7	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	1.36	3.51	6.60
T_8	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	1.48	3.75	7.07
	SEm±	0.12	0.17	0.31
	CD(P = 0.05)	0.37	0.52	0.94

RDN – Recommended Dose of Nitrogen, GM – Green Manure, FYM – Farm Yard Manure, GJ – *Ghanjeevamarit*, PSB – Phosphorus Solubilizing Bacteria

Table 4: Effect of organic nutrient sources on number of effective tillers hill^{-1}, panicle length, panicle weight, test weight number of sound grains panicle^{-1} and sterility % of traditional scented rice variety Lokti Machhi Selection -1

	Treatment	Number of effective tillers/hill	Panicle length (cm)	Panicle weight (g)	Test weight (g)	Number of sound grains panicle^{-1}	Sterlity %
T_1	100% RDN (45% GM + 55% FYM)	7.7	25.1	15.43	10.1	265.7	5.3
T_2	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB)	6.5	23.8	13.53	9.6	244.0	8.6
T_3	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB)	6.9	24.0	14.34	9.7	253.8	8.1
T_4	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)	7.2	24.9	15.31	10.0	256.4	7.3
T_5	100%RDN (45% GM + 55% FYM)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	8.0	25.9	16.25	10.2	286.4	4.4
T_6	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	6.7	23.9	13.90	9.8	251.0	8.3
T_7	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	7.3	24.8	15.01	9.9	254.6	7.2
8	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	7.5	25.0	15.36	10.0	259.6	6.7
	SEm±	0.26	0.43	0.52	0.20	6.09	0.44
	CD(P = 0.05)	0.81	NS	1.59	NS	18.48	1.33

Table 5: Effect of organic nutrient sources on grain yield, straw yield and harvest index of traditional scented rice variety Lokti Machhi Selection -1

	Treatment	Grain yield (q/ha)	Straw yield (q/ha)	Harvest Index (%)
T_1	100% RDN (45% GM + 55% FYM)	36.97	112.00	24.82
T_2	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB)	33.95	99.73	25.39
T_3	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB)	34.55	104.63	24.82
T_4	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)	35.56	108.98	24.61
T_5	100%RDN (45% GM + 55% FYM)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	38.8	113.34	25.51
T_6	75% RDN (60% GM + 40%FYM + 250 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	34.07	100.19	25.37
T_7	75% RDN (60% GM + 40%FYM + 500 kg GJ) + seedling treatment (*Azospirillum* + PSB) + *Jeevamrit*@500 litre at 15 days interval from 10 DAT	35.16	108.37	24.50
T_8	75% RDN (60% GM + 40%FYM + 1000 kg GJ) + seedling treatment (*Azospirillum* + PSB)+ *Jeevamrit*@500 litre at 15 days interval from 10 DAT	35.79	109.77	24.61
	SEm±	0.83	2.70	0.46
	CD(P=0.05)	2.53	8.19	NS

RDN – Recommended Dose of Nitrogen, GM – Green Manure, FYM – Farm Yard Manure, GJ – *Ghanjeevamarit*, PSB – Phosphorus Solubilizing Bacteria

Conclusion

Application of 100% RDN (45% GM + 55% FYM) + *Jeevamrit* @ 500 litre at 15 days interval from 10 DAT recorded significantly higher values of growth characteristics *viz;* Number of tillers hill^{-1}, dry matter accumulation hill^{-1}, and leaf area index, CGR, RGR and yield attributing characters *viz*; number of effective tillers hill^{-1}, panicle length, panicle weight, 1000 grains weight, number of sound grains panicle^{-1}, grain yield and straw yield due to direct and more availability of nutrients and better translocation of nutrient in plant.

References

1. Agrawal P. Effect of scheduling of nitrogen, potassium and harvesting time on growth and yield, N uptake and quality of grain and seed of rice. M.Sc. (Ag) Thesis, IGKV, Raipur; c2000.
2. Anonymous. Area and production of rice in world. Available from: http://www.faostat.com; c2019.
3. Anonymous. Annual report 2022-23. Available from: https://agricoop.gov.in/Documents/annual report English 2022-23.
4. Balsubramaniam AS, Patil RA, Khanvilkar SA, Jadhav SN. Effect of FYM and Glyricida green manure in conjunction with fertilizer nitrogen in transplanted kharif rice. J Maharashtra Agric Univ. 2002;18(2):235-237.
5. Gomez KA, Gomez AA. Statistical procedures for agricultural research. New York: John Wiley and Sons; c1984.
6. Lal B, Verma DK, Jaiswal LM, Prasad S, Giri SP, Yadav RA. Effect of nitrogen level on yield attributes of aromatic rice. Oryza. 2009;46(2):158-159.
7. Mendoza. Organic/sustainable agriculture: case studies in the Philippines (Rice-based farm system in Infanta, Quezon). Available from: www.organicrice.case study.html; c2004.
8. Pandey N, Sarawgi AK, Rastogi NK, Tripathi RS. Effect of farmyard manure and chemical N fertilizer on grain yield and quality of scented rice (*Oryza sativa* L.) varieties. Indian J Agric Sci. 1999;69(9):621–3.
9. Patel VJ. Effect of organic nutrient management on productivity and quality of aromatic rice (*Oryza sativa* L.) varieties. M.Sc. (Ag) Thesis, IGKV, Raipur; c2012.
10. Ramesh P, Mohan S, Subba Rao A. Organic farming; its relevance to the Indian context. Curr Sci. 2005;88(4):561-567.
11. Rao PR, Kumar RM, Ram Prasad AS, Ravichandaran S. System of rice intensification (SRI) versus traditional method of rice cultivation (TRC). In: National symposium on system of rice intensification (SRI) - present status and future prospects; ANGARU, Hyderabad; c2012. p. 79.
12. Sarawgi SK, Sarawgi AK. Effect of blending of N with or without FYM on semi-dwarf, medium to long slender scented rice varieties in lowland Alfisol of Chhattisgarh. In: International symposium on rainfed rice ecosystems: Perspective and Potential; IGKV, Raipur (C.G.), India; c2004. p. 159–60.