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Effect of Farmyard manure and Bio-digester liquid manure on Growth and Yield of Aerobic rice (*Oryza sativa* L.)

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ABSTRACT

Field experiments were conducted during 2010 and 2011 at Zonal Agricultural Research Station, Mandya to study the effect of farmyard manure and bio-digester liquid manure on the performance of aerobic rice. Soil was red sandy loam in texture, low in organic carbon (0.38 %) and available nitrogen (215.5 kg ha^{-1}), medium in available P_2O_5 (26.2 kg ha^{-1}) and K_2O (162.3 kg ha^{-1}). Treatment consisted of three levels of FYM (7.5, 10 & 12.5 t ha^{-1}) and four levels of bio-digester liquid manure equivalent (BDLME) to (75, 100, 125 & 150 kg N ha^{-1}) and compared with recommended practice (FYM 10 t + 100:50:50 N:P_2O_5:K_2O kg ha^{-1}) and absolute control. The experiment was laid out in Randomized Complete Block Design with three replications. Significantly superior growth components viz., plant height (79.0 cm), number of leaves per hill (99.9) and total dry matter production per hill (150.4 g) and yield components viz., number of productive tillers per hill (29.7) and number of filled grains per panicle (129.5) were produced by the application of FYM 12.5 t + BDLME to 150 kg N ha^{-1}. Similarly, significantly higher grain and straw yields (4323 and 5023 kg ha^{-1}, respectively) were found by the application of FYM 12.5 t + bio-digester liquid manure equivalent (BDLME) to 150 kg N ha^{-1} and was on par with FYM 12.5 t + BDLME to 125 kg N ha^{-1} (4246 and 4932 kg ha^{-1}, respectively) and recommended practice (4481 and 5215 kg ha^{-1}, respectively).

Key words: *Organic agriculture, Farmyard manure, Bio-digester liquid manure, Aerobic rice.*

INTRODUCTION

Organic agriculture is the oldest form of agriculture on earth. Organic culture of plants and animals was practiced since the dawn of civilization. Currently, India ranks 33rd in terms of total land under organic cultivation and 88th position for agricultural land under organic crops to total farming area. About 5.2 million hectares is the total area, out of which 2.8 million hectares is under certified organic farming with about 1,95,741 farmers. The Indian organic farming industry is estimated at US $ 100.4 million and according to Agricultural and Processed Food Products Export Development Authority (APEDA), a nodal agency involved in promoting Indian organic agriculture, about 9,76,646 million tonnes of organic products worth of Rs. 498 crores are being exported to EU, USA, Australia, Japan, Switzerland and middle-east[1].

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Rice (*Oryza sativa* L.) is the principal food crop to billions of people around the world. India occupies a pride place in rice production among the food crops cultivated in the world. India has the largest area (41.92 million hectare) among rice growing countries and stands second in production (89.09 million tonnes) with a productivity of 2125 kg $ha^{-1, 1}$. An aerobic method of growing rice is a production system, which concentrates mainly on direct seeding and irrigating intermittently, contrast to the practices such as nursery raising, puddling, transplanting and submergence. Traditional rice cultivation requires 3000 to 5000 litres of fresh water to produce a kilo gram of rice, but aerobic rice requires 50 and 55 per cent less water and labour, respectively. Organic farming minimizes environmental pollution and maintains sustainability of soil by maintaining high soil organic matter. Keeping these points in view, the field trials were carried out to study the effect of farmyard manure and bio-digester liquid manure on growth and yield of aerobic rice.

MARERIALS AND METHODS

Field experiments were conducted during *kharif* 2010 and 2011 at Zonal Agricultural Research Station, Mandya of the University of Agricultural Sciences, Bangalore to study the "Effect of farmyard manure and bio-digester liquid manure on the performance of aerobic rice". The experimental site is situated between $11^0\ 30^1$ to $13^0\ 05^1$ North latitude and $76^0\ 05^1$ to $77^0\ 45^1$ East longitude and an altitude of 695 meters above mean sea level. Soil of the experimental site was red sandy loam in texture, low in organic carbon (0.38 %) and available nitrogen (215.5 kg ha^{-1}), medium in available P_2O_5 (26.2 kg ha^{-1}) and K_2O (162.3 kg ha^{-1}). Treatment consisted of three levels of FYM (7.5, 10 & 12.5 t ha^{-1}) and four levels of bio-digester liquid manure equivalent (BDLME) to (75, 100, 125 & 150 kg N ha^{-1}) and compared with recommended practice (FYM 10 t + 100:50:50 $N:P_2O_5:K_2O$ kg ha^{-1}) and control. It was laid out in Randomized Complete Block Design with three replications. Rasi (IET-1444) variety was used for experimentation.

Well decomposed farmyard manure was analyzed for its nutrient composition and applied as per the treatment specifications two weeks before sowing of the crops and mixed thoroughly with soil. The bio-digester liquid manure was collected from bio-digester pit located at dairy unit, ZARS, Mandya and analyzed for nitrogen a day before application. Required quantity of liquid manure for different treatments was estimated based on N content and then applied by opening furrows near to the crop rows and later on covered with soil to avoid evaporation loss. Total quantity of nitrogen of different treatments was top dressed through BDLM in two splits at 30 and 60 days after sowing.

RESULTS AND DISCUSSION

Growth parameters and total dry matter production

Pooled data of the present study revealed that, significantly taller plants (79.0 cm), more number of tillers per hill (32.3), leaves per hill (99.9) and LAI (2.76) were produced by the application of FYM 12.5 t + bio-digester liquid manure equivalent (BDLME) to 150 kg N ha^{-1} which was on par with FYM 12.5 t + BDLME to 125 kg N ha^{-1} and recommended practice (FYM 10 t + 100:50:50 $N:P_2O_5:K_2O$ kg ha^{-1}) (Table 1). However, all these three treatments were superior in the above growth parameters when compared to other organic treatment combinations. This might be due to greater availability and steady release of nutrients from the combined organic sources (FYM and BDLM) which perhaps enabled the pants to grow tall.

Total dry matter production per hill at 30, 60, 90 DAS and at harvest differed significantly due to treatments. At 30 DAS, significantly higher total dry matter production per hill (5.73 g) was found with recommended practice. Later on, significantly higher total dry matter production per hill (20.5, 63.5 & 150.4 g at 60, 90 DAS and at harvest, respectively) was obtained with FYM 12.5 t + BDLME to 150 kg N ha^{-1} and FYM 12.5 t + BDLME to 125 kg N ha^{-1} (19.2, 59.8 & 145.5). However, these two treatments were on par with recommended practice (21.7, 66.4 & 156.4) which was superior over all other treatment combinations (Table 2).

It is reported that higher growth indices recorded in paddy had a positive association with higher dry matter accumulation and grain yield[4,7]. Further, Prabhakar Reddy *et al.*[5] reported that higher dry matter production of paddy (3.3 and 12.6 t ha^{-1} at 60 DAS and at harvest, respectively)

was recorded by combined application of 10 t fly ash along with 10 t FYM ha^{-1}. Similar increase in growth parameters was observed with increased levels of bio-digester liquid manure and FYM in field trials conducted to develop package for organic rice production at several research stations *viz*., Bramhavar, Kathalagere, Mandya and Naganahally[8]. Similarly Babu and Reddy[3] reported that slow release of nutrients from the organic sources at later stages of crop growth might have resulted in increased dry matter and yield.

Yield and its parameters

Among various organic treatments, more productive tillers per hill (29.7), longer panicle length (18.3), more filled grains per panicle (129.5) and 1000-grain weight (24.4 g) were obtained by the application of FYM 12.5 t + BDLME to 150 kg N ha^{-1} and FYM 12.5 t + BDLME to 125 kg N ha^{-1} (28.0, 18.2, 123.3 & 24.2, respectively) than other treatments. However, these two treatments were on par with recommended practice (30.7, 18.4, 133.8 & 24.6, respectively) (Table 3).

Pooled data of the present investigation showed that, significantly higher grain yield and straw yield (4323 and 5023 kg ha^{-1}, respectively) were produced by the application of FYM 12.5 t + BDLME to 150 kg N ha^{-1} and it was on par with FYM 12.5 t + BDLME to 125 kg N ha^{-1} (4246 and 4932 kg ha^{-1}, respectively) and recommended practice (4481 and 5215 kg ha^{-1}, respectively) (Table 4). However, these three treatments were significantly superior to other organic treatment combinations. High yields obtained with FYM 12.5 t + BDLME to 150 kg N ha^{-1} could be attributed to significantly superior growth components *viz*., plant height (79.0 cm), number of leaves per hill (99.9), leaf area per hill (1727 cm^2), leaf area index (2.76), leaf area duration (63.6 days) and total dry matter production per hill (150.4 g). These could have resulted in significantly higher yield components *viz*., number of productive tillers per hill (29.7) and number of filled grains per panicle (129.5) than other treatments. Perhaps, high uptake of nutrients like nitrogen, phosphorus and potassium (118.0, 27.9 and 92.0 kg ha^{-1}, respectively) might have promoted the growth as well as yield components. Further, it could have been due to the slow and steady release of N into soil solution to match the required absorption pattern of aerobic rice. Probably, the adequate supply of nutrients might have promoted the grain yield.

These results are in conformity with the findings of Reddy[7] who obtained higher grain yield of Byrnellu variety (52.4 q ha^{-1}) by the application of FYM 10 t ha^{-1} than that from NPK fertilizers (100:50:50 kg ha^{-1}) (43.1 q ha^{-1}). Reddy and Janarjuna[6] reported that higher grain yield of paddy (46.8 q ha^{-1}) under aerobic condition was produced by the application of FYM (100 kg N equivalent ha^{-1}). Zubair *et al.*[10] at Taman Bogo experimental station, Indonesia showed that liquid organic N fertilizer @ 4500 L ha^{-1} applied in three splits (0, 30 and 60 days after planting) increased the rice yield to 3.19 t ha^{-1}.

Similar results were also obtained by Reddy *et al.*[9] who carried out various field trials at Research Institute on Organic Farming Kathalagere, Mandya, Ponnampet, Bramhavar and Naganahally for developing package of practices for paddy production through compost and cattle urine or bio-digester liquid manure. Rice response varied among agro-climatic zones to organic nutrient levels depending on soil fertility levels. At Kathalagere, significantly higher grain yield (45.4 q ha^{-1}) and straw yield (57.8 q ha^{-1}) of transplanted paddy were produced by the application of FYM 12.5 t ha^{-1} + cattle urine (equivalent to 125 kg N ha^{-1}). While at Bramhavar, a coastal zone, application of cattle urine equivalent to 90 kg N ha^{-1} produced higher grain yield (6163 kg ha^{-1}) which was a consequence of higher dry matter production, more number of panicles, grains per panicle and panicle weight. High yield was accompanied by high uptake of nutrients which could be attributed to better availability matching the rhythm of crop growth and high nutrient use efficiency. Improved microbial population in soil under organic condition would have promoted nutrient availability in soil and uptake by the crop. Similar high paddy yields were obtained at Nagenahally and Mandya by the application of FYM 12.5 t and BDLME to 150 kg N ha^{-1}. Further, 30 years long term field trial at Rodale institute, Kutztown, USA, organic system gave higher or equal yields of corn and wheat than that of inorganic system. However, organic system uses 45 per cent less energy besides emitting less green house gases than that in the inorganic system[2].

Table 1: Growth parameters of aerobic rice as influenced by FYM and bio-digester liquid manure

Treatment	Plant height (cm)			No. of tillers hill^{-1}			No. of leaves hill^{-1}			LAI		
	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled
T_1	58.5	62.2	60.3	16.0	19.6	17.8	55.1	65.5	60.3	1.65	1.83	1.74
T_2	61.0	64.3	62.6	18.4	20.1	19.3	58.6	67.6	63.1	1.80	1.93	1.86
T_3	68.1	71.4	69.7	21.4	24.7	23.0	71.3	77.0	74.1	2.25	2.43	2.34
T_4	68.2	72.3	70.2	22.1	25.5	23.8	73.4	80.1	76.7	2.27	2.44	2.35
T_5	63.0	66.6	64.8	18.1	21.1	19.6	63.6	70.0	66.8	2.09	2.23	2.16
T_6	64.9	67.6	66.2	19.1	21.9	20.5	67.0	70.8	68.9	2.12	2.25	2.19
T_7	69.2	72.8	71.0	22.6	27.4	25.0	74.9	85.5	80.2	2.40	2.60	2.50
T_8	70.5	73.6	72.1	23.7	28.1	25.9	80.1	89.5	84.8	2.42	2.61	2.51
T_9	66.1	70.4	68.3	20.9	23.0	21.9	67.6	73.6	70.6	2.25	2.37	2.31
T_{10}	66.8	70.9	68.9	21.2	23.6	22.4	70.8	74.5	72.7	2.33	2.42	2.37
T_{11}	74.5	77.5	76.0	28.7	32.3	30.5	88.4	98.3	93.4	2.60	2.74	2.67
T_{12}	76.5	81.6	79.0	30.4	34.2	32.3	95.2	104.5	99.9	2.64	2.89	2.76
T_{13}	80.1	82.3	81.2	32.1	35.0	33.6	101.5	106.5	104.0	2.75	2.93	2.84
T_{14}	51.5	50.8	51.2	12.0	10.8	11.4	48.3	46.4	47.4	1.11	1.04	1.08
S.Em±	3.00	2.88	2.91	1.37	1.44	1.47	5.6	3.2	4.5	0.08	0.09	0.08
C.D. at 5%	8.73	8.38	8.26	3.98	4.17	4.16	16.3	9.4	12.8	0.22	0.25	0.24

T_1 : FYM 7.5 t + BDLME to 75 kg N ha^{-1}
T_2 : FYM 7.5 t + BDLME to 100 kg N ha^{-1}
T_3 : FYM 7.5 t + BDLME to 125 kg N ha^{-1}
T_4 : FYM 7.5 t + BDLME to 150 kg N ha^{-1}
T_5 : FYM 10 t + BDLME to 75 kg N ha^{-1}
FYM - Farmyard manure

T_6 : FYM 10 t + BDLME to 100 kg N ha^{-1}
T_7 : FYM 10 t + BDLME to 125 kg N ha^{-1}
T_8 : FYM 10 t + BDLME to 150 kg N ha^{-1}
T_9 : FYM 12.5 t + BDLME to 75 kg N ha^{-1}
T_{10} : FYM 12.5 t + BDLME to 100 kg N ha^{-1}
DAS - Days after sowing

T_{11} : FYM 12.5 t + BDLME to 125 kg N ha^{-1}
T_{12} : FYM 12.5 t + BDLME to 150 kg N ha^{-1}
T_{13} : FYM 10 t + 100:50:50 kg N:P_2O_5:K_2O ha^{-1}
T_{14} : Control
BDLME - Bio-Digester Liquid Manure Equivalent

Table 2: Total dry matter production (g hill^{-1}) at different growth stages of aerobic rice as influenced by FYM and bio-digester liquid manure

Treatment	30 DAS			60 DAS			90 DAS			At harvest		
	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled
T_1	2.17	2.83	2.50	9.1	11.2	10.2	34.2	37.6	35.9	101.0	110.7	105.8
T_2	2.35	2.90	2.63	9.6	11.5	10.5	35.0	39.1	37.1	106.5	117.0	111.7
T_3	3.08	3.75	3.42	12.2	14.3	13.3	44.4	50.0	47.2	122.3	136.7	129.5
T_4	3.25	3.83	3.54	12.8	15.1	13.9	45.1	52.1	48.6	127.3	137.0	132.2
T_5	2.83	3.23	3.03	10.5	12.1	11.3	38.2	42.8	40.5	116.0	123.0	119.5
T_6	2.67	3.25	2.96	11.1	12.5	11.8	39.1	44.1	41.6	117.2	124.5	120.8
T_7	3.35	3.82	3.58	13.9	16.8	15.4	47.5	55.3	51.4	128.7	136.0	132.3
T_8	3.42	4.20	3.81	14.6	17.3	15.9	50.6	58.4	54.5	130.7	137.7	134.2
T_9	2.83	3.40	3.12	11.3	13.3	12.3	40.1	46.6	43.3	119.3	128.3	123.8
T_{10}	2.97	3.50	3.23	11.8	13.8	12.8	42.5	47.8	45.2	122.0	133.7	127.8
T_{11}	3.90	4.82	4.36	17.8	20.6	19.2	55.3	64.4	59.8	139.3	151.7	145.5
T_{12}	4.20	5.33	4.77	18.9	22.1	20.5	58.7	68.2	63.5	142.7	158.2	150.4
T_{13}	5.43	6.02	5.73	20.2	23.2	21.7	62.5	70.3	66.4	150.2	162.7	156.4
T_{14}	1.52	1.45	1.48	7.2	6.3	6.7	20.4	18.8	19.6	53.2	50.5	51.8
S.Em±	0.3	0.3	0.3	1.0	1.0	1.0	2.7	2.9	2.8	5.2	5.3	5.2
C.D. at 5%	0.8	1.0	0.9	2.8	3.0	2.9	7.8	8.5	7.9	15.0	15.4	14.6

T_1 : FYM 7.5 t + BDLME to 75 kg N ha^{-1}
T_2 : FYM 7.5 t + BDLME to 100 kg N ha^{-1}
T_3 : FYM 7.5 t + BDLME to 125 kg N ha^{-1}
T_4 : FYM 7.5 t + BDLME to 150 kg N ha^{-1}
T_5 : FYM 10 t + BDLME to 75 kg N ha^{-1}
FYM - Farmyard manure

T_6 : FYM 10 t + BDLME to 100 kg N ha^{-1}
T_7 : FYM 10 t + BDLME to 125 kg N ha^{-1}
T_8 : FYM 10 t + BDLME to 150 kg N ha^{-1}
T_9 : FYM 12.5 t + BDLME to 75 kg N ha^{-1}
T_{10} : FYM 12.5 t + BDLME to 100 kg N ha^{-1}
DAS - Days after sowing

T_{11} : FYM 12.5 t + BDLME to 125 kg N ha^{-1}
T_{12} : FYM 12.5 t + BDLME to 150 kg N ha^{-1}
T_{13} : FYM 10 t + 100:50:50 kg N:P_2O_5:K_2O ha^{-1}
T_{14} : Control
BDLME - Bio-Digester Liquid Manure Equivalent

Table 3: Yield parameters of aerobic rice as influenced by FYM and bio-digester liquid manure

Treatment	No. of productive tillers hill^{-1}			Panicle length (cm)			Filled grains panicle^{-1}			1000 grain weight (g)		
	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled	2010	2011	Pooled
T_1	16.0	17.7	16.9	17.1	17.3	17.2	92.3	97.0	94.7	23.0	23.1	23.1
T_2	17.4	19.0	18.2	17.0	17.3	17.2	99.3	102.3	100.8	23.1	23.2	23.2
T_3	20.3	22.5	21.4	17.7	18.0	17.9	105.7	111.3	108.5	23.4	23.8	23.6
T_4	20.6	23.2	21.9	17.9	18.1	18.0	107.3	112.7	110.0	23.4	23.8	23.6
T_5	18.6	20.3	19.5	17.1	17.3	17.2	100.7	104.0	102.3	23.1	23.2	23.2
T_6	19.1	21.1	20.1	17.2	17.4	17.3	102.3	106.0	104.2	23.2	23.3	23.3
T_7	21.2	23.7	22.5	18.0	18.2	18.1	108.7	116.0	112.3	23.6	24.1	23.8
T_8	22.0	25.1	23.6	18.0	18.2	18.1	111.0	119.7	115.3	23.7	24.2	24.0
T_9	19.6	21.2	20.4	17.4	17.7	17.5	103.7	107.3	105.5	23.2	23.4	23.3
T_{10}	20.1	21.7	20.9	17.6	17.9	17.7	104.3	109.7	107.0	23.2	23.5	23.4
T_{11}	26.0	29.9	28.0	18.1	18.3	18.2	120.3	126.3	123.3	23.8	24.5	24.2
T_{12}	27.7	31.7	29.7	18.2	18.5	18.3	125.7	133.3	129.5	24.1	24.8	24.4
T_{13}	29.3	32.2	30.7	18.3	18.5	18.4	131.0	136.7	133.8	24.2	24.9	24.6
T_{14}	9.7	9.2	9.4	17.0	17.2	17.1	70.7	60.8	65.8	23.1	22.6	22.9
S.Em±	1.3	1.0	1.1	0.5	0.3	0.39	3.9	4.8	4.4	0.4	0.8	0.62
C.D. at 5%	3.8	2.9	3.7	NS	NS	NS	11.4	13.9	12.5	NS	NS	NS

T_1 : FYM 7.5 t + BDLME to 75 kg N ha^{-1}
T_2 : FYM 7.5 t + BDLME to 100 kg N ha^{-1}
T_3 : FYM 7.5 t + BDLME to 125 kg N ha^{-1}
T_4 : FYM 7.5 t + BDLME to 150 kg N ha^{-1}
T_5 : FYM 10 t + BDLME to 75 kg N ha^{-1}
FYM - Farmyard manure

T_6 : FYM 10 t + BDLME to 100 kg N ha^{-1}
T_7 : FYM 10 t + BDLME to 125 kg N ha^{-1}
T_8 : FYM 10 t + BDLME to 150 kg N ha^{-1}
T_9 : FYM 12.5 t + BDLME to 75 kg N ha^{-1}
T_{10} : FYM 12.5 t + BDLME to 100 kg N ha^{-1}
NS – Non-Significant

T_{11} : FYM 12.5 t + BDLME to 125 kg N ha^{-1}
T_{12} : FYM 12.5 t + BDLME to 150 kg N ha^{-1}
T_{13} : FYM 10 t + 100:50:50 kg N:P_2O_5:K_2O ha^{-1}
T_{14} : Control
BDLME - Bio-Digester Liquid Manure Equivalent

Table 4: Grain yield, straw yield and harvest index of aerobic rice as influenced by FYM and bio-digester liquid manure

Treatment	Grain yield (kg ha^{-1})			Straw yield (kg ha^{-1})			Harvest Index		
	2010	**2011**	**Pooled**	**2010**	**2011**	**Pooled**	**2010**	**2011**	**Pooled**
T_1	2791	2924	2858	3132	3362	3247	0.472	0.466	0.469
T_2	2846	3002	2924	3288	3535	3411	0.463	0.460	0.461
T_3	3387	3559	3473	3861	4182	4022	0.467	0.460	0.463
T_4	3423	3617	3520	3950	4304	4127	0.464	0.456	0.460
T_5	3082	3284	3183	3476	3776	3626	0.471	0.465	0.468
T_6	3125	3348	3236	3561	3865	3713	0.467	0.465	0.466
T_7	3472	3705	3589	4219	4503	4361	0.451	0.450	0.451
T_8	3613	3925	3769	4305	4608	4456	0.457	0.458	0.457
T_9	3166	3420	3293	3605	3953	3779	0.469	0.464	0.467
T_{10}	3248	3495	3372	3633	4062	3848	0.473	0.463	0.468
T_{11}	4016	4476	4246	4738	5125	4932	0.459	0.466	0.463
T_{12}	4087	4558	4323	4817	5230	5023	0.459	0.465	0.462
T_{13}	4356	4606	4481	5077	5352	5215	0.462	0.463	0.462
T_{14}	1546	1492	1519	2006	1931	1969	0.436	0.440	0.438
S.Em±	137	190	169	151	210	199	0.339	0.337	0.02
C.D. at 5%	398	553	480	440	610	565	NS	NS	NS

T_1 : FYM 7.5 t + BDLME to 75 kg N ha^{-1}
T_2 : FYM 7.5 t + BDLME to 100 kg N ha^{-1}
T_3 : FYM 7.5 t + BDLME to 125 kg N ha^{-1}
T_4 : FYM 7.5 t + BDLME to 150 kg N ha^{-1}
T_5 : FYM 10 t + BDLME to 75 kg N ha^{-1}
T_6 : FYM 10 t + BDLME to 100 kg N ha^{-1}
T_7 : FYM 10 t + BDLME to 125 kg N ha^{-1}
T_8 : FYM 10 t + BDLME to 150 kg N ha^{-1}
T_9 : FYM 12.5 t + BDLME to 75 kg N ha^{-1}
T_{10} : FYM 12.5 t + BDLME to 100 kg N ha^{-1}
T_{11} : FYM 12.5 t + BDLME to 125 kg N ha^{-1}
T_{12} : FYM 12.5 t + BDLME to 150 kg N ha^{-1}
T_{13} : FYM 10 t + 100:50:50 kg N:P_2O_5:K_2O ha^{-1}
T_{14} : Control
FYM - Farmyard manure
NS – Non-Significant
BDLME - Bio-Digester Liquid Manure Equivalent

CONCLUSION

Application of FYM 12.5 t + BDLME to 150 kg N ha^{-1}, FYM 12.5 t + BDLME to 125 kg N ha^{-1} have given on par result with recommended practice (FYM 10 t + 100:50:50 $N:P_2O_5:K_2O$ kg ha^{-1}) w.r.t various growth and yield components of aerobic rice. It could be recommended that above mentioned nutrient management practices are best option for organic aerobic rice production.

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