Journal of Agricultural Engineering and Food Technology
Print ISSN: 2350-0085; Online ISSN: 2350-0263; Volume 2, Number 2; April-June, 2015 pp. 142-144
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http://www.krishisanskriti.org/jaeft.html

Effect of different Organic Sources Available with Farmers on Paddy (*Oryza sativa*) in Bhandara District of Maharashtra

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Abstract—*Krishi Vigyan Kendra,Bhandara diagnosed the problem of low yield in paddy, unbalanced use of nutrients and lack of knowledge about integrated nutrient management and conducted OFT on farmers field. An on farm testing was conducted during the rainy (kharif) season of 2011-2012 on farmer's field in Bhandara district of Maharashtra to access the effects of different sources of nutrients available with farmers on yield, yield attributing characters and soil fertility in rice crop. The experiment was laid out on 7farmer's field with three treatments, Viz. T1- Farmers practice: Application of unbalance chemical fertilizer only, T2 – Application of 10 t/ha. Glyricidia + 50:25:25 kg NPK / ha and T3- Application of glyricidia 3t/ha + paddy straw 2 t / ha + 50:25:25 kg NPK / ha . In Bhandara district paddy straw is readily available but farmers burn it or sold for other purpose. Glyricidia is available with farmers in small quantity. The Source of technology was Dr. Panjabrao Deshmukh Krishi Vidhtapeeth, Akola (MS).*

1. INTRODUCTION

Rice is the world's most important crop and is a staple food for more than half of the world's population. Worldwide, rice is grown on 161 million hectares, with an annual production of about 678.7 million tons of paddy (FAO, 2009). About 90% of the world's rice is grown and produced (143 million ha of area with a production of 612 million tons of paddy) in Asia (FAO, 2009). Rice provides 30–75% of the total calories to more than 3 billion [9].To meet the global rice demand, it is estimated that about 114 million tons of additional milled rice need to be produced by 2035, which is equivalent to an overall increase of 26% in the next 25 years. The possibility of expanding the area under rice in the near future is limited. Therefore, this extra rice production needed has to come from a productivity gain. The major challenge is to achieve this gain with less water, labor, and chemicals, thereby ensuring long-term sustainability. Rice is widely cultivated food crop providing meal, income and employment to million of rural growers and consumers [1]. The Productivity of rice in India is very low which is far below the other rice growing countries. The adoption of Modern farming practice and integrated nutrient management is essential to produce crops.

The high cost of chemical fertilizer and low purchasing power of Indian Farmers restrict its use on proper amount, and non-availability of organic manures hampering crop production and soil health / Soil fertility. With the view to reduce the losses and indiscriminate use of chemical fertilizers, substitution of part of the chemical fertilizer. Green manures are an ideal method of sustaining soil fertility in the tropics [12, 11] and in organic farming, for both soil fertility and microbial activity (Palm et al., 2001).*Gliricidia sepium* is a fast growing, tropical, leguminous tree. It add valuable nutrient such as N, P, K, Ca and Mg to the soil. Glyricidia plant grow on 700-m long bunds can provide about 30 kg N ha-1yr-1 under rainfed systems with 700-800 mm annual rainfall. Usually about 1 to 2 t ha-1 leaf manures can be applied. Application of 1 t ha-1gliricidia leaf manure provides21 kg N, 2.5 kg P, 18 kg K, 85 g Zn, 164 g Mn, 365 g Cu,728 g Fe besides considerable quantities of S, Ca, Mg, B, Mo etc.

One of the most abundant lignocellulose wastes on earth is paddy straw. Annual production of rice is about 136.5 million tones. About 1-1.5 kg of straw is produced per kg of grain harvested [12,13] and thus, 136.5 million tones of paddy straw is estimated to be produced annually. In India, approximately 70-80 million tones of paddy straw is disposed off by burning.

2. MATERIAL AND METHODS

On farm testing and field demonstrations were conducted at Krishi Vigyan Kendra Sakoli Dist Bhandara (M.S.) on the farmers field during 2011-2012 (*kharif*) to study the effects of organic sources glyricidia as green manure and paddy straw in combination with inorganic fertilizers . The surface soil samples (0-15 cm) collected from the experimental site were

analyzed for physico-chemical characteristics as suggested by Jackson (1973) and results are summarized in Table 1.

Table 1

Particulars	Description
Physical constants-	
Bulk density (Mg m^{-3})	1.45
Particle density (Mg m^{-3})	2.65
Maximum water holding Capacity (%)	31.12
Soil texture	Sandy loam
Chemical Properties -	
pH	7.1
EC (dSm^{-1}) at 25 ^{0}C	0.18
Organic carbon (%)	0.49
Nutritional Properties-	
Available N (kg ha^{-1})	232.0
Avalarle P_2O_5 (kg ha^{-1})	19.0
Avalarle K_2O (kg ha^{-1})	225
Rainfall	
Annual Rainfall	1186.5 mm
Rainy Days	52

The experiment/ OFT consisted of seven farmers and three treatments T1- farmers practice (Application of unbalanced chemical fertilizer only). T2 –Application of 10 t / ha glyricidia + 50:25:25 kg NPK/ ha and T3- Application of glyricidia 3 t / ha + paddy straw 2t/ha+50:25:25 kg NPK/ ha. Most popular multi resistant variety SYE- 2001, bold and medium duration Variety (135-140days) used with seed rate of 50 kg/ha. Each treatment was planted on 0.40 ha area. Sowing was done during last week of June and transplanting during the third week of July. 21-25 days old seedlings were used. Transplanting was done at 20x15cm. Organic manure and fertilizers were applied as per treatments. NPK were supplied through urea, single super phosphate and murate of potash as per treatment respectively. Full dose of phosphorus, potash and organic manure was applied as besal. Half dose of Nitrogen was applied as besal dose and remaining half dose applied in two equal split at 20 DAT and 45 DAT. Quantity of glyricidia (N,2.42 % P2O5 0.12 %, K2O 1.83 %) and paddy straw (N 0.69 %, P2O5 0.29 %, K2O 1.82 %) were thoroughly mixed in puddled field as per treatment. Irrigation and plant protection was applied depending on requirement. The crop was harvested at the physiological maturity.

3. RESULT AND DISCUSSION

It has been observed that ancillary characters like plant height ((95.13 cm) and number of tillers /hill (13.73) were more in treatment T3-ie Application of glyricidia 3 t / ha + paddy straw 2 t/ha+50:25:25 kg NPK/ ha. All yield attributes like length of panicle (24.86 cm),No. of grains / panicle (149.2), Grain yield /hill (137.86 g), Test weight (25.02 g) were also recorded higher in treatment T3.

Table 2: Ancillary characters and yield attributes as influenced by different treatments

Treatment	Plant height (cm)	No. of tillers / hill	Length of panicle (cm)	No. of grains / panicle	Grain yield /hill (g)	Test weight (g)
T1- farmers practice (Application of unbalanced chemical fertilizer only)	92.06	9.89	21.46	112.32	92.13	24.18
T2 – Application of 10 t / ha glyricidia + 50:25:25 kg NPK/ ha	94.66	12.33	24.80	143.0	128.46	24.97
T3- Application of glyricidia 3 t / ha + paddy straw 2 t/ha+50:25:25 kg NPK/ ha.	95.13	13.73	24.86	149.2	137.86	25.02

Grain and straw yield were significantly influenced by treatment T3, i.e. Application of glyricidia 3 t / ha + paddy straw 2 t/ha+50:25:25 kg NPK/ ha. (6925 kg/ha) followed by treatment T2 i.e. Application of 10 t / ha glyricidia + 50:25:25 kg NPK/ ha. (6546kg/ ha) Minimum yield was recorded in Treatment T1, i.e. farmers practice (Application of unbalanced chemical fertilizer only) (5755kg/ha).

Table 3: Grain and straw yield kg/ha of paddy as influenced by different treatments during 2011-2012.

Treatment	2011-2012	
	Grain yield kg/ha	Straw Yield kg/ha
T1- farmers practice (Application of unbalanced chemical fertilizer only)	5755	6448
T2 -Application of 10 t / ha glyricidia + 50:25:25 kg NPK/ ha	6546	7580
T3- Application of glyricidia 3 t / ha + paddy straw 2 t/ha+50:25:25 kg NPK/ ha.	6925	7716
F test	Sig.	Sig.
SEm+-	197.52	260.99
CD at 5 %	608.62	804.20
CV %	5.48	6.11

The soil samples were analyzed after the harvesting of crop for the physico-chemical characteristics as suggested by Jackson (1973) and results are summarized in Table 4.

Table 4: Physico-chemical characteristics

Particulars	Description
Physical constants-	
Bulk density (Mg m^{-3})	1.45
Particle density (Mg m^{-3})	2.65
Maximum water holding Capacity (%)	31.21
Soil texture	Sandy loam
Chemical Properties -	
pH	7.1
EC (dSm^{-1}) at 25 ^{0}C	0.16
Organic carbon (%)	0.53
Nutritional Properties-	
Available N (kg ha^{-1})	233.2
Avalarle P_2O_5 (kg ha^{-1})	21.0
Avalarle K_2O (kg ha^{-1})	229

4. CONCLUSION

On the basis of these results it can be concluded that application of glyricidia 3 t / ha + paddy straw 2 t/ha+50:25:25 kg NPK/ ha.is found to be more advantages than farmers practice and application of 10 t/ ha glyricidia with 50 % RDF. As these organic sources are easily available with farmers of Bhandara District.

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