



E-ISSN: 2278-4136

P-ISSN: 2349-8234

JPP 2019; 8(6): 1103-1105

Received: 28-09-2019

Accepted: 30-10-2019

JS Sudharani

Crop Production, District
Agricultural Advisory and
Transfer of Technology Centre,
Mahabubnagar, PJTSAU
Telangana, India

K Aruna

Agril. Extension and District
Agricultural Advisory and
Transfer of Technology Centre,
Mahabubnagar, PJTSAU
Telangana, India

A Ramakrishna Babu

Plant protection & Coordinator,
District Agricultural Advisory
and Transfer of Technology
Centre, Mahabubnagar,
PJTSAU Telangana, India

K Sridhar

Crop Production, District
Agricultural Advisory and
Transfer of Technology Centre,
Mahabubnagar, PJTSAU
Telangana, India

P Archana

Agril. Extension and District
Agricultural Advisory and
Transfer of Technology Centre,
Mahabubnagar, PJTSAU
Telangana, India

Corresponding Author:**JS Sudharani**

Crop Production, District
Agricultural Advisory and
Transfer of Technology Centre,
Mahabubnagar, PJTSAU
Telangana, India

Evaluation of liquid biofertilizers in irrigated rice in farmers field at Mahabubnagar district of, Southern Telangana agroclimatic zone of Telangana state, India

JS Sudharani, K Aruna, A Ramakrishna Babu, K Sridhar and P Archana

Abstract

In the present investigation was carried out as on farm trial in farmers field at Mahabubnagar district, of Southern Telangana Agroclimatic Zone, of Telangana State, India for two years during kharif 2014 to 2015, to evaluate the feasibility of application of liquid bio fertilizers (Azospirillum and PSB) in combination with 75% of recommended dose of Nitrogen and phosphorus applied as inorganic fertilizer, in order to reduce the use of chemical/ inorganic nitrogen (N) and phosphorus (P) fertilizers on rice cultivated in lowland ecosystem. The results of both the years indicated that the plant performances were better when 25% less of recommended dose of nitrogen and phosphorus (inorganic/chemical) fertilizer was applied in combination with Azospirillum and PSB @ 2 l/ha. Considering the yield attributes, 75% RDNP + Azospirillum +PSB performed superior to farmers practice (100% inorganic). The grain yield of rice was enhanced by 3.6% and 2.7% during 2014 and 2015 respectively, to the recommended dose even with 25% less RDF application Results revealed the greater scope of applying liquid biofertilizers (Azospirillum and PSB) to supplement chemical NP fertilizer with optimum yield of rice.

Keywords: Azospirillum, PSB liquid biofertilizer, inorganic chemical fertilizer rice

Introduction

Demand for safe and healthy food and long term sustainability and concerns on environmental pollution associated with more use of agrochemicals. Though the use of chemical inputs in agriculture is inevitable to meet the growing demand for food in world, there are opportunities in selected crops and niche areas where organic production can be encouraged to tap the domestic export market (Mishra *et al.*, 2013)^[4]. Organic Farming has emerged as an important priority area globally in view of the growing demand for safe and healthy food and long term sustainability and concerns on environmental pollution associated with more use of agrochemicals (Kumar *et al.* 2013)^[3]. Biofertilizers are becoming increasingly popular in many countries and for many crops. They are defined as products containing active or latent strains of soil microorganisms, either bacteria alone or in combination with algae or fungi that increase the plant availability and uptake of mineral nutrients (Vessey *et al.*, 2003)^[5]. The concept of biofertilizers was developed based on the observation that these microorganisms can have a beneficial effect on plant and crop growth (Davidson *et al.*, 1998)^[2]. Consequently, a range of plant growth-promoting rhizobacteria (PGPR) has been identified and well characterized. Direct beneficial effects can occur when the microorganisms provide the plants with useful products. The best known case of this are microorganisms that can directly obtain N from the atmosphere and convert this into organic forms usable by plants. Moreover, biofertilizers as to replace part of the use of chemical fertilizers reduces amount and cost of chemical fertilizers and thus prevents the environment pollution from extensive application of chemical fertilizers helping in achieving sustainability of farms (Kumar *et al.* 2013)^[3-4]. Based on these reports, it can be assumed that biofertilizers could offer an opportunity for rice farmers to increase yields, productivity, and resource use efficiency. And, the increasing availability of biofertilizers in many countries and regions and the sometimes aggressive marketing brings ever more farmers into contact with this technology.

However, rice farmers get little advice on biofertilizers and their use from research or extension because so little is known on their usefulness in rice. Necessity would be recommendations describing under which conditions biofertilizers are effective, what their effect on the crop is, and how they should best be used. To start addressing these issues, we conducted this study, testing the effect of liquid biofertilizers in an irrigated lowland rice system as on farm trial in farmers field at Mahabubnagar district, of Southern Telangana

Agroclimatic Zone, of Telangana State, India for two years during *kharif* 2014 and 2015, to evaluate the feasibility of application of liquid bio fertilizers (Azospirillum and PSB) in combination with 75% of recommended dose of Nitrogen and phosphorus applied as inorganic fertilizer, in order to reduce the use of chemical/ inorganic nitrogen (N) and phosphorus (P) fertilizers on rice cultivation as excess use of complex fertilizer leads to reduce of soil fertility and poor yields. The objectives of the study were (1) to evaluate the effects of liquid biofertilizers on irrigated rice grain yield and (2) to determine, based on the results, whether biofertilizers are a possible option to improve the productivity of rice production and under which conditions.

Material and Methods

The present study focuses on the effect of liquid bio fertilizers (Azospirillum and PSB) with 25% replacement of N and P chemical fertilizer (individual and/or in combination) on the yield of one of most popular rice variety MTU-1010 in two cropping seasons during *kharif* 2014 and 2015, farmers field at Mahabubnagar district, of Southern Telanagana Agroclimatic Zone, of Telangana State, India, where mono cropping (rice) is practiced. 75% of recommended doses of P and 50% K were applied basally after soil testing and N applied in three equal splits. liquid biofertilizer are dull white in colour, pH 6.8 to 7.5 with no bad smell, and no foam

formation. All liquid biofertilizer have shelf life for 6 months, the liquid bio fertilizer was treated to 25 kg farm yard manure and incubated overnight and the next day this was spread in the field, at third day of transplanting of rice seedlings where in a thin film of water was maintained.

T1: 75% NP, 100%K of recommended dose of inorganic fertilizer + Azospirillum lipoferum @ 2000ml/ha + PSB @ 2000 ml/ha.

T2: Farmers Practice (N:P:K: 120:60:40kg ha⁻¹)

Results

Based on the on farm trials conducted during *kharif* 2014 and 2015, it was observed that by the practice of integrated nutrient management of substituting 25% of recommended dose of Nitrogen and phosphorus applied as inorganic fertilizer with liquid biofertilizers (Azospirillum lipoferum @ 2000ml/ha + PSB @ 2000 ml/ha), recorded 3.6% and 2.7% higher grain yield (5437 kg/ha & 5492 kg/ha) as compared to farmers local practices (5250 kg/ha & 5349 kg/ha) during 2014 & 2015 respectively. In addition to increase in yield, the improved technology gave higher net return (Rs.38181/- & Rs.44888/-), benefit: cost ratio (1.19 & 1.3) and reduction in cultivation costs than farmers practices (Net returns: Rs. 35250/- & Rs.37037/-, B:C ratio: 1.08 & 1.1) during 2014 & 2015 respectively.

Table 1: Effect of liquid bio fertilizers on yield of rice during *Kharif*-2014

S. No.	Name of the farmer	Village/Mandal	Yield (kg/ha)		% increase in yield
			Treatment	Control	
1	Mahipal reddy	Kurukunta/Nawabpet	5285	5008	5.5
2	Ravinder reddy	Kurukunta/Nawabpet	5702	5510	3.5
3	Krishna Reddy	Kurkunta/Nawabpet	5326	5234	1.8
Average Yield			5437	5250	3.6
Average Gross Margin [Rupees]			70,681/-	68250/-	
Average Net Margin [Rupees]			38181/-	35250/-	
Average input cost [Rupees]			32000/-	32500/-	
Average B:C ratio [Rupees]			1.19	1.08	

Table 2: Effect of liquid bio fertilizers on yield of rice during *Kharif* -2015

S. No.	Name of the farmer	Village/Mandal	Yield (kg/ha)		% increase in yield
			Treatment	Control	
1	Vishnuvardhan Reddy	Machanpally/Hanvada	5324	5224	1.9
2	Keshav Reddy	Konagatupally/Hanvada	5485	5326	3.0
3	Hanumanth Reddy	Gudimalkapur/Hanvada	5832	5542	5.2
4	Srinivas Goud	Peddadaripally/hanvada	5348	5324	0.5
5	Sri kishan reddy	Racherlapally/Midjil	5526	5385	2.6
6	Srinivas reddy	Dokur/Devarkadra	5438	5290	2.8
Average Yield (kg/ha)			5492	5349	2.7
Average Gross Margin. [Rupees]			76888	69537	
Average Net Margin. [Rupees]			44888	37037	
Average input cost[Rupees]			32000	32500	
Average B:C ratio			1.3	1.1	

Table 3: Pooled data of 2014 & 2015 years

Average Yield	Yield (kg/ha)		% increase
	Treatment	Control	
<i>Kharif</i> 2014	5437	5250	3.6
<i>Kharif</i> 2015	5492	5349	2.7
<i>Pooled yield</i>	5465	5300	3.1

Key Recommendations: 75% of recommended dose of N & P + Azospirillum ½ l/acre + PSB ½ l/acre

Summary and Conclusions

The study was conducted to evaluate the effect of liquid biofertilizers on the grain yield of lowland rice applied in integration with 75% of recommended dose of fertilizer. The observed grain yield increases were not huge (0.5 to 3.6%) but could provide substantial income gains given the relatively low costs of liquid biofertilizers tested. The positive effect of the tested biofertilizers was not limited to low rates of inorganic fertilizers and some effect was still observed at

grain yields up to 3.6%. However, the trends in our results seem to indicate that the use of biofertilizers might be most helpful in low- to medium-input systems. The results achieved can already be used to develop better advice for farmers on biofertilizer use in lowland rice, but several important questions remain. In particular, biofertilizers need to be evaluated under conditions with abiotic stresses typical for most low- to medium-input systems (e.g., under drought or low soil fertility) and with a range of germplasm because their effect might depend also on the variety used. More upstream-oriented research would be needed to better understand the actual mechanisms involved, which in turn could also contribute to making the best use of biofertilizers in rice-based systems.



Fig 1: Treating the FYM with liquid bio fertilizer



Fig 2: Visiting the field at early vegetative stage



Fig 3: Field visit at flowering stage



Fig 4: Crop at flowering stage

References

1. Annual Report, District Agricultural Advisory and Transfer of Technology Centre, Mahabubnagar, PJTSAU Telangana, India, 2014 and, 2015.
2. Davidson J. Plant beneficial bacteria. *Biotechnol.* 1998; 6:282-286.
3. Kumar K, Shukla UN, Dharmendra Kaur, Anil Kumar Pant, Prasad SK. Bio- Fertilizers for Organic Ariculture, *Popular kheti*, 2013, 1(4).
4. Mishra DJ, Singh Rajvir, Mishra UK, Kumar SS. Role of Bio fertilizers in Organic Agriculture: A review, *Research Journal of Recent Sciences.* 2013; 2(ISC-2012, 39-41).
5. Vessey JK. Plant growth promoting rhizobacteria as biofertilizers. *Plant Soil.* 2003; 255:571-586.