

Original Research Article

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Effect of Integrated Nitrogen Management on Yield and Economics of Foxtail Millet Genotypes

B. Selectstar Marwein, Rajesh Singh* and Punnam Chhetri

Naini Agricultural Institute, SHUATS, Prayagraj-211007, India

*Corresponding author:

ABSTRACT

Keywords

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A field experiment was conducted during the kharif season of 2018 on Foxtail millet of varieties SIA 3156 and SIA 326 (PRASAD) at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj (U.P). the experiment was laid out in Randomized Block Design with 6 treatments combinations, consisting of two varieties of Foxtail millet (SIA 3156, SIA 326) and nitrogen management viz., Farmer's practice (NPK= 40:20:0), 100% RDF (NPK= 50:30:20)), 75% RD N + 25% N through PM, 75% RD N + 25% N through PM + Azospirillum SI, 50% RD N + 50% N through PM and 50% RD N + 50% N through PM + Azospirillum SI. The Experiment revealed that in variety SIA 3156, integration of inorganic fertilizer of 75% RD N through Urea + 25% N through PM + Azospirillum Seed Inoculation resulted in maximum grain yield (2.31 t/ha), higher Net return (₹ 32,229.35 /ha) and maximum B:C ratio (2.59). In variety SIA 326, the experiment reveals that 75% RD N through Urea+ 25% N through Poultry Manure found out to be the best treatment which result in highest grain yield (2.31 t/ha), highest Net return (₹ 25,946.09 /ha) and B:C ratio (2.28).

Introduction

Foxtail millet (*Setaria italica* L. Beauv) is important minor millet belonging to the family Poaceae. In India, the cultivation of foxtail millet is confined to Andhra Pradesh, Karnataka, and Tamil Nadu. It's grain used for human consumption and a feed for poultry and cage birds. It is used in several food preparations like chapati, fermented bread, biscuits, malts, etc. the stalks are used as fodder and for thatching. It is rich in micronutrients and good for diabetic patients. It protects against cancer and related heart

diseases (Anon., 1993). Foxtail millet comes under drought tolerant crop and it can be grown as a short-term catch crop. It is adapted to a wide range of elevation, soils, and temperatures. It is usually grown in the marginal lands having low level of nutrients and organic matter. However, it responses to the amount of fertilizers used and they significantly contribute in yield and yield attributing characters. Fertilizer management is one of the important cost-effective factors known to augment the crop production. The supplementation of fertilizers along with the organic manure plays the key role in overall

balance supply of nutrients owing to the better growth and production of the crop. The potential of foxtail millet as rainfed crop has not been fully exploited.

Materials and Methods

The experiment was carried out during *Kharif* season 2018 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Prayagraj (U.P.), which is located at 25°40'94" N latitude and 81°85'35" E longitude of 98 meter above the sea level (MSL). This area is situated on the right side of the river Yamuna by the side of Allahabad Rewa Road about 5 km away from Allahabad city. The soil of experimental field was sandy loam, pH of soil was 7.3 with 0.690% organic C, having available N, P, K, 278.75, 18.2 and 250.5 kg h⁻¹ respectively. The experiment involving two varieties of Foxtail millet SIA 3156 and SIA 326 (*Prasad*) which was laid out in randomized block design with six treatments replicated thrice, comprising Farmer's practice (NPK= 40:20:0), 100% RDF (NPK= 50:30:20)), 75% RD N + 25% N through PM, 75% RD N + 25% N through PM + *Azospirillum* SI, 50% RD N + 50% N through PM and 50% RD N + 50% N through PM + *Azospirillum* SI.

Results and Discussion

Effect on yield of foxtail millet

The data on yield as influenced by Integrated Nitrogen Management on two varieties of Foxtail millet are presented in Table 1. In variety SIA 3156, the treatment A₁₄ (75% RD N through urea + 25% N through Poultry Manure + *Azospirillum* SI) was recorded with highest grain yield (2.31 t/ha). However, A₁₆ (50% RD N through urea + 50% N through Poultry Manure + *Azospirillum* SI) and

treatment A₁₃ (75% RD N through urea + 25% N through Poultry Manure) were statistically at par with treatment A₁₄ (75% RD N through urea + 25% N through Poultry Manure + *Azospirillum* SI). With regard to straw yield and harvest index, there was no significant. However treatment A₁₂ (RDF (NPK= 50:30:20)) was recorded with maximum straw yield (3.87 t/ha). Integration of inorganics, organics and bio-fertilizer might have exerted a pronounced effect on yield of Foxtail millet. Poultry manure has also significant effect on grain yield of foxtail millet as reported by Damar *et al.*, 2016. In respect of *Azospirillum* inoculated treatments, a well-developed root system coupled with increased availability of nutrients could have promoted greater uptake of nutrients resulting in higher grain yield (Rana, 1985).

In variety SIA 326, a significant grain yield (1.78 t/ha) was recorded with treatment A₂₃ (75% RD N through urea + 25% N through Poultry Manure). There were no significant with regard to straw yield. However, treatment A₂₃ (75% RD N through urea + 25% N through Poultry Manure) was recorded with maximum straw yield (5.33 t/ha). The conjunctive use of organic and inorganic sources has beneficial effect on physiological process of plant metabolism and growth thereby leading to higher grain yield and straw. The easy availability of nitrogen due to mineralization of organics influences the shoot and root growth favouring absorption of other nutrients. Similar results were obtained by Varalakshmi *et al.*, (2005), Yakadri and Reddy (2009), Umesh *et al.*, (2006) and Basavaraju and Purushotham (2009).

Effect on economics of Foxtail millet

In variety SIA 3156, treatment A₁₄ (75% RD N through urea + 25% N through Poultry Manure + *Azospirillum* SI) was recorded with highest Gross return (₹ 52,526.66 /ha), Net

return (₹ 32,229.35 /ha) and B:C ratio (2.59). While treatment A₁₁ [Farmer's practice (NPK= 40:20:0)] was recorded with lowest Gross return (₹ 41,733.26 /ha) and treatment

A₁₆ (50% RD N through urea + 50% N through Poultry Manure + *Azospirillum* SI) was recorded with lowest Net return (₹ 22,777.89 /ha) and B:C ratio (2.01).

Table.1 Effect of Integrated Nitrogen Management on yield of Foxtail millet

Fertilizer Treatment	Varieties			
	SIA 3156		SIA 326 (PRASAD)	
	Grain Yield (t/ha)	Straw Yield (t/ha)	Grain Yield (t/ha)	Straw Yield (t/ha)
Farmer's practice (NPK= 40:20:0)	1.73	3.53	1.28	4.74
RDF (NPK= 50:30:20)	1.81	3.87	1.46	4.12
75% RD N + 25% N through PM	2.09	3.27	1.78	5.33
75% RD N + 25% N through PM + <i>Azospirillum</i> SI	2.31	3.16	1.37	5.20
50% RD N + 50% N through PM	1.95	3.13	1.23	4.08
50% RD N + 50% N through PM + <i>Azospirillum</i> SI	2.15	3.59	1.37	4.30
S.E.(m)±	0.10	0.62	0.09	0.82
CD (P = 0.05)	0.31	-	0.30	-

Table.2 Effect of Integrated Nitrogen Management on Economics of Foxtail millet

Fertilizer Treatment	Varieties					
	SIA 3156			SIA 326 (PRASAD)		
	Gross return (₹ /ha)	Net return (₹ /ha)	B:C ratio	Gross return (₹ /ha)	Net return (₹ /ha)	B:C ratio
Farmer's practice (NPK= 40:20:0)	41,733.26	24,556.76	2.42	33,873.34	16,696.84	1.97
RDF (NPK= 50:30:20)	43,866.74	25,847.84	2.43	35,699.94	17,681.04	1.98
75% RD N + 25% N through PM	48,333.34	28,086.03	2.39	46,193.40	25,946.09	2.28
75% RD N + 25% N through PM + <i>Azospirillum</i> SI	52,526.66	32,229.35	2.59	39,673.26	19,375.95	1.95
50% RD N + 50% N through PM	45,253.34	22,777.89	2.01	32,700.06	10,224.61	1.42
50% RD N + 50% N through PM + <i>Azospirillum</i> SI	48,773.34	26,247.89	2.16	36,006.66	13,481.21	1.60

In variety SIA 326, Treatment A₂₃ (75% RD N through urea + 25% N through Poultry Manure) was recorded with highest Gross return (₹ 46,193.40 /ha), Net return (₹ 25,946.09 /ha) and B:C ratio (2.28). While treatment A₂₅ (50% RD N through urea + 50% N through Poultry Manure) treatment was recorded with lowest Gross return (₹ 32,700.06 /ha), Net return (₹ 10,224.61 /ha)

and B:C ratio (1.42). Ramdev *et al.*, (2017) reported that integration of Poultry manure with RDF result in higher net return in Pearl millet which is close conformity as reported by Singh *et al.*, (2013) under two years studies on pearl millet.

In variety SIA 3156, on the basis of the above finding it can be concluded for obtaining

higher grain yield (2.31 t /ha), higher Net return (₹ 32,229.35 /ha) and maximum B:C ratio (2.59), treatment A₁₄ (75% RD N + 25% N through Poultry Manure + Azospirillum SI) was found to be the best treatment from all other treatments. And in variety SIA 326, it can be concluded for obtaining higher grain yield (2.31 t /ha), higher Net return (₹ 25,946.09 /ha) and B:C ratio (2.28), treatment A₂₃ (75% RD N + 25% N through Poultry Manure) was found to be the best treatment from all other treatments.

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