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Original Research Article

Effect of Integrated Nutrient Management on Yield, Yield Attributes and Economy of Kharif Sorghum (*Sorghum bicolour* L.) in Marathawada Region

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Keywords

FYM Yield, INM, Pressmud, RDN, Vermicompost, yield

A B S T R A C T

The field investigation entitled "Effect of integrated Nutrient Management on growth and yield of *Kharif* Sorghum" conducted at experimental farm, Department of Agronomy, College of Agriculture, Latur under Vansantrao Naik Krishi Vidypeeth, Parbhani to find out effect of integrated Nutrient Management on yield attribute, yield and economy of *Kharif* Sogyhum Variety Proagro-8340 (Hybrid) during 2014. The experiment was laid out by using randomized block design with three replications. The treatment was consisting of RDF, FYM, Presmud, Vermicompost and $ZnS0_4$ constituting seven treatments. Viz. T1 - control, T2-RDF (Recommended does of Nitrogen), T3-75% RDN+25% N through pressmud, T4-75% RDN+25% N through vermicompost, T5-75% RDN+25% N through FYM, T6-75% RDN+25% N through FYM+$ZnSO_4$ @20kg/ ha.,T7-75% RDN+25% N through Vermicompost +$ZnSO_4$ @20kg/ ha. The result indicated that the application inorganic and organic combination of treatment T7-75% RDN+25% N through Vermicompost +$ZnSO_4$ @20kg/ ha produced higher yield (2383 kg/ha) as well as, high B: C ratio (2.28), gross monetary returns (Rs.57354), and net monetary (Rs.32225).

Introduction

Sorghum (*Sorghum bicolor* L. Moench) is one of the main staple crops for the world's poorest and most food-insecure people. The crop is genetically suited to hot and dry agro ecologies where it is difficult to grow other food grains.

Use of organic manures alone, as a substitute to inorganic fertilizer is not Profitable and will not be enough to maintain the present levels of crop productivity of high yielding varieties. Application of organic manures and FYM along with inorganic fertilizers into soil increases the productivity of the system and also sustained the soil health for a longer period (Gawai and Pawar, 2007). Integrated nutrient management includes the intelligent use of organic, inorganic, and on-line biological resources so as to sustain optimum yields, improve or maintain the soil physical and chemical properties and provide crop nutrition packages which are technically sound, economically attractive, practically feasible and environmentally safe (Tandon, 1989).

Hence, it is essential that the farmers be made aware of profitability of Integrated nutrient management under kharif sorghum. By keeping above points in view, the present study is proposed following objectives.

To study the effect of Integrated Nutrient Management (INM) on growth and yield of *kharif* Sorghum.

To work out the economics of sorghum under Integrated Nutrient Management (INM)

Materials and Methods

The experiment was conducted during *kharif* season of the year 2014-15 at Experimental Farm, Department of Agronomy, College of Agriculture Latur under Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. the soil was low in available nitrogen (118.86 kg ha^{-1}), medium in available phosphorus (20.42 $kgha^{-1}$), very high in available potassium (385.89 $kgha^{-1}$) content and alkaline in reaction having pH of 8.17. The present experiment was laid out by using Randomized block design with three replications.

The treatments were consisting of RDF, FYM, Vermicompost and Biofertilizers constituting seven treatments viz., T1-Control, T2-RDN (Recommended Dose of Nitrogen), T3-75% RDN + 25% N through Pressmud, T4-75% RDN + 25% N through Vermicompost, T5-75% RDN + 25% N through FYM, T6-75% RDN + 25% N through FYM + $ZnSO_4$ @ 20 kg ha^{-1} T7-75% RDN + 25% N through Vermicompost + $ZnSO_4$ @ 20 kg $ha^{-1.}$ Organic manures viz. Organic manures *viz.*, FYM, Pressmud, Vermicompost were also applied before sowing to the plots as per the given treatments.

The complete dose of nitrogen, phosphorus, potassium as per treatment was drilled at the time of sowing uniformly in the plots by using the urea, single super phosphate, muriate of potash, zinc sulphate. The Variety used was.Proagro-8340 (hybrid).

Results and Discussion

The data on effect of inorganic fertilizer, FYM, vermicompost, press mud and micro nutrient (znso4) on length of earhead (cm), weight of earhead (g), number of grains per plant earhead, 1000 grain weight (g) and weight of grains per plant, of sorghum and yield are presented in (Table 1 and 2).

Different treatments of nutrient management have significant effect on length of earhead, breadth of earhead, weight of earhead (g), wt. of grains per earhead (g) and no. of grains per head (Table 1).

The weight of earhead (g), weight of grains per earhead (g) and number of grains per earhead were significantly higher in nutrient management *i.e.* application of 75% RDN + 25% N through vermicompost + $ZnSO_4$ @ 20 kg ha^{-1}, but the weight of earhead significantly higher treatment T_2 (100% RDN).

Grain yield is a function of yield attributing characters. Hence, the increase in yield attributes viz. Length of earhead (cm), weight of earhead (g), number of earhead, weight of grain (g) per earhead, increased yield.

The application of 75% RDN + 25% N through vermicompost + $ZnSO_4$ @ 20 kg ha^{-1} produced significantly highest earhead weight (kg ha^{-1}) than rest of the treatments, grain and fodder (biological yield) yield (Table 2). Similar results are also reported by shelke *et al.*, (1997) and Dhonde *et al.*, (2004).

Economic returns

Gross monetary returns, net monetary returns and B: C ratio were influenced significantly due to different treatments (Table 3).

Table.1 Mean length of earhead(cm), breadth of earhead (cm), weight of earhead (g), weight of grains per plant (g), number of grains per plant and test weight (g)of sorghum as influenced by various treatments

Treatments	Length of earhead (cm)	Breadth of earhead (cm)	Weight of earhead (g)	Weight of grains / plant (g)	Number of grains /plant	Test weight (g)
T_1 - (control)	24.66	4.25	25.88	17.68	1002.00	18.27
T_2 -100 % RDN	30.90	6.56	47.76	38.34	2055.15	19.58
T_3- 75 % RDN + 25% N through pressmud	29.95	6.39	37.33	34.74	1549.67	21.53
T_4 - 75% RDN + 25% N through vermicompost	30.74	6.35	42.79	30.10	1433.22	18.50
T_5 - 75% RDN + 25 % N through FYM	30.60	6.31	43.76	34.95	1586.19	19.85
T_6 - 75% RDN + 25 % N through FYM+ $ZnSO_4$ @ 20 kg/ha^{-1})	30.84	6.49	43.35	36.24	1685.21	20.05
T_7- 75% RDN + 25% N through vermicompost+ $ZnSO_4$ @ 20 kg/ha^{-1})	31.28	6.67	43.38	43.07	2223.94	21.96
SE+	0.41	0.16	1.20	1.24	88.59	0.75
C.D. at 5%	1.29	0.48	3.74	3.85	275.99	2.34
General Mean	**29.85**	**6.14**	**40.60**	**33.65**	**1647.91**	**19.96**

Table.2 Mean weight of earhead, grain yield, fodder yield, biological yield (kg ha^{-1}) and harvest index (%) as influenced by various treatments

Treatments	Weight of earhead kg ha^{-1}	Yield (kg ha^{-1})		Biological Yield kg ha^{-1}	Harvest index (%)
		Grain	Fodder		
T_1 - (control)	1041	786	1156	1942	40.47
T_2 -100 % RDN	2637	2156	2738	4894	44.05
T_3- 75 % RDN + 25 % N through pressmud	1794	1904	2096	4000	47.60
T_4 - 75% RDN + 25 % Nthrough vermicompost	2511	2112	2918	5030	41.98
T_5 - 75% RDN + 25 % N through FYM	1816	1955	2088	4043	48.35
T_6 - 75% RDN + 25 % N through FYM+ $ZnSO_4$ @ 20kg/ha^{-1})	2637	2144	3282	5426	39.51
T_7- 75% RDN + 25 % N through vermicompost+ $ZnSO_4$ @ 20 kg/ha^{-1})	2742	2383	3570	5953	40.03
SE+	18.4	42.7	102.4	264.92	-
C.D. at 5%	56.6	131.6	315.6	816.24	-
General Mean	**2172**	**1920**	**2550**	**4405.43**	**43.14**

Table.3 Mean Grain yield (kg ha^{-1}) and economics (Rs.ha^{-1}) of sorghum as influenced by different treatments

Treatment	Grain Yield (kg ha^{1})	Economics (Rs.ha^{-1})			B:C ratio
		GMR	CC	NMR	
T_1 - (control)	786	18364	17867	497	1.02
T_2 -100 % RDN	2156	49742	22010	27732	2.25
T_3- 75 % RDN + 25% N through pressmud	1904	43116	22129	20987	1.94
T_4 - 75% RDN + 25% N through vermicompost	2112	49688	23629	26273	2.10
T_5 - 75% RDN + 25% N through FYM	1955	43902	22428	21474	1.95
T_6 - 75% RDN + 25% N through FYM+ $ZnSO_4$ @ 20 kg/ha^{-1})	2144	51702	23928	27774	2.16
T_7- 75% RDN + 25% N through vermicompost+ $ZnSO_4$ @ 20 kg/ha^{-1})	2383	57354	25129	32225	2.28
SE+	42.7	506.7	-	402.6	-
C.D at 5%	131.6	1561.2	-	1240.6	-
General Mean	**1920**	**44838**	**22446**	**22423**	**1.95**

The highest gross monetary (Rs.57354) and net monetary returns (Rs.32225) and B:C ratio (2.28) were observed due to application of 75% RDN + 25% N through vermicompost + $ZnSO_4$ @ 20 kg ha^{-1}. Similar result are also reported by Manjhi *et al.,* (2009), Dhonde *et al.,* (2004) and Cleto *et al.,* (2014).

B: C ratio was observed more in $T_7$of sorghum crop on area basis (2.28) recorded significantly superior B: C ratio higher than nutrient management treatment T_3, T_4, T_5, T_6, T_1 and at par with T_2 100% RDN. Similar result is also reported by Dhonde *et al.,* (2004), Samborlang *et al.,* (2011) and Tamboli *et al.,* (2013).

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