IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 8, Issue 6 Ver. I (Jun. 2015), PP 49-52
www.iosrjournals.org

Effect of Various Levels of Fertilizers on Growth and Yield of Finger Millet

Patil, S. V[1]., Bhosale, A. S[2]. and Khambal, P. D[3].

1, M.Sc. (Agri.) Student, College of Agriculture, Kolhapur, 2 Associate Professor, Department of Agronomy, College of Agriculture, Kolhapur.3 Assistant Professor, Department of Agronomy, KRM College of Agriculture, Phondaghat.

Abstract: *A field investigation was conducted to study the effect of different levels of fertilizers on growth and yield of finger millet. The RDF through briquettes (60:30:00 Kg NPK ha^{-1}) shows significantly higher results regarding different growth attributes like plant height, number of functional leaves plant^{-1}, number of tillers hill^{-1}, leaf area plant^{-1} and dry matter production plant^{-1}. The treatment T_2 also recorded significantly higher yield attributing characters like number of fingers earhead^{-1} and 1000 grain weight. However, treatment T_3 was at par with application of 75% RDF through briquettes. The higher yield attributing characters resulted into significant increase in grain yield (25.20 qtl ha^{-1}) and straw yield (32.72 qtl ha^{-1}) with the application of RDF through briquettes in treatment T_2. However, treatment T3 was at par with the application of 75% RDF through briquettes (45:22.5:00 Kg NPK ha^{-1}) in respect of grain yield (24.40 qtl ha^{-1}) and straw yield (31.60 qtl ha^{-1}). On the basis of this results it could be concluded that, application of RDF through briquettes (60:30:00 Kg NPK ha^{-1}) is an optimum dose and advisable for obtaining the maximum grain and straw yield for transplanted finger millet.*

Keywords: *Finger millet, fertilizer levels, briquettes, growth and yield.*

I. Introduction

Finger millet is an important rainfed crop, due to its resilience and ability to withstand adverse weather conditions when grown in soils having poor water holding capacity. In monsoon season the applied fertilizers are drained or leached out especially in heavy rainfall areas. The application of fertilizers through briquettes will be helpful for increasing fertilizer use efficiency and use of applied fertilizers (Nigade and More, 2013).

The integrated use of UB-DAP has the potential to increase finger millet production of small resource-poor finger millet farmers with less fertilizers and in sustainable manner in rainfed transplanted finger millet ecoregions. The information regarding the effect of various levels of fertilizers and deep placement of N & P briquettes on growth and yield attributes of finger millet is negligible and hence present investigation was undertaken.

II. Materials And Methods

This field experiment was conducted at Zonal Agricultural Research station, Shenda park farm, Kolhapur during Kharif 2012. Geographically it comes under the sub mountain zone with average annual rainfall of 1050 mm being received in about 64 rainy days. The soil of experimental plot was sandy clay loam in texture, low in available phosphorus and moderately high in available nitrogen and potash. It was neutral in reaction. The field experiment was laid out in randomized block design (Panse and Sukhatme, 1967) comprising six treatments viz., T_1 RDF through fertilizer (60:30:00 Kg NPK ha^{-1}), T_2 RDF through briquettes (60:30:00 (60:30:00 Kg NPK ha^{-1}), T_3 75 % Recommonded dose of fertilizers through briquettes (45:22.5:00 Kg NPK ha^{-1}), T_4 50 % RDF through briquettes (30:15:00 Kg NPK ha^{-1}), farmers practice (application of 125 kg Urea ha^{-1}) and T_6 Absolute control. The variety GPU 28 of finger millet was used in this investigation.

Seeds were treated with Thirum @ 3 gm kg^{-1} of seeds before sowing. Seed treatment with biofertilizer (Azospirillum @ 0.25 gm kg^{-1} of seeds) was common to all treatments except treatment T_5 and T_6. Fertilizer application was done as per the treatments. Basal dose of fertilizers was applied at the time of transplanting. Half of the nitrogen was applied as top dressing at 32 DAT. Urea (46 percent Nitrogen), DAP (18 percent Nitrogen and 46 percent Phosphorus) and UB-DAP briquettes (17 percent Nitrogen and 34 percent Phosphorus) were used as fertilizer source. Seeds were sown on nursery beds of 1.5 m X 8 m size in lines 7.5 cm apart with seed rate of 4 kg ha^{-1}. 32 days old seedlings were used for transplanting. Transplanting was done with a spacing of 20-40 X 7.5 cm. Growth observation viz., plant height (cm), number of tillers hill^{-1}, number of leaves plant^{-1}, dry matter production plant^{-1} and leaf area plant^{-1} were recorded at periodical interval. Harvesting of experimental crop was carried out at 90 percent physiological maturity stage. The post harvest observations viz., number of fingers earhead^{-1}, grain yield (qtl ha^{-1}), straw yield (qtl ha^{-1}) and test weight (1000 grain weight) were also recorded.

III. Results And Discussion

A. Growth studies

1. Plant height :

RDF through briquettes (60:30:00 kg NPK ha^{-1}) in treatment T_2 was significantly higher over 50 % RDF through briquettes (30:15:00 kg NPK ha^{-1}) and farmers practice (125 kg Urea ha^{-1}). At par with RDF through fertilizers in treatment T_1 and 75 % RDF through briquettes in treatment T_3.

2. Number of functional leaves plant^{-1} :

At all stages of crop growth, RDF through briquettes recorded significantly more number of functional leaves plant^{-1} than rest of the treatments, followed by RDF through fertilizers (60:30:00 kg NPK ha^{-1}). At crop growth stages of 30, 45, 60 and 75 DAT, RDF through briquettes and RDF through fertilizers (60:30:00 kg NPK ha^{-1}) treatments were found at par. On the other hand, the treatment control showed minimum number of functional leaves over all the treatments under study. Similar results reported by Gavade (2010) and Nigade and More (2013).

3. Number of tillers^{-1} :

The treatment T_2 was significantly higher over 50 % RDF through briquettes (30:15:00 Kg NPK ha^{-1}) and farmers practice (125 Kg Urea ha^{-1}), however at par with RDF through fertilizers (60:30:00 Kg NPK ha^{-1}) and 75 % RDF through briquettes (45:22.5:00 Kg NPK ha^{-1}).

4. Leaf area plant^{-1} :

At 45 and 60 DAT the application of RDF through briquettes (60:30:00 kg NPK ha^{-1}) recorded significantly superior over rest of the treatments except application of RDF through fertilizers, while at 75 DAT the application of RDF through briquettes (60:30:00 Kg NPK ha^{-1}), RDF through fertilizers (60:30:00 kg NPK ha^{-1}) and 75 % RDF through briquettes (45:22.5:00 Kg NPK ha^{-1}) were found at par. The higher leaf area has resulted into higher photosynthetic activity, the synthesis of higher amount of photo synthate by finger millet at all stages of crop. Similar results were observed by Deshmukh (2007) and Gavade (2010).

5. Dry matter production plant^{-1} :

At 30, 45 and 60 DAT the application of RDF through briquettes (60:30:00 Kg NPK ha^{-1}) was found significantly superior over 50 % RDF through briquettes, farmers practice (125 Kg Urea ha^{-1}) and control treatments. Further it was at par with the application of RDF through fertilizers (60:30:00 Kg NPK ha^{-1}) and 75 % RDF through briquettes (45:22.5:00 Kg NPK ha^{-1}).

At 75 DAT the application of RDF through briquettes (60:30:00 Kg NPK ha^{-1}) was significantly superior over rest of the treatments. The results are in conformity with the results noted earlier by Roy et al. (2002), Mendhe et al. (2006) and Gavade (2010).

B. Yield studies

1. Number of fingers earhead^{-1} :

RDF through briquettes (60:30:00 kg NPK ha^{-1}) was significantly higher over 50 % RDF through briquettes (30:15:00 kg NPK ha^{-1}) and farmers practice at par with RDF through fertilizers (60:30:00 kg NPK ha^{-1}) and 75 % RDF through briquettes (45:22.5:00 kg NPK ha^{-1}).

2. 1000 grain weight :

The application of RDF through briquettes in treatment T_2 was significantly superior over the RDF through fertilizers, 50 % RDF through briquettes (30:15:00 kg NPK ha^{-1}), farmers practice (125 kg Urea ha^{-1}) and control treatments except the application of 75 % RDF through briquettes (45:22.5:00 kg NPK ha^{-1}). These results are in conformity with the results obtained by Gautam and Kaushik (1982), Reddy et al. (1985), Roy et al. (2002), Nigade and More (2013).

C. Yield

1. Grain yield

The application of RDF through briquettes was found significantly superior over RDF through fertilizers, 50 % RDF through briquettes, farmers practice and control treatments, however it was at par with the application of 75 % RDF through briquettes. Higher grain yield observed due to the briquette application might be due to reduction in leaching losses of nutrients and increase in the availability of nutrients. Similar results were also reported by Talshilkar et al. (1992), Dhane et al. (2002), Pillai (2004), Bulbule et al. (2005), Darade (2009) in Rice and Gawade (2010) in finger millet.

2. Straw yield

The treatment RDF through briquettes was found significantly superior over RDF through fertilizers (60:30:00 kg NPK ha^{-1}), 50% RDF through briquettes, farmers practice and control treatments. However it was at par with the application of 75% RDF through briquettes. The treatment control recorded significantly the lowest straw yield as compared with other treatments. The higher straw yield might be due to steady and slow availability of nitrogen at early as well as later growth phase and availability of phosphorus in root zone. This might be due to same trend was also recorded in growth observations. These observations are in the line with the observations made by Dafterdar and Sawant (1995), Talashilkar et al. (2000), Mendhe et al. (2006) and Darade et al. (2009) in case of rice and Gavade (2010) in case of finger millet.

D. Benefit cost ratio

The treatment RDF through briquettes recorded significantly higher B:C ratio (1.61) over rest of the treatments viz., RDF through fertilizers (1.45), 50% RDF through briquettes (1.21), farmers practice (1.19) and control(1.10) except 75% RDF through briquettes (1.59). Similar results were recorded by Maitra et al. (2000), Ramamoorthy et al. (2009) and Gavade (2010).

IV. Conclusion

On the basis of present investigation, it is concluded that, the application of RDF through briquettes (60:30:00 kg NPK ha^{-1}) is an efficient and advisable for obtaining the maximum grain yield. The gross and net monetary returns as well as benefit cost ratio is also higher with application of RDF thrpugh briquettes (60:30:00 kg NPK ha^{-1}).

Table 1. Growth attributes

Treatment	Plant height				No of Leaves				No of tillers				Leaf area				Dry matter			
	30	45	60	75	30	45	60	75	30	45	60	75	30	45	60	75	30	45	60	75
T_1	39.3	59.1	81.6	94.8	8.2	10.3	10.9	11.4	3.0	3.2	3.1	2.7	34.89	158.20	250.91	325.43	9.26	15.10	20.41	43.69
T_2	40.8	60.3	82.8	96.3	8.8	10.8	11.5	11.9	3.1	3.4	3.3	2.9	36.85	179.00	270.30	332.85	10.15	16.17	20.86	50.26
T_3	38.7	58.7	80.7	94.2	7.2	9.4	10.1	10.3	2.7	3.1	2.9	2.6	33.80	142.46	235.16	308.38	8.53	14.51	20.29	41.46
T_4	31.5	51.2	70.2	81.1	6.9	8.8	9.3	10.1	2.5	2.8	2.7	2.5	32.23	130.41	227.19	293.90	7.13	13.00	18.63	38.14
T_5	27.4	47.4	62.3	72.4	6.5	7.7	8.8	9.2	2.1	2.4	2.3	2.3	31.65	124.15	220.35	283.91	6.45	12.84	17.33	35.15
T_6	21.2	41.3	60.1	68.1	5.2	6.2	7.5	8.4	1.5	2.1	2.1	1.9	28.22	93.81	174.1	188.37	5.23	10.05	13.58	27.35
General mean	33.1	53.0	72.9	84.4	7.1	8.8	9.6	10.2	2.4	2.8	2.7	2.4	32.94	138.00	229.66	288.80	7.79	13.61	18.51	39.34
S.E. ±	1.04	1.60	1.86	1.85	0.21	0.29	0.44	0.43	0.17	0.14	0.16	0.15	0.89	3.25	4.83	8.87	0.58	0.60	0.57	0.82

Table 2. Yield attributes

Treatment	No. of fingers $earhead^{-1}$	1000 grain weight(g)	Grain yield (q ha^{-1})	Straw yield (q ha^{-1})	Gross returns (Rs. ha^{-1})	Cost of production (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	B : C ratio
	6.2	2.9	22.50	29.56	29217	20057	9160	1.45
	6.5	3.4	25.20	32.72	32694	20260	12434	1.61
	6.4	3.3	24.40	31.60	31650	19870	11780	1.59
	5.8	2.9	18.00	26.93	23620	19480	4140	1.21
	5.2	2.8	13.20	17.89	17182	14400	2782	1.19
	3.5	2.6	10.10	12.70	13073	11875	1199	1.10
General mean	5.6	2.9	18.9	25.23	24572.67	17657.00	6915.83	1.35
S.E. ±	0.19	0.08	0.58	0.65	713	--	713	--

References

[1]. Bulbule, A.V., V.S. Patil and G.D. Jangle. 2005. Efficient fertilizer Management through deep placement as briquette for lowland rainfed transplanted rice. J. Maharashtra Agric. Univ. **30**(3): 259-262.

[2]. Dafterdar, S. Y. and N.K. Savant. 1995. Evaluation of environmentally friendly fertilizer management, for low land rice on tribal farmer's field in India. Paper presented at the IRRI Research conference, Los Banos, Laguna, Philippines.

[3]. Darade, A.B. and K.B. Bankar. 2009. Effect of Urea-DAP briquettes and zinc levels on nitrogen, phosphorus and potassium uptake and yield of hybrid rice. Int. J. Agric.Sci. **5**(2): 510-512.

[4]. Deshmukh, G.M. 2007. Studies on effect of FYM, Lime, NP Fertilizer and Boron on yield, nutrient uptake and quality of nagli (Eluesine corocana G.). M.Sc. (Agri.). Thesis submitted to the K.K.V., Dapoli.

[5]. Dhane, S.S., A.N. Yadav and D.Mahale. 2002. Urea Briquettes containing diammonium Phosphate an important NP source for Costal saline soils. J. Maharashtra Agric. Univ. **27**(2): 226-228.

[6]. Gautam, R.C. and S.K. Koushik. 1982. Fertilizer nitrogen requirement of finger millet. Indian J. Agron. **27**(3) 263-266.

[7]. Gavade M.S. 2010. Effect of organic manures and sources and levels of fertilizers on growth, yield and quality of finger millet (Eleusine corocana L.). M.Sc. (Agri.) Thesis submitted to Dr. B. S. K. K. V., Dapoli, India (MS).

[8]. Maitra, S., D.C. Ghosh, G. Sounda, P.K. Jana and D.K. Roy. 2000. Productivity, competition and economics of intercropping legumes in finger millet (Eleusinecoracana) at different fertility levels. Indian J. Agric. Sci. **70** (12): 824-828.

[9]. Mendhe, J.T.P.S., N.N. Jarande and A.A. Kanse. 2006. Effect of briquette, inorganic fertilizers and organic manure on growth and yield of rice. J. Soil and Crop Res. **16**(1): 232-235.

[10]. Nigade, R. D. and S. M. More. 2013. Performance of finger millet varieties to different levels of fertilizer on yield and soil properties in sub-montane zone of Maharashtra. International J. Agric. sci. **9**(1): 256-259.

[11]. Panse, V.G. and P.V. Sukhatme.1967. Statastical methods for Agricultural workers. ICAR Publications, New Delhi, PP. 199-210.

[12]. Pillai, M.G. 2004. Comparative study on the effect of glyricidia in corporation, broadcast of fertilizers and deep

[13]. placement of UB- DAP on yield, nutrient use efficiency and nutrient recovery of Sahyadri hybrid rice. M.Sc. (Agri). Thesis submitted to Dr. B. S. K. K. V., Dapoli, India (MS).

[14]. [13] Ramamoorthy, K., S. Radhamani and P. Subbian. 2009. Productivity and profitability of rainfed finger millet (Eleusine corocana L. Gaertn) through organic farming. Green farming. **2**(5): 269-271.

[15]. [14] Reddy, S.R. and N.R. Reddy. 1985. Effect of nitrogen and phosphorus levels on growth and yield of finger millet. Agron. J., **82**(2): 183-185.

[16]. [15] Roy, D.K.,T. Chakraborty, G. Sounda, and S. Maitra. 2002. Growth and yield attributes of finger millet as influenced by plant population and different levels of nitrogen and phosphorus. Indian J. Agric. Res. **46**(1): 65-70.

[17]. [16] Talashilkar, S.C., D.S. Savant, V.B. Dhamapurkar and N.K. Savant. 2000. Yield and nutrient uptake by rice as influenced by integrated use of calcium silicate slag and UB-DAP in acid lateritic soil. J. Indian Soc. Soil Sci., **48**(4): 847-849.

[18]. [17]Talshilkar, S.C., A.S. Dalavi, S.S. Dhane and N.K. Savant.1992. Agronomic performance of Urea briquettes fortified with diammonium phosphate in rainfed transplanted rice in Konkan national seminar on strategies for coastal agriculture in Twenty first century. Indian society of Coastal Agri. Research.