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Response of Finger Millet to Urea–DAP Briquette Application under Irrigated Conditions of Mandya

K. S. Shubhashree, H. R. Raveendra, C. R. Ravishankar, K. Madhusudan

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Abstract Afield experiment was conducted during *kharif* 2014--15 and 2015-16 to study the effect of different fertilizer management techniques on finger millet as affected by growth and yield attributes under irrigated condition. The trial was laid out in randomized block design with six treatments replicated four times. The trial comprised of six treatments viz. application of 100% of RDF through chemical fertilizers, (100:50:50 kg NPK ha^{-1}), application of 100, 75, 50% of RDF through briquettes, farmers practice and absolute control.Application of 100% RDF through fertilizers recorded significantly superior grain yield (4790 kg/ha) and straw yield (6985 kg/ha) which was on par with 100% RDF through briquettes (4578 and 6703 kg/ha grain and straw yield respectively) and 75% RDF through briquettes (4578 kg/ha grain and 6799 kg/ha straw yield).Plant height also showed similar trend and was significantly higher in T_1, T_2 and T_3 than that of farmers practice. Yield attributes such as number of tillers per plant, fingers per ear and finger length were also higher in the same treatments supporting higher yield. However, application of 75% RDF through briquettes recorded higher Benefit cost ratio of 2.65 revealing it has efficient fertilizer management technique when compared to other management techniques. Farm the present investigation, it can be concluded that higher grain and fodder yield associated with higher monetary returns can be obtained by application of 75% of DRF through briquettes.

Keywords Finger millet, Fertilizers, Briquettes, Grain yield.

Introduction

Finger millet is an important staple food and fodder crop of Karnataka. Its major cultivation is under rainfed condition although in many irrigated tracts it is cultivated even under irrigated condition. It is an important nutri cereal, climate resilient and climate smart crop which is hopefully the future solution for changing climate and the only means to achieve the nutritional security among the economically weaker sections of the society. Usually, the crop is mainly grown on marginal and less fertile soils, because of

K. S. Shubhashree*
Junior Agronomist,

H. R. Raveendra,
Junior pathologist,

C. R. Ravishankar, K. Madhusudan
Breeder, AICRP on Small millets,
ZARS, VC Farm, Mandya, India
e-mail: ks.shubhashree@gmail.com
*Correspondence

the less remunerative prices of the produce which leads to lower productivity. In order to overcome the problem of lower productivity there is a need increase the resource use efficiency such as fertilizer use efficiency and others. Under irrigated conditions, nutrients applied through fertilizers undergo various losses such as leaching and volatilization. Urea-DAP briquettes dissolve slowly and release nutrients up to maximum period of crop growth [1]. Application of fertilizers through briquettes is efficient method to achieve higher grain yield of finger millet under rainfed situations of Kolhapur [2]. Urea-DAP briquettes have the potential to increase finger millet production of small farmers with fewer fertilizers and efficient utilization of applied nutrients. The present investigation was formulated and taken up, as there is very meager information available about the effect of Urea-DAP briquettes on growth and yield attributes of transplanted finger millet.

Materials and Methods

A field investigation was carried out at Zonal Agricultural Research Station, V. C. Farm, Mandya during *kharif* 2014 and 2015 under irrigated situation Geographically it comes under the Southern dry Zone of Karnataka with an average annual rainfall of 750 mm. The soil of experimental plot was sandy loam in texture, neutral in reaction (6.84) with EC (0.13 dSm^{-1}), low in available nitrogen (221.32 kg ha^{-1}), medium in available phosphorus (48.17 kg ha^{-1}) and available potash (219.07 kg ha^{-1}). The field experiment was laid out in randomized block design comprision six treatments viz., T_1-RDF through fertilizer (100:50:500 kg NPK ha^{-1}), T_2 -100% RDF through briquettes (100:50:50 kg NPK ha^{-1}), T_3 -75% RDF through briquettes, T_4-50% RDF through briquettes, T_5- farmers practice (application of 125 kg urea ha^{-1}) and T_6- Absolute control. The finger millet variety KMR-301 was used in this investigation. Nursery was taken up with a bed size of 25ft length and 4ft width and 10 cm raised beds, with a seed rate of 5 kg per ha. The nursery areas was fertilized with ammonium sulfate, single super phosphate and murate of potash. Irrigation was given as per the demand. Seedlings were transplanted with 30 cm row spacing and 10 cm between the plants using 20 days old seedlings. As per recommendation half of the dose of nitrogen, full dose of phosphorus and potash were applied as basal dose at the time of transplanting and remaining 50% of the nitrogen was applied at after inter cultivation (20 DAP). Source of fertilizers used to supply nitrogen and phosphorus were urea DAP briquettes (17% nitrogen and 34% phosphorus), urea, single super phosphate, murate of potash. At harvest, growth attributes viz. plant height,number of tillers per plant and yield attributes such as number of fingers per earhead, finger length and per plot grain and straw yield were also recorded.

Results and Discussion

The growth attributing characters, yield contributing parameters and yield were influenced by the different treatments. Among all the treatments 100% RDF through fertilizers recorded significantly higher plant height (104.1) over 50% RDF through briquettes, farmers practice (125 kg urea ha^{-1}) and absolute control. However, it was on par with 100% RDF through briquettes (102.3) and 75% RDF through briquettes (99.9) whereas the least plant height was observed with

Table 1. Growth and yield attributes of finger millet as influenced by different levels of fertilizers.

Treatments	Plant height (mm)	Tillers per plant	Fingers per ear	Finger length (cm)
T_1 - Application of RD of FYM (7.5 t ha^{-1}) +fertilizers (100:50:50 kg NPK ha^{-1})	104.1	3.3	7.7	9.0
T_2 - Application of 100% RDF through briquettes	102.3	3.2	7.6	8.9
T_3 - Application of 75% RDF through briquettes	99.9	3.1	7.6	8.8
T_4 - Application of 50% RDF through briquettes	92.6	2.4	6.7	7.8
T_5 - Application of fertilization as per farmers practice	93.5	2.6	6.8	8.1
T_6 - Absolute control	85.0	1.9	6.2	7.1
SEm ±	1.3	0.2	0.2	0.2
CD (p = 0.05)	3.8	0.6	0.6	0.6

Table 2. Yield and economics of finger millet as influenced by different levels of fertilizers.

Treatments	Average over two years Grain yield (kg/ha)	Straw yield (kg/ha)	BC ratio
T_1 - Application of RD of FYM (7.5 t h^{-1}) + fertilizers (100:50:50 kg NPK ha^{-1})	4780	6985	2.52
T_2 - Application of 100% RDF through briquettes	4578	6703	2.56
T_3 - Application of 75% RDF through briquettes	4511	6799	2.65
T_4 - Application of 50% RDF through briquettes	3538	5270	2.31
T_5 - Application of fertilizers as per farmers practice	3607	5036	2.49
T_6 - Absolute control	2781	4069	2.06
SEm ±	124.0	193.1	
CD (p = 0.05)	356.7	555.5	

absolute control. The data also revealed that highest number of productive tillers per plant with 100% RDF through fertilizers (3.3) and it was on per with 100% RDF through briquettes (3.2) and 75% RDF through briquettes (3.1). The results are in conformity with Patil et al. [2].

Among different treatments significantly higher grain yield (4780 kg^{-1}) was recorded with RDF through fertilizers. Higher yield in the treatment might be due to more transformation of nutrients to sink resulting in higher number of finger per head and finger length as compared to 50% RDF through briquettes (3538 kg ha^{-1}), farmers practice (3607 kg ha^{-1}) and absolute control (2781 kg ha^{-1}). However, it was at par with the application of 75% RDF through briquettes (4511 kg ha^{-1}) and 100% RDF through briquettes (4578 kg ha^{-1}) Higher finger millet grain yields achieved with briquette application might be due to increased availability of nutrients to the crop as briquettes release nutrients slowly and steadily throughout the growth period Bulbule et al. [3] and Darade and Bankar [4] reported similar results in rice whereas Gawade et al. [5] and Patil et al. [2] confirmed the results in finger millet.

The straw yield also followed similar trend as that of grain yield and highest grain yield was with 100% RDF through fertilizers (6985 kg ha^{-1}) over 50% RDf through briquetters (5270 kg ha^{-1}), farmers practice (5036 kg ha^{-1}) and absolute control (4069 kg ha^{-1}). Application of 75 % RDF through briqueties (6799 kg ha^{-1}) and 100% RDF through briquettes (6703 kg ha^{-1}) recorded on par straw yield with 100% RDF through fertilizers. 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. These findings are in conformity with that of the results obtained from Mendhe et al. [6] and Darade and Bankar [4] in case of rice and whereas similar results were obtained in finger millet by Gawadi et al. [5] and Patil et al. [2].

Higher cost-benefit ratio of 2.65 was recorded with 75% RDF through briquettes when compared to other treatments. These results are in conformity with that of Gawadi et al. [5] and Patil et al. [2].

Conclusion

From the present investigation, it can be concluded that by application of 75% RDF through briquettes, higher BC ratio of 2.65 can be obtained which is economical feasible for achieving higher grain and straw yields by enhancing the use efficiency of the applied nutrients.

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