Effect of different nutrient levels on yield and economics of browntop millet

Kiran HP, Sukanya TS, Salmankhan RM and Basavaraddi Chavadi

DOI: https://doi.org/10.22271/chemi.2020.v8.i6am.11192

Abstract
An experiment in Browntop millet was conducted during kharif 2019 in red sandy loamy soil of Zonal Agricultural Research Station, University of Agricultural Sciences, GKVK, Bengaluru with different nutrient levels. Fourteen treatments replicated thrice in randomized complete block design (RCBD). Among the different nutrient levels the treatment with 60 N kg ha\(^{-1}\) + 30 P\(_2\)O\(_5\) kg ha\(^{-1}\) + 20 K\(_2\)O kg ha\(^{-1}\) (T\(_{12}\)) recorded highest grain (1295 kg ha\(^{-1}\)), straw yield (3131 kg ha\(^{-1}\)), Gross monetary returns (Rs. 45310 ha\(^{-1}\)), Net monetary returns (Rs. 24240 ha\(^{-1}\)) and B:C ratio (2.15).

Keywords: Browntop millet, nutrient levels, yield, economics

Introduction
Browntop millet (Brachiaria ramosa) is the rarest cultivated among the millets. It is grown in the regions of scanty and erratic rainfall, poor and marginal soils in southern India. It is popular as a short duration crop, higher yield per unit time, low input requirement, known for its drought and shade tolerance as it can withstand severe moisture stress and suited to wide range of soil conditions. Browntop millet spread out from the Deccan plateau to Tamil Nadu in the South. In the United States, it is majorly grown in the South East regions for hay, pasture and game bird feed. Browntop millet is also called as Korale in Kannada, it is mainly grown in rainfed tracts of Chitradurga, Chikkaballapura and Tumakuru districts of Karnataka. The crop is prevalent in this region in terms of cultivation and consumption. The Browntop millet seed is grown in variety of soils and climatic conditions. The Browntop millet can fill narrow growing windows to produce a good quality forage because of its extremely rapid growth. The nutritional composition of Browntop millet is better when compared to other millets. The grain is a rich source of natural fibre (12.5 per cent), carbohydrate, protein (11.5 per cent), minerals (6.21 per cent), calcium (18 per cent) and iron (8.9 per cent). It is a food for patients suffering from diabetes. Colour of the millet is also appealing and it is well accepted by the farmers as well as consumers when compared to Kodo millet and Finger millet.

Material and Methods
The experiment to study the performance of the crop to different fertilizer levels on yield and economics in Browntop millet consisted of fourteen treatments replicated thrice in a randomized complete block design (RCBD). This experiment was conducted during Kharif 2019 at Gandhi Krishi Vignan Kendra (GKVK). The soil is red sandy loamy and the treatment tested were, T\(_1\): 20:20:10 kg N:P:K ha\(^{-1}\), T\(_2\): 20:20:20 kg N:P:K ha\(^{-1}\), T\(_3\): 20:30:10 kg N:P:K ha\(^{-1}\), T\(_4\): 20:30:20 kg N:P:K ha\(^{-1}\), T\(_5\): 40:20:10 kg N:P:K ha\(^{-1}\), T\(_6\): 40:20:20 kg N:P:K ha\(^{-1}\), T\(_7\): 40:30:10 kg N:P:K ha\(^{-1}\), T\(_8\): 40:30:20 kg N:P:K ha\(^{-1}\), T\(_9\): 60:20:10 kg N:P:K ha\(^{-1}\), T\(_10\): 60:20:20 kg N:P:K ha\(^{-1}\), T\(_11\): 60:30:10 kg N:P:K ha\(^{-1}\), T\(_12\): 60:30:20 kg N:P:K ha\(^{-1}\), T\(_13\): 40:20:0 kg N:P:K ha\(^{-1}\) and T\(_{14}\): Control

Local variety (Dundu korale) was sown at the spacing of 45 × 10 cm. The gross and net plot sizes were 3.0 × 4.5 m and 2.6 × 2.7 m respectively. Data averaged over three replication and the data on Browntop millet grain and straw yield was collected after the crop harvest. The economics of nutrients levels on the crop was worked out. The data collected on different traits was statistically analysed using the standard procedure and the results were tested at five per cent level of significance as given by Gomez and Gomez (1984) \(^{[2]}\).
Gross returns (Rs. ha⁻¹)
The gross return per hectare was calculated by multiplying prevailing market price into total yield obtained per hectare. (Market price/unit quantity × grain yield + market price of straw × straw yield).

Net returns
Net returns were calculated by deducting the cost of cultivation from gross returns.

Net return = Gross return – Total cost of cultivation

Benefit cost ratio
Benefit-cost ratio was worked as follows.

\[ \text{B:C ratio} = \frac{\text{Gross returns (Rs. ha}^{-1})}{\text{Cost of cultivation (Rs. ha}^{-1})} \]

Results and Discussion

Yield attributes
The grain yield (kg ha⁻¹) of treatment (T₁₂) i.e., application of 60 kg N ha⁻¹ + 30 kg P₂O₅ ha⁻¹ + 20 kg K₂O ha⁻¹ (1295 kg ha⁻¹) was a significantly higher compared to application of 40 kg N ha⁻¹ + 20 kg P₂O₅ ha⁻¹ (903 kg ha⁻¹) (T₁₁) and control (762 kg ha⁻¹) (T₁). The straw yield (kg ha⁻¹) of treatment (T₁₂) i.e., application of 60 kg N ha⁻¹ + 30 kg P₂O₅ ha⁻¹ + 20 kg K₂O ha⁻¹ (3131 kg ha⁻¹) higher compared to other application although it was found on par with application of 60 kg N ha⁻¹ + 30 kg P₂O₅ ha⁻¹ + 10 kg K₂O ha⁻¹ (2799 kg ha⁻¹) (T₁₁) but these two were found significantly higher as compared to other treatments and the control has recorded significantly the lower straw yield (1682 kg ha⁻¹) (T₁).

The increased grain and straw yield (Table 1) was due to interaction effects of nitrogen, phosphorous and potassium, which resulted in higher number of leaves per plant, leaf area, total dry matter accumulation in plant, and its accumulation in different plant parts like leaf, stem and higher number of tillers. The above results are in line with the findings of Bhomte et al. (2016) and Maitra et al. (2001) and Rakesh et al. (2015) who concluded that grain and straw yield of crops increased with application of NPK fertilizer.

Table 1: Grain yield, straw yield, gross returns, net returns and benefit: cost ratio as influenced by different levels of major nutrients in Brown top millet

| Treatments | Grain yield (kg ha⁻¹) | Straw yield (kg ha⁻¹) | Gross returns (Rs. ha⁻¹) | Net Returns (Rs. ha⁻¹) | Benefit cost ratio |
|------------|----------------------|----------------------|--------------------------|------------------------|-------------------|
| T₁: 20:20:10 N:P₂O₅:K₂O kg ha⁻¹ | 841 | 1786 | 29425 | 9547 | 1.48 |
| T₂: 20:20:20 N:P₂O₅:K₂O kg ha⁻¹ | 850 | 1875 | 29769 | 9624 | 1.47 |
| T₃: 20:30:10 N:P₂O₅:K₂O kg ha⁻¹ | 873 | 1910 | 30541 | 10210 | 1.50 |
| T₄: 20:30:20 N:P₂O₅:K₂O kg ha⁻¹ | 918 | 2142 | 32114 | 11517 | 1.55 |
| T₅: 40:20:10 N:P₂O₅:K₂O kg ha⁻¹ | 911 | 2033 | 31889 | 11774 | 1.58 |
| T₆: 40:20:20 N:P₂O₅:K₂O kg ha⁻¹ | 914 | 2122 | 31975 | 11594 | 1.56 |
| T₇: 40:30:10 N:P₂O₅:K₂O kg ha⁻¹ | 934 | 2215 | 32684 | 12117 | 1.58 |
| T₈: 40:30:20 N:P₂O₅:K₂O kg ha⁻¹ | 1044 | 2488 | 36538 | 15704 | 1.75 |
| T₉: 60:20:10 N:P₂O₅:K₂O kg ha⁻¹ | 935 | 2370 | 32719 | 12368 | 1.60 |
| T₁₀: 60:20:20 N:P₂O₅:K₂O kg ha⁻¹ | 1066 | 2575 | 37316 | 16698 | 1.80 |
| T₁₁: 60:30:10 N:P₂O₅:K₂O kg ha⁻¹ | 1078 | 2799 | 37340 | 16936 | 1.81 |
| T₁₂: 60:30:20 N:P₂O₅:K₂O kg ha⁻¹ | 1295 | 3131 | 45310 | 24240 | 2.15 |
| T₁₃: 40:20:0 N:P₂O₅:K₂O kg ha⁻¹ | 903 | 1994 | 31612 | 11764 | 1.59 |
| T₁₄: Control | 762 | 1682 | 26678 | 8208 | 1.44 |
| S. Emz | 65.85 | 146.28 | - | - | - |
| CD at 5% | 199.75 | 443.76 | - | - | - |

Economics
Economics is the ultimate criteria for acceptance or rejection and wider adoption of any technology (Table 1). Among the various treatments application of application of 60 kg N ha⁻¹ + 30 kg P₂O₅ ha⁻¹ + 20 kg K₂O ha⁻¹ has recorded higher gross returns of Rs. 45310, net returns of Rs. 24240 with benefit: cost ratio (2.15) compared to other treatments. This was attributed due to higher nutrient uptake and efficient use of nutrients which resulted in higher grain. The lowest B:C ratio (1.44) was obtained in the control.

Conclusion
Application of 60 kg N ha⁻¹ + 30 kg P₂O₅ ha⁻¹ + 20 kg K₂O ha⁻¹ has shown higher grain, straw yield, gross returns, net returns and B:C ratio in Brown top millet.

References
1. Bhomte MV, Apotikar VA, Pachpote DS. Effect of different fertilizer levels on growth and yield of little millet (Panicum sumantrense) genotypes. Contem. Res. Ind 2016;6(3):2231-2137.
2. Gomez KA, Gomez AA. Statistical Procedures for Agric. Res. 2nd Ed. John Wiley & sons, New York 1984.

3. Maitra S, Ghosh DC, Sounda G, Jana PK. Performance of intercropping legumes in finger millet (Eleusine coracana) at varying fertility levels. Indian J Agron 2001;46(1):38-44.
4. Neha GG, Preeti C, Shobha K. Effect of different nitrogen levels and varietal performance on growth and yield of summer pearl millet. Int. J Curr. Microbiol. App. Sci 2017;6(6):861-869.
5. Nigade RD, More SM. Performance of finger millet varieties to different levels of fertilizer on yield and soil properties in sub-montane zone of Maharashtra. Int. J Agr. Sci. 2012;9(1):256-259.
6. Patil SV, Bhosale AS, Khambal PD. Effect of various levels of fertilizers on growth and yield of finger millet. J Agric. Veter. Sci 2015;8(6):49-52.
7. Rakesh C, Yadav LR, Parihar S. Effect of vermicompost and fertility levels on growth and yield of pearl millet (Pennisetum glaucum L.). Ann. Arid Zone 2015;54(1&2):59-61.