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Performance of pre-released finger millet genotypes under varied levels of NPK fertilizer for higher productivity in Southern Transition Zone of Karnataka

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Abstract
A field trial was of "Performance of pre-released finger millet genotypes under varied levels of NPK fertilizers for higher productivity and quality in Southern Transition Zone of Karnataka" was conducted during late-*Kharif* 2023 at Zonal Agricultural and Horticultural Research Station, Navile, Shivamogga. The results of the experiment showed that, among different genotypes, CFMV-1 recorded significant higher plant height (114.90 cm), number of tillers (3.52 plant^{-1}), number of fingers per ear head (7.38), finger length (7.08 cm), grain yield (3104 kg ha^{-1}), straw yield (5456kg ha^{-1}) net returns (69974₹ ha^{-1}) and B: C ratio (2.69). However, it was on par with ML-365. The application of 125 per cent RDF recorded significantly taller plants (112.25), number of tillers (3.57), number of fingers per ear head (6.69) finger length (6.91 cm) and grain yield (3011 kg ha^{-1}) straw yield (5343 kg ha^{-1}) net returns (65654) and B: C ratio (2.55) over 75 per cent RDF.

Keywords: Tillers, finger length, grain yield, straw yield and economics

Introduction
Millets exhibit unique characteristics among cereals. These can grow well under dry and aberrant weather conditions, can cope with relatively poor soils and require comparatively less external inputs than major cereals, namely rice, wheat and maize. Millets are a staple food with superior nutritional qualities and used both as food and fodder. In addition, millets sequestrate carbon, thereby adding to CO_2 abatement opportunities, contribute to enhanced agro-biodiversity by their rich varietal diversity, ecologically beneficial (Brahmachari *et al*., 2018) [2], allow for mutually beneficial intercropping with other important crops (Maitra *et al*., 2001) [5]. Under the changing scenario of global warming and climate change, cultivation of ecologically sound and hardy millets may be a wise alternative for optimum output with food and nutritional security.
Finger millet (*Eleusine coracana*) is important millet grown extensively in various regions of Asia and is the predominant food crop of Southern India. It occupies an area of 1.21m ha with a production of 1.70 m t and average productivity of 1396 kg ha^{-1} (Anon, 2022) [1]. Karnataka holds the first rank in the area and production among the ragi-growing states in India. In Karnataka, finger millet is grown in an area of 7.88 lakh ha, (Anon, 2022) [1] with an annual production of 12.72 lakh tonnes and productivity of 1871 kg ha^{-1}.
The problem analysis revealed that the lower yields were due to lack of knowledge on use of improved varieties, existing varieties are susceptible to neck blast and lodging, imbalanced nutrient management, non-application of bio fertilizers, lack of knowledge on split application of fertilizers, micronutrients, stem borer and neck blast. Keeping these points in consideration, the following trial was conducted to study the performance of pre-released finger millet genotypes under varied levels of NPK fertilizer for higher productivity in Southern Transition Zone of Karnataka.

Materials and Methods
The experiment was conducted in Zonal Agricultural and Horticultural Research Station, Navile, Shivamogga, Karnataka during Kharif 2023 study on "Performance of pre-released finger millet

genotypes under varied levels of NPK fertilizers for higher productivity and quality in Southern Transition Zone of Karnataka". The experiment was laid out in Randomized complete block design (factorial concept) with twelve treatment combinations consist of four genotypes (CFMV-1, KMR-630, ML-365 and GPU-28) with three different levels of NPK fertilizer (75 per cent RDF- 75:37.5:37.5 kg NPK ha^{-1}, 100 per cent RDF 100:50:50 kg NPK ha^{-1} and 125 per cent RDF 125:62.5:62.5 kg NPK ha^{-1}) replicated three times. Necessary plant protection measures were taken as per the requirement. Periodical observations were recorded. The data so obtained were subjected to statistical analysis as per the standard procedures given by Gomez and Gomez (1984) [4].

Results and Discussion

Effect of different fertility levels on growth and yield attributes of finger millet

The obtained data from the experiment is presented in Table 1. The results showed that among different genotypes CFMV-1 recorded significantly higher plant height (114.90 cm), number of tillers (3.52), number of finger (7.39) and length of finger (7.08 cm). However, it was on par with ML-365. This might due to genetic variation among the varieties might have contributed to the differences in growth and yield attributes these results were conferred with results of Triveni *et al.,* 2019. Among fertilizer levels application of 125 per cent RDF noticed significantly higher plant height (112.25 cm), number of tillers (3.57), number of finger (6.61) and length of finger (6.91) over 75 per cent RDF (90.53 cm, 2.53, 6.05and 5.91cm, respectively) and it was on par with 100 per cent RDF (101.39 cm, 3.04, 6.29 and 6.19 cm, respectively) The plant needed nitrogen for its metabolism, which aided in greater cell division and cell elongation was earlier reported by Maitra *et al.* (2020) [6].

Table 1: Growth and yield attributes of finger millet as influenced by different fertility levels and genotypes

Treatments	Plant height (cm)	Number of Tillers	Number of Fingers per ear head	Finger length (cm)
Factor A				
G_1- CFMV-1	114.90	3.52	7.39	7.08
G_2 -KMR- 630	87.77	2.61	5.67	5.39
G_3 -ML-365	110.43	3.27	6.47	6.59
G_4 -GPU -28	92.46	2.78	5.74	6.29
S.Em±	5.41	0.14	0.22	0.32
C.D at 5%	15.86	0.42	0.65	0.92
Factor B				
F_1- 75 per cent RDF	90.53	2.53	6.05	5.91
F_2-100 per cent RDF	101.39	3.04	6.29	6.19
F_3-125 per cent RDF	112.25	3.57	6.61	6.91
S.Em±	4.68	0.13	0.19	0.27
C.D at 5%	13.73	0.37	0.56	0.79
Interaction				
C.D at 5%	NS	NS	NS	NS

Effect of different fertility levels on grain and straw yield of finger millet

The results indicated that (table 2) grain and straw yield exhibited significant variations with respect to different genotypes. Among the different genotypes, CFMV-1 recorded significantly higher grain and straw yield (3104 and 5456 kg ha^{-1}, respectively) over KMR-630 (2370 and 4255 kg ha^{-1}, respectively). Higher yield in CFMV-1 might be due to its higher growth rate and yield parameters in CFMV-1. The higher yield parameters in CFMV-1 due to more plant height, number of tiller, and tolerant to neck blast disease. However, all the growth and yield attributing parameters were observed to be on par with that of KMR 630. The variation in seed yield of different genotypes may be due to climatic diversities and genetic makeup of the genotypes. More absorption of nutrients might have resulted in vigorous growth which is indicated by increased plant height and tiller number which finally contributed to enhancement in yield attributing characters and ultimately resulted in higher grain yield in ML-365. A similar result was also obtained by Shubhashree *et al*., 2022 [8]. Among the fertiliser levels, application of 125 per cent RDF recorded significantly higher grain and straw yield (3011 kg ha^{-1} and 5343 kg ha^{-1}, respectively) over 75 per cent RDF (2435 kg ha^{-1} and 4579 kg ha^{-1}, respectively). However, it was on par with 100 per cent RDF (2695 kg ha^{-1} and 4786 kg ha^{-1}, respectively). Improved grain filling and increased grain yield with nutrient management in finger millet was recorded previously reported by Menon *et al*. (2023) [7].

Effect of different fertility levels on economics

The obtained data from the experiment is presented in Table 2. The results showed that, among genotypes, higher gross returns (₹ 111266 ha^{-1}), net returns (₹ 69974 ha^{-1}) and B: C ratio (2.69) were recorded in CFMV-1 and it was on par with ML-365 (₹ 99766 ha^{-1}, ₹ 58946 ha^{-1} and 2.44, respectively). However, significantly lower gross, net returns were noticed in KMR-630 (₹ 85136ha^{-1}, ₹ 44432 ha^{-1} and 2.09, respectively). Among the fertilizer levels, the application of 125 per cent of RDF resulted in the significantly higher gross returns of ₹ 107979 ha^{-1}, net returns of ₹ 65654 ha^{-1} and B: C ratio of 2.55. However, 75 per cent of RDF recorded lowest gross returns of ₹ 87541 ha^{-1}, net returns of ₹ 48091 ha^{-1} and B: C ratio of 2.22. This increased economic returns, was due to improvement in grain yield of finger millet. The results are in conformity with that of Chavan *et al*., 2017 [3].

Table 2: Yield and economics of finger millet as influenced by different fertility levels and genotypes

Treatments	Grain yield (Kg ha^{-1})	Straw yield (Kg ha^{-1})	Cost of cultivation (₹ ha^{-1})	Gross returns (₹ ha^{-1})	Net returns (₹ ha^{-1})	B:C ratio
Factor A						
G_1- CFMV-1	3104	5456	41292	111266	69974	2.69
G_2 -KMR- 630	2370	4255	40703	85136	44432	2.09
G_3 -ML-365	2775	5422	40820	99766	58946	2.44
G_4 -GPU -28	2583	4393	40853	92680	51826	2.26
S.Em±	125	223				
C.D at 5%	366	655				
Factor B						
F_1- 75 per cent RDF	2435	4579	39450	87541	48091	2.22
F_2-100 per cent RDF	2695	4786	40977	96116	55139	2.34
F_3-125 per cent RDF	3011	5343	42325	107979	65654	2.55
S.Em±	108	193				
C.D at 5%	318	567				
Interaction						
C.D at 5%	NS	NS	NS	NS		

Conclusion

From this study it can be concluded that, CFMV-1 finger millet variety was superior over in seed yield and B:C ratio over KMR-630. Among the fertilizer levels, 125 per cent recommended dose of fertilizer produced higher yield and B:C ratio over 75 per cent RDF.

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