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Influence of NPK fertilizer doses on growth, yield and economics of improved finger millet genotypes under red sandy loam soils of Andhra Pradesh

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Abstract
A field experiment was conducted at Agricultural Research Station, Vizianagaram, Andhra Pradesh during *kharif*, 2019 to evaluate the fertilizer use efficiency of improved finger millet cultivars. Experiment was conducted in split-plot design with NPK fertilizer doses as main plot treatments and finger millet cultivars as sub plot treatments. Experimental results indicated that 125% recommended dose of fertilizer significantly increased plant height, productive tillers, earhead length, number of fingers per earhead, grain yield and straw yield apart from recording higher net returns and B:C. Among four improved cultivars, VR 1101 and WN 559 have outperformed in terms of yield and economics than other cultivars and national check varieties.

Keywords: Finger millet, NPK fertilizer doses, yield, economics

Introduction
Finger millet is one of the most important crops in small millet group by having more acreage and production compared to other small millets. It can grow on a wide range of moisture regimes, soils and elevations due to its inherent stress tolerance mechanism. Adding to this finger millet is good source of calcium, phosphorus, micronutrients and other phytochemicals and hence it is highly preferred food crop. In order to replace the old and low yield traditional cultivars, AICRP on Small millets has been developing number of finger millet cultivars having high yielding as well as high nutritional qualities. However, these improved varieties will not respond in similar way to the management practices particularly nutrient management. Studying the fertilizer responsiveness would be very much useful for saving of fertilizer cost as well as for preventing land degradation in the long run while maintaining maximum yields. Keeping this in view this study was proposed to find out the optimum fertilizer dose for improved finger millet cultivars.

Materials and Methods
A field experiment was conducted during kharif, 2019 at Agricultural Research Station, Vizianagaram, Andhra Pradesh. The soil of the experimental site was deep red sandy loam in texture with low in available nitrogen (110 kg/ha), high in available phosphorus (63kg/ha) and medium in available potassium (280 kg/ha). Climate of the experimental site was hot humid with average annual rainfall of 1200mm. Experiment was conducted in split-plot design with fertilizer levels as main plots (F_1: No NPK; F_2: 75% RDF; F_3: 100% RDF; F_4: 125% RDF) and improved finger millet cultivars as subplots (V_1:WN 585; V_2:WN 585; V_3:WN 585; V_4:WN 585; V_5: VL 376 (NC); V_6: PR 202(NC)). Planting was done with 20 days old seedlings on 16.07.2019. 50-40-25kg NPK/ha was taken as recommended dose of fertilizer as per All India Coordinated Small millets Improvement Project. Total quantity of phosphorus and half dose of nitrogen and potassium were applied as basal dose at the time of sowing and remaining half dose of nitrogen was applied at maximum tillering stage and half dose potassium was applied at Panicle initiation stage. Observations were recorded from five randomly selected plants at the time of maturity and all the data was subjected to statistical analysis to determine the significance.

Results and Discussions

Effect on growth and yield attributing characters

All the growth and yield attributing characters of finger millet cultivars were significantly influenced by NPK fertilizer doses as well as cultivar. Days to 50% flowering and days to maturity were significantly extended with increase in fertilizer dose from absolute control to 125% RDF. Plant height was highest in 125% RDF, however it was on par with 100% RDF. Productive tillers recorded in 125% RDF were 40.7%, 18.8%,11.8% higher than absolute control, 75% RDF and 100% RDF respectively. Earhead length and finger per ear head recorded in 125% RDF were significantly higher than 75% RDF and absolute control, however it was on par with 100% RDF (Table 1). In 125% RDF, maximum test weight was recorded which was 19.6%, 11.6%, 7.3% higher when compared to absolute control, 75% RDF and 100% RDF respectively. Similar results were reported by Triveni *et al*., 2020 [6]. Kushwah *et al*., 2014 [3] reported that higher applications of fertilizers have positive impact on growth pattern with betterment of physiological process such as cell division, cell elongation along with timely metabolic processes.

Among the improved finger millet cultivars, days to 50% flowering and days to maturity were higher in PR 1511 (91.2 days and 118.5 days) as compared to other cultivars (Table 1). National check variety VL 376 has taken very less time to maturity (100.6 days). Considering the growth parameters, plant height was maximum in PR 1511, however it was on par with VR 1101. Productive tillers per plant were significantly higher in WN 559, however, it was on par with VR 1101. Earhead length in VR 1101 was significantly higher but equal to national check variety VL 376. Highest number of fingers per earhead was seen in VL 376 and it was closely followed by VR 1101. Genotypic variability among different cultivars might be the reason for differences in their performances. These results corroborates with the results reported by Gupta *et al*. (2012) [2]. Test weight was maximum in VR 1101, however it was on par with WN 559. Lowest test weight was recorded in national check variety VL 376.

Effect on yield and economics

Among different NPK fertilizer doses, highest grain yield was recorded in 125% RDF which was 233.9%, 31.1%, 13.2% higher than absolute control, 75% RDF and 100% RDF respectively (Table 1). These results are in conformity with the results reported by Triveni *et al*. (2018). In a long term fertilizer trial at Bengaluru, it was proved that application of $N:P_2O_5:K_2O$ at 50:50:25 kg ha^{-1} increased finger millet yield and soil fertility status compared tonon-fertilized plants (Sankar *et al*.,2011) [5]. In contrast to this, Ndungu-Magiroi *et al*.,2017 [4] reported that application of 30 kg N ha^{-1} increased grain yields by 82% above the 0 N treatment, but increasing N rates beyond 30 kg ha^{-1} did not affect yield. Straw yield was also found higher in 125% RDF compared to lower NPK doses. Net returns were highest in 125% RDF compared to 100% RDF and 75% RDF. Divyashree *et al*.,2018 [1] reported that application of 30:20:10 kg NPK/ha witnesses more profits than lower levels of NPK fertilizers in little millet. Negative net returns were recorded in absolute control due to lesser yield and more cost of field operations. Benefit cost ratio was highest in 125% RDF whereas lowest in absolute control.

Among finger millet cultivars, grain yield was significantly higher in VR 1101, however it was on par with WN 559. Maximum growth and yield attributing characters were collectively contributed to grain yield. Straw yield was maximum in PR 1511 and it was closely followed by VR 1101 and WN 559. Considering the economics, highest net returns were recorded in VR 1101 and it was closely followed by WN 559, but significantly higher than other finger millet cultivars and national check varieties (Table 1). Benefit cost ratio for VR 1101 and WN 559 were significantly higher compared to other cultivars and check varieties.

Table 1: Effect of different levels of NPK fertilizers on growth, yield and economics of improved finger millet cultivars.

Treatments	Days to 50% flowering	Days to maturity	Plant height (cm)	Productive tillers/plant	Ear head length (cm)	Fingers/ear	Test weight(g)	Grain yield (kg/ha)	Straw yield (kg/ha)	Net returns (Rs/ha)	B:C ratio
NPK Fertilizer doses (F)											
F1: No NPK	81.4	108.2	89.0	2.7	8.9	7.6	2.81	937	4895	-2760.62	-0.09
F2: 75% RDF	81.6	110.8	105.2	3.2	9.5	8.4	3.01	2380	7991	40081.42	1.15
F3: 100% RDF	82.9	111.6	111.0	3.4	9.8	8.5	3.13	2755	8846	51034.04	1.43
F4: 125% RDF	84.6	112.6	113.7	3.8	10.0	8.8	3.36	3119	9554	61637.67	1.68
S.Em±	0.19	0.09	1.68	0.10	0.21	0.12	0.03	32.6	90.0	1028.5	0.03
CD (P=0.05)	0.64	0.30	5.8	0.36	0.77	0.43	0.12	113.0	311.5	3558.9	0.10
Finger millet cultivars (V)											
V1:WN 585	75.1	103.3	99.0	2.9	9.1	7.36	2.95	2074	7229	30460.94	0.84
V2: VR 1101	89.1	117.4	109.1	3.6	10.2	9.38	3.27	2642	8344	48337.19	1.35
V3: PR 1511	91.2	118.5	110.0	3.3	9.9	7.78	3.06	2258	8503	36255.63	1.01
V4: WN 559	85.3	114.3	104.3	3.7	9.4	8.73	3.23	2506	8202	44054.06	1.23
V5: VL 376 (NC)	73.2	100.6	100.7	2.9	10.2	9.47	2.90	2088	7253	30891.88	0.85
V6: PR 202(NC)	82.0	110.8	105.1	3.3	8.3	7.26	3.06	2218	7397	34989.06	0.97
S.Em±	0.22	0.18	1.37	0.13	0.15	0.26	0.02	55.1	126	1734.9	0.05
CD (P=0.05)	0.61	0.51	3.92	0.36	0.44	0.73	0.07	157.4	360.0	4957.9	0.14

References

1. Divyashree U, Kumar MD, Sridhara S, Naik TB. Effect of different levels of fertilizers on growth and yield of little millet (*Panicumsumatrense* Roth ex Roem and Schult). International Journal of Farm Sciences. 2018; 8(2):104-108.
2. Gupta N, Gupta AK, Gaur VS, Kumar A. Relationship of nitrogen use efficiency with the activities of enzymes involved in nitrogen uptake and assimilation of finger millet genotypes grown under different nitrogen inputs.Scientific World Journal, 2012, 1–10.
3. Kushwah BB, Thakur NS, Saxena U, Shrivastava DK, Upadhyay SN, Choudhary RK *et al*. Physiological

growth parameter of sorghum as influenced with fertility, FYM and bioinoculants. Annals of Plant and Soil Research. 2014; 16(2):170-171.
4. Ndungu-Magiroi KW, Kasozi A, Kaizzi KC, Mwangi T, Koech M, Kibunja CN *et al*. Finger millet response to nitrogen, phosphorus and potassium in Kenya and Uganda. Nutrient Cycling in Agroecosystems. 2017; 108:297–308.
5. Sankar GRM, Sharma KL, Dhanapal GN, Shankar MA, Mishra PK, Venkateswarlu B *et al*. Influence of soil and fertilizer nutrients on sustainability of rainfed finger millet yield and soil fertility in semi-arid Alfisols. Communications in Soil Science and Plant Analysis. 2011; 42:1462–1483.
6. Triveni U, Nagarjuna D, Patro TSSK, Anuradha N. Performance of improved short duration finger millet genotypes in red sandy loamy soils of North Coastal Zone of Andhra Pradesh at graded doses of NPK fertilizers. International Journal of Chemical Studies. 2020; 8(4):1130-1132.
7. Triveni U, Rani YS, Patro TSSK, Anuradha N, Divya M. Fertilizer responsiveness of short duration improved finger millet genotypes to different levels of NPK fertilizers. Indian Journal of Agricultural Research. 2018; 52(1):97-100.