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Performance of Foxtail millet [*Setaria italica* (L.)] at Various Nitrogen Levels

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ABSTRACT

A field trial was conducted on sandy clay soil of Agricultural College Farm, Bapatla, during *kharif,* 2018 with four varieties of foxtail millet in combination with four nitrogen levels. The results revealed that, among the four varieties, Prasad and among the nitrogen levels, application of 60 kg N ha^{-1} recorded the highest drymatter accumulation at harvest (kg ha^{-1}), yield attributes (number panicles m^{-2}, number of filled grains $panicle^{-1}$, 1000 grain weight (g)), grain and stover yield(kg ha^{-1}).

Keywords: *Drymatter accumulation, Foxtail millet, Grain yield, Varieties, Nitrogen levels, Stover yield, Yield attributes*

Millets hold great promise for food security and nutrition amid ever-increasing agricultural costs, climate change and burgeoning mouths to feed world-wide.The present climatic conditions and the added advantages of small millets necessitate the exploitation of the underutilized crops *viz.,* foxtail millet, fingermillet, proso millet, barnyard millet and little millet.

Foxtail millet (*Setaria italica* L.), locally known as *korra* and also known as Italian millet, is known for drought tolerance, can withstand severe moisture stress and also suited to wide range of soil conditions. It is of short duration, low consumptive crop, nutritionally superior, cheaply providing proteins, minerals and vitamins and forms staple food for the poorer sections of the society (Mallesh, 1986).

The yield of foxtail millet is extremely low in India because it is being grown on marginal lands with poor fertility status and conventional cultivation of low yielding cultivars (Saini and Negi, 1996). The high yielding varieties have been recognized as important non cash input for realizing higher productivity. Nitrogen is one of the major limiting elemental nutrient that facilitate growth and development in most plants followed by the importance of photosynthesis (Suleiman, 2011). Thus the newly released varieties along with optimization of nitrogen levels will significantly contribute to the household security and nutrition of the inhabitants of the region.

MATERIAL AND METHODS

A field trial was conducted on sandy clay soils of Agricultural College Farm, Bapatla during *kharif,* 2018. The soil was neutral in soil reaction (pH=6.5), very low in available nitrogen (159.2 kg ha^{-1}) and medium in organic carbon (0.58%) and available phosphorus (27.7 kg P_2O_5 kg ha^{-1}) and very high in available potassium (470.4 K_2O kg ha^{-1}). The trial was laid out in randomized block design with factorial concept. The treatments consisted off our varieties Prasad (V_1), Narasimharaya (V_2), SiA 3156 (V_3) and CO-2 (V_4) and four nitrogen levels *viz.,* 0 kg N ha^{-1}(N_1), 20 kg ha^{-1} (N_2), 40 kg ha^{-1} (N_3) and 60 kg ha^{-1} (N_4) replicated thrice. A total of 187.2 mm rainfall was received in 14 rainy days during the crop growth period. The entire dose of phosphorus@ 20 kg ha^{-1} was applied uniformly to all plots as basal. Nitrogen was applied in two equal splits as per the treatments *viz.,* half as basal and remaining half as top dressing at 30DAS. The data on drymatter production, yield attributes, yield and net returns were recorded as per standard statistical procedures.The data was analyzed by following the analysis of variance (ANOVA) for randomized block design with factorial concept as suggested by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Drymatter accumulation at harvest (kg ha^{-1})

The results of the study revealed that among the foxtail millet varieties tested, maximum drymatter accumulation was recorded in Prasad (V_1) (4024 kg ha^{-1}) and was significantly superior to Narasimharaya (V_2), SiA 3156 (V_3) and CO-2 (V_4). The variety CO-2 (V_4) (2829 kg ha^{-1}) accumulated the lowest drymatter. The drymatter accumulation of Narasimharaya was on a par withSiA 3156 (Table 1.). It might be attributed due to genetic character for higher photosynthetic capacity. The results were in conformity with the findings of Raundal and Patil (2017) and Jyothi *et al.* (2016).

The application of 60 kg ha^{-1}nitrogen resulted in maximum drymatter accumulation (4122 kg ha^{-1})

Table 1. Variation in drymatter accumulation (kg ha^{-1}) at harvest and yield attributes of foxtail millet varieties as influenced by nitrogen levels

Treatments	Drymatter accumulation	No. of panicles m^{-2}	Number of filled grains	1000 grain weight (g)
Varieties				
V_1 – Prasad	4024	74	628	3.65
V_2 – Narasimharaya	3613	71	607	3.11
V_3 - SiA 3156	3451	67	545	3.55
V_4 - CO – 2	2829	62	462	2.98
SEm±	138.8	0.8	13.6	0.161
CD (P=0.05)	401	2	39	0.46
Nitrogen levels (kg ha^{-1})				
N_1 - 0	2364	54	409	3.02
N_2 - 20	3480	69	588	3.34
N_3 – 40	3950	74	609	3.39
N_4 – 60	4122	77	636	3.55
SEm±	138.8	0.8	13.6	0.161
CD (P=0.05)	401	2	39	NS
Interaction (V × N)				
SEm±	277.7	1.6	27.35	0.322
CD (P=0.05)	NS	NS	NS	NS
CV%	13.8	4.1	8.4	16.7

Table 2. Variation in grain (kg ha^{-1}) and stover yield (kg ha^{-1}) of foxtail millet varieties as influenced by nitrogen levels

Treatments	Grain yield (kg ha^{-1})	Stover yield (kg ha^{-1})
Varieties		
V_1 – Prasad	1609	2405
V_2 – Narasimharaya	1402	2201
V_3 - SiA 3156	1366	2075
V_4 - CO – 2	860	1959
SEm±	69.5	93.5
CD (P=0.05)	200	270
Nitrogen levels (kg ha^{-1})		
N_1 - 0	741	1612
N_2 - 20	1336	2134
N_3 – 40	1514	2426
N_4 – 60	1645	2467
SEm±	69.5	93.5
CD (P=0.05)	200	270
Interaction (V × N)		
SEm±	138.9	187
CD (P=0.05)	NS	NS
CV%	18.4	15

and was on a par with application of 40 kg N $ha^{-1}$and was significantly superior over 20 kg N ha^{-1} and 0 kg N ha^{-1}. Minimum drymatter accumulation (2364 kg ha^{-1}) was recorded in 0 kg N ha^{-1} application. Drymatter accumulation with 60 kg N ha^{-1} was higher by 4.4%, 18.4% and 74.4% over 40 kg N ha^{-1}, 20 kg N ha^{-1} and no nitrogen application, respectively. Increase in drymatter accumulation with increase in nitrogen levels from 0 to 60 kg ha^{-1} might be due to production of more number of nitrogenous compounds like amino acids, proteins, protoplasm, photosynthates which contributed for higher drymatter accumulation at higher N level. These results were in consonance with the findings of Nagarajan *et al.* (2018) and Jyothi *et al*. (2016).

Yield Attributes

The variety Prasad (V_1) recorded maximum number of panicles m^{-2}(74) and 1000 grain weight (3.65 g)and was significantly superior to the other three varieties tested. The variety CO-2 (V_4) recorded lowest 1000 grain weight (2.98 g,). Among the nitrogen levels tested, maximum number of panicles m^{-2} (77) were produced with application of 60 kg N $ha^{-1}$and was significantly superior over all the remaining N levels tested. Lowest number of panicles m^{-2} was recorded with no nitrogen application (54).The number of filled grains $panicle^{-1}$ were maximum in Prasad (V_1) (628) and it was on par with Narasimharaya. The least number of filled grains $panicle^{-1}$ were registered by CO-2 (462). Among the N levels tested, 60 kg produced significantly maximum number of filled grains $panicle^{-1}$ (636) and was a par with application of 40 kg N ha^{-1}. Nitrogen levels could not reach the level of significance with regard to 1000 grain weight (g).

Yield (kg ha^{-1})

Prasad variety out yielded the remaining three varieties and had shown its statistical supremacy in yielding maximum grain yield(1609 kg ha^{-1}). The lowest grain yield was recorded by CO-2 (860 kg ha^{-1}). Nitrogen@ 60 kg ha^{-1} resulted in maximum grain yield (1645 kg ha^{-1}) and was significantly superior over 20 kg N ha^{-1} and no nitrogen levels (741 kg ha^{-1}). However, it was on par with grain yield @ 40 kg N ha^{-1}.

Among the four varieties tested, maximum stover yield was recorded in Prasad variety (2405 kg ha^{-1}) and was significantly superior over SiA 3156 and CO-2 varieties and was a on par with the variety Narasimharaya. The lowest stover yield was recorded in CO-2 (1959 kg ha^{-1}). Among the nitrogen levels tested, application of 60 kg N ha^{-1} recorded maximum stover yield (2467 kg ha^{-1}) and was on a par with application of 40 kg N ha^{-1} (2426 kg ha^{-1}) and significantly superior over 20 kg N (2134 kg ha^{-1}) and no nitrogen application (1612 kg ha^{-1}).

There was no interaction between varieties and nitrogen levels for all parameters studied.

CONCLUSION

From the above study, it can be concluded that among the four varieties tested, the variety Prasad recorded maximum yield and among the N levels tested application of 60 kg N ha^{-1} and 40 kg N ha^{-1} recorded similar yield.

LITERATURE CITED

Jyothi K N, Sumathi V and Sunitha N 2016 Productivity, nutrient balance and profitability of foxtail millet varieties as influenced by levels of nitrogen. *IOSR Journal of Agriculture and Veterinary Science*. 9 (4): 18-22.

Mallesh N G 1986 In: Small millets in Global Agriculture (Sitharam, A.K.W. Riley and Harinarayana, G. eds.). Oxford and IBH Publishing Co. Pvt. Ltd., India, 305-339.

Nagarajan G, Ramesh T, Janaki P and Rathika S 2018 Enhancement of fingermillet productivity through land configuration and nitrogen management under sodic soil. *Madras Agricultural Journal*. 105 (7-9): 257-261.

Panse V G and Sukhatme P V 1985 *Statistical Methods for Agricultural Workers*. ICAR, New Delhi. pp. 100-174.

Raundal P U and Patil V U 2017 Response of little millet varieties to different levels of fertilizers under rainfed condition. *International Advanced Research Journal in Science, Engineering and Technology*. 4 (8): 55-58.

Saini J P and Negi S C 1996 Response of foxtail millet (*Setaria italica*) genotypes to nitrogen fertilization under dry-temperate conditions. *Indian Journal of Agronomy* 41 (2): 261-264.

Suleiman S 2011 Does GABA increase the efficiency of symbiotic N_2 fixation in legumes? *Plant signal behavior*. 6: 32-36.

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