

Response of Foxtail Millet (*Setaria italica*) to Nitrogen and Phosphorus under Rainfed Conditions of Northern Dry Zone of Karnataka

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Abstract: A field experiment was conducted for two consecutive rainy seasons of 1991 and 1992 at Regional Research Station, Bijapur (Karnataka), to study the response of foxtail millet to various levels of nitrogen and phosphorus under rainfed conditions. Grain and fodder yields of foxtail millet were significantly higher (516 and 1485 kg ha⁻¹, respectively) with the application of 45 kg N ha⁻¹ compared to 0, 15 and 30 kg N ha⁻¹. In pooled data, application of 45 kg N ha⁻¹ increased the grain yield by 184, 63 and 23% compared to 0, 15 and 30 kg N ha⁻¹, respectively. There was no response to phosphorus application. The interaction effects were non-significant.

Key words: Foxtail millet, *Setaria italica*, nitrogen, phosphorus.

Foxtail millet is a staple food for millions living in the arid and semi-arid regions of the world. Minor millets are grown in an area of 3.1 Mha in India with a production of 11.3 m tonnes. The foxtail millet forms bulk of the area and production under minor millets and is cultivated on marginal lands with low nutrient status under limited moisture conditions. Subramanian and Ganesaraja (1992) reported a grain yield of 1360 kg ha⁻¹ with 20 kg N and 10 kg P₂O₅ ha⁻¹ as compared with 1295 kg ha⁻¹ in the control. Since information on agronomic requirements of the crop is meager under rainfed conditions of northern dry zone of Karnataka, an experiment was conducted on optimum nitrogen and phosphorus requirements of rainfed foxtail millet.

Materials and Methods

The field experiment was conducted at Regional Research Station, Bijapur

(Karnataka), for two consecutive seasons of 1991 and 1992 in shallow black soils under rainfed conditions. Experiment was laid out in factorial RBD with four nitrogen levels and three phosphorus levels (Table 1). The treatment combinations were replicated thrice. The seeds of foxtail millet (cv. RS-118) were hand-dibbled during first fortnight of July during both the seasons at a spacing of 30 x 10 cm. Fertilizers were applied as per the treatments, 5 cm away from the seedling and covered with soil. Nitrogen was applied in two equal split doses. First installment of 50% was applied at the time of sowing, and after 30 days of sowing. The full dose of phosphorus was given as basal application. All the cultural operations were uniform and as per the recommended package of practices. Five randomly selected plants were used from the net plot of 2.10 x 3.9 m² for recording growth and yield parameters. The crop was harvested during

Table 1. Grain and fodder yield (kg ha^{-1}) of foxtail millet as influenced by levels of nitrogen and phosphorus under rainfed conditions

Treatments	Grain yield			Fodder yield		
	1991	1992	Pooled	1991	1992	Pooled
Nitrogen kg ha^{-1}						
0	198.0	165.0	182.0	391.0	1487.0	939.0
15	316.0	372.0	344.0	692.0	1593.0	1142.0
30	447.0	396.0	421.0	1061.0	1593.0	1326.0
45	626.0	404.0	516.0	1305.0	1666.0	1485.0
S.Em \pm	3.4	42.6	29.8	99.7	63.5	59.1
C.D. at 5%	9.9	124.6	87.1	291.6	NS	172.8
Phosphorus kg ha^{-1}						
0	399.0	316.0	358.0	870.0	1551.0	1210.0
15	436.0	327.0	381.0	845.0	1662.0	1233.0
30	357.0	360.0	358.0	872.0	1580.0	1226.0
S.Em \pm	2.94	36.0	25.8	86.38	55.0	51.2
C.D. at 5%	8.6	NS	NS	NS	NS	NS

NS = Non-significant.

first fortnight of October during both the years. The crop, during growing period, received a total rainfall of 500.9 mm and 237.5 mm during 1991 and 1992, respectively.

Results and Discussion

Effect of nitrogen

The grain yield of foxtail millet differed significantly due to different levels of nitrogen during both the years as well as on pooled basis (Table 1). During 1991 the fodder yield was increased with the increasing level of N to 45 kg N ha^{-1} . Grain yield was increased significantly during both 1991 and 1992. In pooled data, application of 45 kg N ha^{-1} increased the grain yield by 184, 632 and 23% over the application of 0, 15 and 30 kg N ha^{-1} , respectively. Umrani and Bhoi (1982), Hosmani *et al.* (1975) and Intodia (1994)

also observed linear response to application of nitrogen upto 40 and 60 kg ha^{-1} , respectively. The increased grain yield was mainly attributed to improvement in yield contributing characters, viz., plant height, ear head length and number of tillers per plant with increasing levels of nitrogen (Table 2). Intodia (1994) reported that the crop fertilized with 40 and 60 kg N ha^{-1} significantly increased the ear length, ear girth and plant height, when compared to application of 0 and 20 kg N ha^{-1} .

Effect of phosphorus

Application of phosphorus did not increase the fodder yield of foxtail millet significantly during both the years as well as on pooled basis (Table 1). Except during 1991, the grain yield did not differ significantly due to P_2O_5 levels. However, during 1991, application of 15 $\text{kg P}_2\text{O}_5$

Table 2. Plant height, ear head length and no. of effective tillers/plant of foxtail millet as influenced by levels of nitrogen and phosphorus under rainfed conditions

Treatments	Plant height (cm)			Ear head length (cm)			No. of effective tillers/plant		
	1991	1992	Pooled	1991	1992	Pooled	1991	1992	Pooled
Nitrogen kg ha⁻¹									
0	76.0	94.0	84.9	10.2	14.3	12.3	3.6	5.6	4.61
15	81.0	94.0	87.8	11.1	14.9	13.0	3.8	6.7	5.30
30	78.0	93.0	85.4	11.3	16.1	13.7	3.6	7.9	5.77
45	82.0	97.0	89.5	11.5	16.2	13.8	3.6	6.9	5.27
S.Em±	1.65	1.92	1.27	0.37	0.56	0.34	0.22	0.57	0.31
C.D. at 5%	4.8	NS	NS	NS	NS	0.99	NS	NS	NS
Phosphorus kg ha⁻¹									
0	78.0	95.0	86.5	10.9	15.2	13.1	3.5	7.0	5.27
15	78.0	94.0	85.9	11.1	15.6	13.4	3.8	6.8	5.33
30	82.0	95.0	88.4	11.1	15.3	13.2	3.6	6.6	5.11
S.Em±	1.43	1.66	1.09	0.32	0.48	0.29	0.19	0.49	0.27
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS

ha⁻¹ provided significantly higher grain yield of 436 kg ha⁻¹ over control. Application of 30 kg P₂O₅ ha⁻¹ had significant adverse effect on grain yield. Subramanian and Ganesaraja (1992) also reported similar findings. The yield attributing characters did not differ significantly during the year 1991 and 1992 due to application of phosphorus (Table 2).

Interaction effect

The interaction effects of nitrogen and phosphorus on grain and fodder yields due to nitrogen and phosphorus were found non-significant during both the years.

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