

Response of pearl millet [*Pennisetum glaucum* (L.)] to different fertilizer levels in medium deep black soil under rain fed conditions

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ABSTRACT

A field experiment was conducted during three rainy seasons (*khariif*) 2004, 2005, 2006 to study the response of pearl millet (*Pennisetum glaucum* L.) to different fertilizer levels in medium deep black soil under rain fed conditions at Bajra Research Scheme, College of Agriculture, Dhule. Among the different treatments application of 5 tones of FYM + 60:30:30 kg NPK/ha (T_8) produced significantly higher grain yield (35.27 q/ha), fodder yield (60.04 q/ha), gross return (Rs. 24195/ha) and net returns (Rs. 12756/ha) over rest of the treatment except application of 5 tones of FYM + 50:25:25 kg NPK/ha (T_7) which was at par with T_8 . The application of 5 tones of FYM + 50:25:25 kg NPK/ha (T_7) recorded highest B:C ratio among all treatments.

Key words : Pearl millet, Rainfed condition, Fertilisers.

INTRODUCTION

Pearl millet (*Pennisetum glaucum* L.) is the fourth most important cereal staple food crop in India next to rice, wheat and sorghum. Maharashtra stands second in area and fourth in production of pearl millet in India. It is necessary to increase the productivity of pearl millet by using advanced techniques because this crop is being continuously grown on marginal lands with low levels of inputs. However, inadequate nitrogen and phosphorus fertilization which is already deficient in the soil of arid and semiarid regions (Khateek *et al.*, 1999) Fertilizer is also important input for successful crop production. This is necessary to provide adequate and balanced dose of fertilizer to the *khariif* pearl millet. For increasing productivity and fertilizer use efficiency under rainfed condition hybrids are more responsive to fertilizers in view of this background, the present investigation was under taken to find out the optimum dose of fertilizer in medium black soil under rainfed condition.

MATERIALS AND METHODS

The field investigation on response of pearl millet [*Pennisetum glaucum* (L.)] hybrid Saburi to different fertilizer levels in medium soil under rain fed conditions during rainy season (*khariif*) in 2004, 2005 and 2006 at Bajra Research Scheme, College of Agriculture, Dhule was carried out. The soil was medium black with pH 8.1, low in available nitrogen (205 kg/ha), and available phosphorus (17 kg/ha) and rich in available potassium (492 kg/ha). The experiment was laid out in Randomized Block Design with 8 treatment replicated thrice. The treatment consisted of T_1 - 0:0:0 kg NPK/ha, T_2 -20:0:0 kg NPK/

ha, T_3 - 0:20:0 kg NPK/ha, T_4 - 0:0:20 kg NPK/ha, T_5 - 20:20:20 kg NPK/ha, T_6 - 40:20:20 kg NPK/ha, T_7 - 50:25:25 kg NPK/ha and T_8 - 60:30:30 kg NPK/ha. Pearl millet variety Saburi (RHRBH 8924) was sown at 45 x 15 cm by dibbling every year. In all the treatments 5 tones of FYM/ha was applied and seeds were treated with biofertilizer (Azospirillum + PSB @ 25 gm/kg seed each). The fertilizer application was done as per the treatments, the half dose of N, full dose of P and K was applied at the time of sowing and remaining half dose of N was applied at 30 days after sowing. The rainfall received during crop season was 783.6, 392.6, and 860.6 mm in 40, 31 and 44 rainy days in 2004, 2005 and 2006, respectively.

RESULTS AND DISCUSSION

Effect of fertilizer levels:

The grain and fodder yield of pearl millet hybrid Saburi was influenced significantly due to different fertilizer levels. All the treatments produced significantly higher grain and fodder yield over control (T_1). The application of 60:30:30 kg NPK/ha + 5 tones of FYM recorded significantly higher grain and fodder yield during all three years. The data pooled over years showed significantly higher grain yield (35.27q/ha) and fodder yield (60.04 q/ha) in application of 60:30:30 kg NPK/ha + 5 tones of FYM (T_8) over rest of the treatments except in application of 50:25:25 kg NPK/ha + 5 tones of FYM (T_7) which was at par with T_8 and produced grain yield (34.46q/ha) and fodder yield (58.36 q/ha). The results are in conformity with the finding of Gautam (2000), Chaubey *et al.* (2001) and Manirathnam *et al.* (2002).

Table 1 : Mean grain and fodder yield of pearl millet as influenced by different fertilizer levels 2004 to 2006

Sr. No.	Treatments	Grain yield (q/ha)				Fodder yield (q/ha)			
		2004	2005	2006	Pooled mean	2004	2005	2006	Pooled mean
T ₁	0:0:0 kg NPK/ha	22.32	22.89	23.55	22.92	38.16	39.28	40.12	39.19
T ₂	20:0:0 kg NPK/ha	25.88	25.36	26.68	25.97	44.05	43.77	45.73	44.52
T ₃	0:20:0 kg NPK/ha	23.64	24.47	24.81	24.30	40.12	41.52	42.09	41.24
T ₄	0:0:20 kg NPK/ha	23.13	25.12	26.37	24.87	39.28	43.21	44.89	42.46
T ₅	20:20:20 kg NPK/ha	28.70	27.26	30.05	28.67	48.82	46.57	51.07	48.82
T ₆	40:20:20 kg NPK/ha	32.69	30.70	32.82	32.07	55.56	52.19	55.83	54.53
T ₇	50:25:25 kg NPK/ha	34.50	33.12	35.75	34.46	58.36	56.12	60.61	58.36
T ₈	60:30:30 kg NPK/ha	35.40	33.48	36.93	35.27	60.04	57.24	62.85	60.04
	S.E. + ₋	0.80	0.85	0.93	0.49	1.30	1.50	1.63	0.85
	C.D. (P=0.05)	2.43	2.58	2.81	1.39	3.96	4.54	4.95	2.40
	Mean	28.29	27.80	29.62	28.57	48.05	47.49	50.40	48.64

Table 2 : Mean gross and net returns and B.C. ratio as influenced by different fertilizer levels 2004 to 2006

Sr. No.	Treatments	Gross returns (Rs/ha)				Net returns (Rs/ha)				B.C. ratio			
		2004	2005	2006	Pooled mean	2004	2005	2006	Pooled mean	2004	2005	2006	Pooled mean
T ₁	0:0:0 kg NPK/ha	14535	14915	17691	15714	5318	5731	7174	6074	1.58	1.62	1.68	1.63
T ₂	20:0:0 kg NPK/ha	16852	16529	20046	17809	7368	7095	9312	7925	1.78	1.75	1.87	1.79
T ₃	0:20:0 kg NPK/ha	15388	15929	18632	16649	5638	6246	7682	6522	1.58	1.64	1.70	1.64
T ₄	0:0:20 kg NPK/ha	15057	16368	19555	16993	5340	7002	8789	7043	1.56	1.75	1.82	1.71
T ₅	20:20:20 kg NPK/ha	18687	17751	22567	19668	8553	7768	11200	9174	1.84	1.78	1.98	1.87
T ₆	40:20:20 kg NPK/ha	21283	19984	24649	21972	10949	9784	13099	11277	2.06	1.96	2.13	2.05
T ₇	50:25:25 kg NPK/ha	22453	21556	26860	23623	11886	11139	15010	12670	2.12	2.07	2.26	2.15
T ₈	60:30:30 kg NPK/ha	23045	21805	27734	24195	11579	11072	15612	12756	2.07	2.03	2.29	2.13
	S.E. ±	519	553	724	397	465	388	621	403	0.05	0.03	0.05	0.03
	C.D. (P=0.05)	1574	1678	2197	1203	1410	1178	1883	1224	0.14	0.09	0.15	0.10
	Mean	18412	18104	22216	19578	8329	8230	10985	9220	1.82	1.83	1.97	1.87

Economics:**Gross and net return:**

The application of 5 tones of FYM and 60:30:30 kg NPK/ ha recorded significantly higher gross monetary returns during all three years and when the data were pooled over the seasons (Rs.24195/ha). However, it was at par with treatment of application of 5 tones of FYM and 50:25:25 kg NPK/ha (Rs. 23623).

The application of 5 tones of FYM and 60:30:30 kg NPK/ ha recorded significantly higher net returns in 2006 (Rs.15612/ha) as well as in pooled data (Rs. 12756/ha) when the data was pooled over the season, except during 2004 (Rs. 11579/ha) and 2005 (Rs. 11072/ha) over rest of the treatments combinations, and it was at par with the treatment (T₇) i.e. application of 5 tones of FYM and 50:25:25 kg NPK/ha (Rs. 12670/ha).

Cost benefit ratio:

The highest B:C ratio was recorded by the treatment

(T₇) application of 5 tones of FYM and 50:25:25 kg NPK/ ha during all the years and when the data was pooled over the season (2.15) in year 2006 (2.26) over all the treatments but it was at par with the treatment application of 5 tones of FYM and 60:30:30 kg NPK/ ha (T₈) (2.13) and application of 5 tones of FYM + 40:20:20 kg NPK/ ha (T₆) (2.05).

Grain and fodder yields:

On the basis of three years pooled data it is concluded that the treatment (T₈) application of 5 tones of FYM + 60:30:30 kg NPK/ ha t pearl millet hybrid Saburi produced significantly higher grain yield, fodder yield as well as gross and net monetary returns over rest of the treatments, which was at par with the treatment (T₇) application of 5 tones of FYM and 50:25:25 kg NPK/ ha. The highest B:C ratio (2.15) was recorded by the treatment (T₇) application of 5 tones of FYM and 50:25:25 kg NPK/ha which is recommended for achieving higher

yield and net returns of pearl millet hybrid Saburi in medium black type of soils under scarcity zone.

From the above studies, it is concluded that the application of 5 tones of FYM + 60:30:30 kg NPK/ha produced significantly higher grain yield, fodder yield, gross return and net returns of pearl millet hybrid Saburi in medium black type of soils under scarcity zone.

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