

Nutrient management in pearl millet (*Pennisetum glaucum*) under rainfed condition

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ABSTRACT

A field experiment was carried out during the rainy (*kharif*) season of 1996, 1997 and 1998 on sandy-loam soil of Gwalior, to determine the productivity and profitability from pearl millet [*Pennisetum glaucum* (L.) R. Br. emend. Stuntz] with the application of N both in presence or absence of farmyard manure (FYM). Response to N application was observed up to 40 kg N/ha. However, combination of FYM and nitrogen @ 2.5 tonnes/ha with 20 kg N/ha was found statistically at par with 40 kg N/ha alone in terms of yield, and proved better in respect of net income and benefit : cost ratio. Maximum seed yield, stover yield, net income and benefit : cost ratio were obtained with 5.0 tonnes FYM + 40 kg N/ha and the treatment proved better than 2.5 tonnes/ha + 20 kg N/ha.

Key words : Pearl millet, Nutrient management, N, FYM, Yield

The yield potentiality of rainfed pearl millet has been very low due to use of low fertilizers. It is a very exhaustive crop and hence requires higher doses of nitrogenous fertilizers. High prices of fertilizers and low supply of nitrogen fertilizer necessitates the application of farmyard manure (FYM). Application of FYM assumes special significance for improving soil health, better uptake of nutrient by the crop plant and to counter the adverse effect of agro-chemicals. Verma (1996) also reported beneficial effect of FYM in economizing the use of nitrogen in pearl millet. An information on the effect of

organic manures on the yield and quality of pearl millet is very scanty because generally pearl millet is grown without application of organic manures. Therefore, the present study was undertaken to find out the contribution of FYM in meeting nitrogen requirement of pearl millet.

MATERIALS AND METHODS

An experiment was carried out during the rainy season of 1996, 1997 and 1998 at Research Farm, College of Agriculture, Gwalior. The soil was well drained, sandy loam in texture, low in available nitrogen (140 kg/ha) and medium in phosphorus

(18.6 kg/ha) and potash (307 kg/ha), having 7.3 pH. There were 9 treatments (Tables 1, 2). These treatments were replicated thrice in randomized block design. Before planting the crop, it was fertilized with 30 kg P_2O_5 + 20 kg K_2O /ha. The crop was sown during the third week of July and harvested at maturity in every year. The plot size was 4.4 m × 2.7 m each year.

RESULTS AND DISCUSSION

Growth, yield and yield attributes

Growth and yield attributes, viz. plant height, tillers/plant, head length and girth, enhanced markedly with the application of nitrogen and FYM. Application of 5 tonnes FYM/ha along with 40 kg N/ha resulted in maximum plant height, head length and girth, test weight and it was significantly superior to the control and 2.5 tonnes FYM alone.

Application of 2.5 tonnes/ha FYM + 20

kg N/ha was as good as 40 kg N/ha alone in respect of yield and yield attributes and this treatment gave 59, 37, 17 and 20% higher yield over the control, 2.5 tonnes FYM/ha, 5.0 tonnes FYM/ha + 40 kg N/ha and FYM 5.0 tonnes/ha + 20 kg N/ha respectively. However, the maximum grain and stover yields were obtained with FYM 5.0 tonnes/ha + 40 kg N/ha and it was almost similar with all the combination of FYM and N. Thus it indicates that the application of inorganic fertilizer in combination with organic manures is better than the single application either FYM or N. The higher values of growth characters, yield attributes and yield of pearl millet under the combined application of FYM and nitrogen (5.0 tonnes FYM + 40 kg N/ha) may be due to the improvement in soil health and built up of soil fertility with the continuous use of FYM, thereby better root growth and development and better uptake of the

Table 1. Effect of different nutrients on growth, yield and yield attributes of pearl millet (pooled data of 3 years)

Treatment	Plant height (cm)	Tillers/plant	Head length (cm)	Head girth (cm)	Test weight (g)	Grain yield (q/ha)	Stover yield (q/ha)
Control	191.7	3.3	21.0	5.6	6.71	14.9	32.0
FYM 2.5 tonnes/ha	201.1	3.5	26.7	6.9	6.75	17.3	45.6
FYM 5.0 tonnes/ha	221.3	3.7	27.3	7.0	6.84	20.3	46.6
20 kg N/ha	200.2	4.1	27.6	7.0	6.83	19.8	47.7
40 kg N/ha	207.2	3.7	27.8	7.2	6.93	23.7	49.9
FYM 2.5 tonnes/ha + 20 kg N/ha	204.8	4.1	28.4	7.1	6.92	24.4	51.2
FYM 2.5 tonnes/ha + 40 kg N/ha	209.1	4.2	29.0	7.2	6.94	26.9	54.2
FYM 5.0 tonnes/ha + 20 kg N/ha	211.3	3.9	28.3	7.3	6.93	26.3	54.7
FYM 5.0 tonnes/ha + 40 kg N/ha	218.1	4.0	29.1	7.5	6.95	28.3	56.6
CD (P = 0.05)	3.18	0.75	0.86	0.57	0.06	3.31	2.92

Table 2. Effect of different treatments on net returns and benefit : cost ratio in pearl millet

Treatment	Grain yield (q/ha)				Stover yield (q/ha)				Gross income (Rs/ha)	Variable expenses (Rs/ha)	Net income (Rs/ha)	Net Benefit : cost ratio over control (Rs/ha)	
	1996	1997	1998	Pooled	1996	1997	1998	Pooled					
Control	12.4	16.9	15.5	14.9	37.7	22.5	37.8	32.0	9,428	6,250	3,178		1.50
FYM 2.5 tonnes/ha	15.8	18.7	17.3	17.3	48.9	31.6	53.2	45.6	11,661	6,896	4,765	1,587	1.69
FYM 5.0 tonnes/ha	17.5	23.2	20.3	20.3	50.1	34.9	54.9	46.6	13,096	7,546	5,550	2,372	1.73
20 kg N/ha	15.7	21.7	22.1	19.8	49.8	36.7	56.6	47.7	12,964	6,786	6,178	3,000	1.91
40 kg N/ha	18.4	28.9	23.9	23.7	53.4	36.7	59.5	49.9	14,906	7,146	7,760	4,582	2.00
FYM 2.5 tonnes/ha + 20 kg N/ha	19.3	31.3	22.7	24.4	54.0	39.4	60.4	51.2	15,332	7,016	8,316	5,138	2.15
FYM 2.5 tonnes/ha + 40 kg N/ha	21.2	34.3	25.1	26.9	57.4	41.6	63.7	54.2	16,712	7,786	8,926	5,748	2.15
FYM 5.0 tonnes/ha + 20 kg N/ha	20.2	34.0	24.7	26.3	57.8	41.5	64.7	54.7	16,484	7,666	8,818	5,640	2.15
FYM 5.0 tonnes/ha + 40 kg N/ha	21.7	37.0	27.5	28.3	61.5	41.5	66.9	56.6	17,546	7,886	9,660	6,782	2.22
CD (P = 0.05)	1.42	7.7	1.8	3.21	2.2	2.53	3.1	2.9					

nutrients by crop plant resulted in higher grain and stover yields of pearl millet. Raghuwanshi and Umat (1994) and Verma (1996) also reported increased efficiency of fertilizer in combination with FYM.

Economics

Maximum net returns and benefit : cost ratio were obtained from FYM 5.0 tonnes/ha + 40 kg N/ha. Application of FYM and nitrogen gave better net returns and benefit : cost irrespective of dose as compared to individual application of organic manure or inorganic nitrogen. Application of FYM 2.5 tonnes/ha + 20 kg N/ha was better than 40

kg N/ha alone in terms of net return and benefit : cost ratio. These results are in agreement with those of Verma (1996).

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