

## Response of long duration finger millet (*Eleusine coracana* L.) variety to different levels of nitrogen under rainfed condition

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### ABSTRACT

Promising finger millet varieties were tested for their response to nitrogen application under rainfed condition during *Kharif* 2005-06 at Zonal Agricultural Research Station, Shenda Park, Kolhapur. The results revealed that significantly highest grain yield (23.68 q/ha) was recorded by the variety PR202 with application of 90 kg/ha over local check and was at par with the other varieties. The significantly highest grain yield (20.92 g/ha) was recorded with the variety VR 875 with 60 kg N application. However, the significantly highest straw yield was recorded by all the varieties with 90 kg N application both 30 and 60 kg N application.

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**Key words :** Finger millet, Rainfed, NPK uptake, Soil status

### INTRODUCTION

Among small millets, finger millet (*Eleusine coracana* L.) locally known as Nagli/ Nachni/ Ragi is the most important crop grown in Maharashtra State, which alone account for about 50 per cent area and more than 2/3<sup>rd</sup> production. The yield of finger millet is very low in the state as the crop is mostly grown along the hill sides on sloppy land on light textured soils. It is also coupled with negligence in adoption of improved varieties, no cash inputs like fertilizers and improper method and time of sowing. Recent studies (Satyanaryana *et al.*, 1978; Gautam *et al.*, 1982) indicated that there was good response of finger millet to nitrogen even under rainfed condition. Hence, promising finger millet varieties were tested for their response to nitrogen application under rainfed condition.

### MATERIALS AND METHODS

Field experiment was conducted during *Kharif* 2005 at the Zonal Agricultural Research Station, Shenda Park farm, Kolhapur on sandy loam soil, with pH -7.2, EC-0.10 mmhos/cm., organic carbon 0.96%, available N 101, P 10.6 and K 198 kg/ha. The experiment was laid out in Factorial Randomized Block Design with three replications. The gross and net plot sizes were 3 x 4.5 m<sup>2</sup> and 2.4 x 4.2m<sup>2</sup>, respectively. The treatments consisted of 20 combinations due to five varieties *viz.*, V<sub>1</sub>-VR 840, V<sub>2</sub> - VR 875, V<sub>3</sub>- OEB 22, V<sub>4</sub> -PR202, V<sub>5</sub>-RAU 8 and four nitrogen levels *viz.*, N<sub>0</sub>-0kg, N<sub>1</sub>-30 kg, N<sub>2</sub> - 60 kg, N<sub>3</sub> -90 kg N/ha. The crop was dibbled at 30 x 10 cm

spacing in the first week of July. The half quantity of nitrogen was applied through urea as per treatment and 40 kg P<sub>2</sub>O<sub>5</sub> and 25 kg K<sub>2</sub>O/ha was applied through single super phosphate and murate of potash as basal dose, remaining half quantity of nitrogen was applied one month after sowing. Plant protection measures were undertaken as and when required. The soil samples were collected after harvest of crop and were analyzed for available nutrient status and representative samples of grain and straw at harvest from different treatments were analyzed for uptake studies by following standard method. The uptake of NPK was determined on the basis of dry matter of grain and straw production in different treatments. The results of all the observations were statistically analyzed by applying 'F' test.

### RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been summarized under following heads:

#### Effect of varieties :

The data presented in Table 1 indicate that, among the varieties, the variety VR 875 recorded the significantly highest thousand grain weight (3.195 g) and grain yield (17.22q/ha) over local check. However, it was at par with the variety VR 846, OEB 10 and PR202. There was no significant difference in growth parameters and straw yield among the genotypes. The highest straw yield (41.63q/ha) was recorded with the variety VR 875. Chavan *et al.* (1995) reported that, there is remarkable influence

**Table 1 : Mean growth and yield attributes of long duration finger millet varieties as influenced by nitrogen levels**

Treatments	Plant height (cm)	No. of tillers	Length of finger (cm)	No. of fingers/ear	1000 grain weight (g)	Grain yield q/ha	Straw yield q/ha
<b>Varieties</b>							
V <sub>1</sub> -VR 846	80.8	3.11	6.7	4.8	2.863	16.26	40.70
V <sub>2</sub> VR 875	84.9	3.35	6.8	4.9	3.195	17.22	41.63
V <sub>3</sub> -OEB22	84.0	3.53	6.8	4.9	3.034	16.29	40.21
V <sub>4</sub> - PR 202	85.8	3.57	7.0	4.9	2.972	16.92	39.44
V <sub>5</sub> - RAU 8	82.9	3.40	6.8	5.0	2.876	12.90	40.58
S.E. ±	1.48	0.16	0.12	0.08	0.05	0.35	1.34
C.D. (P=0.05)	NS	NS	NS	V	0.15	1.00	NS
C.V. %	6.13	15.91	6.11	5.82	6.02	7.63	11.49
<b>N kg/ha</b>							
N <sub>0</sub> - 0	75.2	2.76	6.4	4.5	2.810	9.34	24.52
N <sub>1</sub> - 30	81.3	3.19	6.7	4.7	2.948	14.44	34.21
N <sub>2</sub> - 60	87.8	3.62	7.0	5.0	3.059	18.33	47.04
N <sub>3</sub> - 90	90.6	4.04	7.2	5.2	3.135	21.56	56.27
S.E. ±	1.33	0.14	0.11	0.07	0.05	0.31	1.20
C.D. (P=0.05)	3.79	0.40	0.31	0.21	0.13	0.90	3.44
C.V. %	6.13	15.91	6.11	5.82	6.02	7.63	11.49
<b>Interaction</b>							
S.E. ±	2.96	0.31	0.24	0.16	0.10	0.70	2.67
C.D. (P=0.05)	NS	NS	NS	NS	NS	2.01	7.70
C.V. %	6.13	15.91	6.11	5.82	6.02	7.63	11.49

NS=Non-significant

on the crop growth and yield of finger millet.

#### Effect of nitrogen levels :

Among the graded levels of nitrogen applied, it was observed that, increasing levels of nitrogen increased the grain and straw yield and also growth parameters. The

highest grain and straw yield (21.56 and 56.27 q/ha, respectively) was recorded with the application 90 kg N/ha and was significantly superior over 0, 30 and 60 kg N application. Roy *et al.*(2001), Bhoite and Nimbalkarm (1995), Bhosale *et al.* (1994) and Rao *et al.*(1988) has reported that, the grain and straw yield of finger millet

**Table 2 : Mean grain and straw yield (q/ha) as influenced by Varieties x N levels**

Varieties	N <sub>0</sub> - 0 kg	N <sub>1</sub> - 30 kg	N <sub>2</sub> - 60 kg	N <sub>3</sub> - 90 kg	Mean
<b>Grain yield (q/ha)</b>					
V <sub>1</sub> - VR 846	8.75	16.26	17.93	22.08	16.26
V <sub>2</sub> - VR 875	8.29	17.12	20.92	22.57	17.22
V <sub>3</sub> - OEB 22	11.17	14.99	17.17	21.83	16.29
V <sub>4</sub> - PR 202	11.54	14.03	18.43	23.68	16.92
V <sub>5</sub> - RAU 8	6.96	9.77	17.22	17.64	12.90
Mean	9.34	14.22	18.33	21.56	15.92
S.E. ±			0.70		
C.D. (P=0.05)			2.01		
C.V. %			7.63		
<b>Straw yield q/ha</b>					
Varieties	N <sub>0</sub> - 0 kg	N <sub>1</sub> - 30 kg	N <sub>2</sub> - 60 kg	N <sub>3</sub> - 90 kg	Mean
V <sub>1</sub> - VR 846	18.25	34.53	51.06	58.95	40.70
V <sub>2</sub> - VR 875	24.67	34.29	51.31	56.24	41.63
V <sub>3</sub> - OEB 22	28.61	35.15	40.95	56.12	40.21
V <sub>4</sub> - PR 202	23.93	29.60	45.51	58.71	39.44
V <sub>5</sub> - RAU 8	27.13	37.49	46.37	51.31	40.58
Mean	24.52	34.21	47.04	56.27	40.51
S.E. ±			2.67		
C.D. (P=0.05)			7.70		
C.V. %			11.49		

increased significantly with the subsequent increase in nitrogen levels. Significantly highest thousand grain weight (3.135 g), plant height (90.6cm), No. of tillers (4.04), length of finger (7.2 cm) and no of fingers per ear was recorded with the application of 90 kg N/ha which was significantly superior over 30 kg N application but was at par with the 60 kg N application.

#### Interaction effects :

The interaction effects due to varieties and nitrogen levels were found to be significant (Table 2). The significantly highest grain yield (23.68 q/ha) was recorded by the variety PR202 with application of 90 kg/ha over local check and on par with the other varieties. Bhoite and Nimbalkar, (1995) reported that, the variety PR 202 (Godawari) recorded highest grain and straw yield with the application of higher doses of nitrogen. The significantly highest grain yield (20.92 g/ha) was recorded

with the variety VR 875 with 60 kg N application. However, the significantly highest straw yield was recorded by all the varieties with 90 kg N application.

#### Uptake studies :

Higher production of dry matter and NPK uptake by finger millet were recorded with increasing dose of nitrogen (Table 3). In general the applications of nitrogen at higher doses increased the NPK uptake in plants. The results are in conformity with the findings of Rao *et al.* (1988) and Roy *et al.* (2001). The uptake of NPK with the varieties was not significant.

#### Soil fertility status :

The soil studies after harvest of crop indicated that, the soil was low in available NPK nutrients (Table 4). There was not much deviation from the initial analytical values. Among nitrogen levels, subsequent increasing

**Table 3 : Total uptake of NPK (kg/ha) by finger millet crop varieties x N levels**

Varieties	0 kg N	30 kg N	60 kg N	90 kg N	Mean
<b>N Uptake</b>					
V <sub>1</sub> – VR 848	14.91	28.02	35.60	43.14	30.42
V <sub>2</sub> - VR 875	16.85	30.65	40.59	44.29	33.09
V <sub>3</sub> - OEB 22	21.15	27.44	32.95	43.62	31.29
V <sub>4</sub> - PR 202	19.97	25.00	36.30	47.31	32.15
V <sub>5</sub> - RAU 8	15.66	22.76	34.52	37.05	27.50
Mean	17.71	26.77	35.99	43.08	30.89
	Variety		N levels		Interaction
S.E. ±	0.69		0.62		1.37
C.D. (P=0.05)	1.97		1.76		3.94
<b>P Uptake</b>					
Varieties	0 kg N	30 kg N	60 kg N	90 kg N	Mean
V <sub>1</sub> – VR 848	6.35	11.92	16.49	20.11	13.72
V <sub>2</sub> - VR 875	7.34	13.02	18.30	19.71	14.59
V <sub>3</sub> - OEB 22	9.35	12.28	14.61	19.42	13.91
V <sub>4</sub> - PR 202	8.94	11.42	17.37	22.38	15.03
V <sub>5</sub> - RAU 8	8.34	11.76	16.69	19.66	14.11
Mean	8.06	12.08	16.69	20.26	14.27
	Variety		N levels		Interaction
S.E. ±	0.37		0.34		0.75
C.D. (P=0.05)	N.S.		0.96		N.S.
<b>K Uptake</b>					
Varieties	0 kg N	30 kg N	60 kg N	90 kg N	Mean
V <sub>1</sub> – VR 848	35.58	68.49	95.51	109.05	77.16
V <sub>2</sub> - VR 875	45.25	64.79	97.30	105.61	78.24
V <sub>3</sub> - OEB 22	53.06	66.64	76.75	103.13	74.90
V <sub>4</sub> - PR 202	45.93	56.12	84.95	107.19	73.55
V <sub>5</sub> - RAU 8	47.57	65.26	84.42	94.02	72.82
Mean	45.48	64.26	87.79	103.79	75.33
	Variety		N levels		Interaction
S.E. ±	2.28		2.04		4.57
C.D. (P=0.05)	N.S.		5.85		N.S.

NS=Non-significant

**Table 4 : Soil properties after harvest as influenced by varieties and nitrogen levels**

Sr. No.	Treatments	pH	E.C. (dSm <sup>-1</sup> )	O.C. %	Available nutrients kg/ha		
					N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
1.	V <sub>1</sub> N <sub>0</sub>	7.62	0.12	1.02	79.33	9.96	203.20
2.	N <sub>1</sub>	7.67	0.15	0.98	97.36	11.09	216.32
3.	N <sub>2</sub>	7.68	0.15	1.01	100.97	13.93	219.44
4.	N <sub>3</sub>	7.51	0.13	1.04	102.48	15.36	208.80
5.	V <sub>2</sub> N <sub>0</sub>	7.67	0.09	1.01	79.33	11.09	192.00
6.	N <sub>1</sub>	7.48	0.16	1.01	97.36	12.46	215.00
7.	N <sub>2</sub>	7.52	0.14	0.94	108.18	13.33	216.32
8.	N <sub>3</sub>	7.52	0.11	0.98	109.33	14.48	208.80
9.	V <sub>3</sub> N <sub>0</sub>	7.62	0.12	1.05	97.36	11.39	183.84
10.	N <sub>1</sub>	7.59	0.10	1.06	104.51	13.49	222.56
11.	N <sub>2</sub>	7.44	0.10	1.02	108.18	14.07	195.68
12.	N <sub>3</sub>	7.42	0.10	1.08	111.79	13.47	218.80
13.	V <sub>4</sub> N <sub>0</sub>	7.27	0.10	1.02	97.76	11.07	222.56
14.	N <sub>1</sub>	7.28	0.10	1.01	97.36	10.17	215.68
15.	N <sub>2</sub>	7.46	0.11	1.01	111.79	13.93	215.68
16.	N <sub>3</sub>	7.36	0.11	1.01	115.39	14.36	249.44
17.	V <sub>5</sub> N <sub>0</sub>	7.25	0.10	0.96	93.76	11.09	216.32
18.	N <sub>1</sub>	7.28	0.10	0.98	97.76	13.93	249.44
19.	N <sub>2</sub>	7.36	0.08	1.04	108.18	14.36	222.56
20.	N <sub>3</sub>	7.28	0.10	1.03	112.42	15.30	249.44
	Initial	7.20	0.10	1.01	100.97	10.6	198.40

dose of nitrogen showed higher available NPK status.

The results revealed that, in submontane zone of Maharashtra the variety PR 202 recorded the highest grain and straw yield with application of 90 kg N/ha during *Kharif* season under rainfed condition.

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