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Response of finger millet (*Eleucine coracana* (L.) Gaertn) genotypes to nitrogen under rainfed situations of western Himalayan hills

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ABSTRACT

In the present investigation the combination of 4 genotypes ('GPU 45', 'VR 708', 'VL 149' and Local check) and 4 nitrogen levels (0, 20, 40 and 60 kg/ha) were tested for assessing the newly developed finger millet genotypes in relation to nitrogen levels suitable for western Himalayan hills under rainfed conditions. It was found that among all the test genotypes, 'VL 149' produced significantly higher grain and straw yields. The application of different doses of nitrogen on different pre-released varieties of finger millet revealed that 60 kg N /ha produced highest grain and straw yields across the varieties tried. But the response was significant with the application of N up to 40 kg/ha during both the years.

Key words : Finger millet, Genotype, Nitrogen, Yield

INTRODUCTION

Finger millet [*Eleusine coracana* (L.) Gaertn.] is one of the important crops of hills in Uttrakhand under rainfed farming. Among small millets, finger millet accounts for 8 per cent of the area and 11 per cent production of all the millet cultivation in the world (Bennetzen *et al*., 2003). In India, finger millet accounts for 60 per cent area and ¾ of total small millets production. These are the crops of marginal and small farmers but highly suitable for low fertile soils, adjustable to adverse ecological conditions, where the crop options are limited. Besides providing nutritionally rich staple food, it also provides good fodder, which is an important component of sustainable hill farming system. As it is grown on the poor fertile soils, its average productivity is very low (12.87 q/ha) which can be increased considerably if grown with improved genotypes and balanced nutrition.Very few recommended varieties of finger millet are available for the cultivation in the region. Non- availability of drought, cold and disease tolerant varieties suitable for rainfed and high hill conditions constitute an important factor responsible for poor yields.

Keeping this in view, the screening of newly developed finger millet genotypes in relation to nitrogen level was carried out under hilly rainfed conditions.

MATERIALS AND METHODS

A field experiment was conducted during *Kharif* 2006 and 2007 at G.B. Pant University of Agriculture and Technology, Hill Campus, Ranichauri, and Tehri Garhwal for assessing the newly developed finger millet genotypes in relation to nitrogen levels. The experimental soils was silty clay loam in texture with pH of 5.8, low in available nitrogen (180 kg/ha), medium in available phosphorous (14 kg/ha) and available potassium (389 kg/ha). The depth of soil extended up to 1 meter. The combination of 4 genotypes ('GPU 45', 'VR 708', 'VL 149' and Local check) and 4 nitrogen levels (0, 20, 40 and 60 kg/ha) were tested in factorial randomized block design with three replications. The whole quantity of P and K and half of N as per treatment were placed at the time of sowing. The sowing was done at the spacing of 20-25 cm between rows and 10 cm between plants at 3 – 4 cm depth using 10 kg seed/ha. During the crop season, total rainfall of 800.4 and 981.8 mm was received in 2006-07 and 2007-08, respectively as against an average crop season rainfall of 894.5 mm.

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

Effect on growth and yield attributes :

The two years results revealed that the genotype 'VL 149' produced significantly higher plant height than the other genotypes (Table 1). The genotype 'GPU 45' produced the lowest plant height. The plant height was significantly increased with the successive increase in nitrogen levels up to 60 kg N/ha. 'VL 149" recorded significantly highest number of productive tillers/plant over other genotypes. Application of 40 kg N/ha produced maximum number of productive tillers over its lower doses but it was at par with 60 kg N/ha. The maximum number of ears/plant was found with 'VL 149' but at par with 'VR 708'. Genotype 'GPU 45' produced significantly

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Table 1: Effect of genotypes and N levels on growth and yield attributes of finger millet (mean of 2 years)

Treatments	Plant height (cm)	Productive tillers/plant	No. of ears/plant	Grain weight/ear(g)	1000- Grain wt.(g)
Genotypes					
GPU 45	96.8	3.1	4.5	3.13	4.0
VR 708	105.6	3.2	5.6	3.62	4.3
VL 149	112.6	3.7	6.8	3.66	4.6
(Local Check)	103.4	3.4	5.8	3.45	4.4
C.D. (P=0.05)	4.11	0.31	0.76	0.24	0.17
Nitrogen levels (kg/ha)					
0	86.0	3.0	4.3	2.99	3.9
20	98.2	3.3	5.6	3.20	4.2
40	108.5	3.6	6.3	3.56	4.4
60	110.3	3.7	6.7	3.59	4.5
C.D. (P=0.05)	4.11	0.31	0.76	0.24	0.17

Table 2: Effect of genotypes and different levels of nitrogen on grain yield of finger millet

Treatments	Grain yield (q/ha)		Mean	Straw yield (q/ha)		Mean	B:C ratio
	2006	2007		2006	2007		
Genotypes							
GPU 45	15.36	19.10	17.23	48.83	61.89	55.36	1.48
VR 708	14.28	23.61	18.95	48.62	74.68	61.65	1.63
VL 149	21.62	22.22	21.92	75.29	72.29	73.79	1.92
(Local Check)	11.22	25.35	18.29	46.32	77.52	61.92	1.60
C.D. (P=0.05)	2.03	2.14	2.08	6.34	3.59	5.15	-
Nitrogen levels (kg/ha)							
0	10.68	17.02	13.85	44.96	61.47	53.22	1.28
20	12.73	20.49	16.61	53.16	35.19	44.18	1.26
40	17.16	24.10	20.63	61.17	76.44	90.89	1.85
60	18.59	27.23	22.91	59.50	80.36	69.93	1.67
C.D. (P=0.05)	1.96	2.14	2.05	5.18	3.59	4.46	-

lowest number of ears/plant. Application of nitrogen markedly influenced the number of ears/plants and was maximum up to 60 kg N/ha but it was at par with 40 kg N/ha. The 1000- grain weight was significantly lower in case of local check and 'GPU 45' than all the pre-released varieties. Increasing levels of nitrogen up to 60 kg N/ha induced in test weight but markedly increase only up to 40 kg N/ha.

Effect on yield :

The grain yield and straw yields as influenced by different levels of nitrogen on finger millet varieties are presented in Table 2 which indicates that the variety 'VL 149' produced significantly higher grain and straw yields among the varieties tried. The lowest grain and straw yield was found with genotype 'GPU 45'during both the years.

The application of different doses of nitrogen on different pre-released varieties of finger millet reveals that 60 kg N /ha produced highest grain and straw yields across the varieties tried. But the response was significant with the application of N up to 40 kg/ha during both the years. Similar results were also reported by Dubey and Srivas (1999). The highest benefit: cost ratio was recorded with genotype 'VL 149'. Similarly, increasing levels of N up to 40 kg/ha increased the net return and B: C ratio.

Therefore, it can be concluded that the genotype 'VL 149' is found suitable for western Himalayan region for increasing the productivity of finger millet.

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