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Evaluating the Effect of nitrogen on Crop growth, yield and Quality of Finger Millets (*Eleusine coracana*) Under Upland Rainfed Ecosystem of Jharkhand, India

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A B S T R A C T

The experiment was deigned to evaluate the effect of nitrogen levels on crop growth, yield and quality of finger millet genotypes under rainfed ecosystem. The upland condition of experimental site having sandy loam soil in texture and acidic in reaction pH (5.30) with poor fertility organic carbon (0.30%), available nitrogen (182.2kg/ha) phosphorus (8.96 kg/ha) and potassium (92.70 kg/ha) representing major soil group of Jharkhand. The experiment was conducted in Randomized Block Design and treatment combinations consisting of four nitrogen levels (0, 20, 40 and 60 kg N/ha) in three medium duration finger millet genotypes (TNAU-1022, OEB-219 and KMR-204). The maximum response of nitrogen reported superior in KMR-204 genotype on morphological characters during 25, 50, 75 and at maturity level from Date of sowing i.e. Plant height (99.78 cm), number of Tillers per plant (2.47), Leaf area index (1.44) and Crop growth rate (7.70). The yield contributing characters like effective tillers per meter row length fingers per ear (26.88), ear length (6.82 cm), weight per ear (5.79 g), number of grain weight per ear (1701) and test weight (3.48 g) found significantly superior over all the other genotypes under balanced nitrogen application.

Introduction

Finger millet is extensively cultivated in India, Africa, Ceylon, Malaysia, China and Japan. India is the leading producer of the small millets in the world. Annual planting area under small millet is around 2.5 million hectares; and nearly 1.5 million hectares is under finger millet 40-50 % of crops global area. The cultivation of small millets in India, form an important component of the traditional cropping systems and contribute significantly to the regional food and nutritional security and diversity in the national food basket. They are important in the areas of their production as dry land crops, as

well as for hill agriculture. The small millet grain has longer storage life and hence can be termed as "Famine reserves". The resilience exhibited by the crop may prove good for their adjustment to different ecological situations and may make them potential crops for contingency planting. Climatic condition is the most variable factor in upland rainfed crop system in which cropping pattern, timing, intensity and area cover under cropping system totally depend upon availability of rainfall and other irrigation facilities. An unavoidable and irrespective change in climate is the one which cannot be controlled by human. Nearly 86% of agriculture practices in kharif season in Jharkhand is depend upon rainfall and the maximum part this forcibly faced the challenge of unavailability of rainfall during south west monsoon. Unfortunately aberrant weather is a common feature in Jharkhand state agriculture from last one decade (minimum rainfall received 860mm during kharif season whereas the normal rainfall recorded up to 1050mm annually, data collected from state agriculture department, Ranchi, Jharkhand). The rainfall is seasonal, erratic and highly variable with space and time. The aberrant nature of rainfall may be due to early or delayed onset of monsoon (< 10-12 days) and withdrawal or associated drought spells (< 10 days) at any stage of crop. The state of Jharkhand sole depends on mono cropping pattern with rice cultivation which is directly associated with rainfall and harvested water in natural or constructed water bodies. Nearly forty per cent of cultivated land comes under category of upland and they are pre-dominantly, rainfed and mono cropped with upland rice, finger millet, black gram, maize and other small millet crops. Among grain crops, finger millet ranks fourth in productivity after wheat, rice and maize. Finger millet poses considerable production potential in less fertile, intense probably heat and chronically moisture deficit area. This might be due to deeper root system, better extraction of soil moisture, efficient photo-synthetic mechanism and rapid transfer of nutrient from source to sink. The irrigated area is about 9.4% and after realizing the complete irrigation potential, irrigated area may not increase beyond 25%. Cultivation of right type of genotype is a first step to increase the low production of finger millet in this region, where 75 per cent of farmers still use traditional low yielding local varieties. The high yielding new genotypes are more responsive to heavy fertilizer application. After harvest of short duration finger millet genotypes, second crop of rabi can be grown on residual soil moisture. However, the basic information available is inadequate on medium duration new genotypes of finger millet at different nitrogen levels particularly for Jharkhand in rainfed condition. Keeping this in mind that finger millet growers of this region are those belonging to "below poverty line" (BPL) and as such the strategy shall be to improve the economic condition of neglected and economically backward farming community of plateau region by introduction of suitable medium duration finger millet genotypes and nitrogen fertilization.

Materials and Methods

The experiment was conducted in upland soil of the western section of Birsa Agricultural University Farm, Ranchi (Jharkhand). The soil of experimental plot was well drained representing a major soil group of Jharkhand. It is generally light in texture, has high permeability, low water holding capacity, clay has leached to lower horizon and well aggregated due to the presence of hydrated oxides of iron and aluminum.

Three short duration verities of Finger millets (TNAU-1022, OEB-219 and KMR-204) were selected for evaluating the effect of nitrogen on morphology, physiology and yield contributing characters under rainfed

ecosystem. One sampling point of one square meter was randomly selected in each plot for recording all Biometric observations.

Soil sample analysis was done according to the method described by Jackson (1967) collection soil from 0-30 cm depth from each treatment with the help of soil auger. Finally composite soil samples were made by mixing and quartering the same. They were air dried and sieved by 70 mesh (1.6 mm) sieve. After sieving, it was again mixed thoroughly and kept in glass bottle for analysis.

The mechanical analysis of soil was done by the International Pipette method as described by Piper (1950). Soil pH was determined by Glass Electrode pH meter maintaining the soil: water ratio 1:2.5 as described by Jackson (1967). Organic carbon was determined by Tyurin method as described by Kononova (1966).

Total nitrogen percentage was determined by modified Kjeldahl method as described by Jackson (1967).

Results and Discussion

The experimental results finding obtained during investigation have been sown that the application of balance nitrogen (0, 20, 40 and 60g) gives significant difference in all morphological, physiological and yield contributing characters of Finger Millets. The table 1 and 2 exhibit that the genotype TNAU-1022 found significantly superior over rest of the two different genotypes i.e. OEB-219 and KMR-204. The morphological characters of genotype plant height (99.78 cm), number of tillers per plant (2.47), leaf area index (1.57) and crop growth rate (9.60) observed best on other genotypes. The similar findings have been reported by Dubey, O.P and Shrivas, D.N. (1999), Gautam, R.C. and kaushik, S.K (1997) and Muthuswamy, P. (1985). The climatic condition and texture of soil may play a significant role in development of finger millets under rainfed ecosystem. Availability of resources in soil (carbon, Nitrogen and Phosphorus) promoting the growth of fingers in crop and additional supply of nitrogen may help to introduce sustainability in plant (Fig. 1–3).

Table.1 Effect of nitrogen on morphological character of finger millets at maturity

S.N.	Genotype	Plant height (cm)	Tiller per plant	Leaf area index	Crop growth rate
1.	TNAU-1022	99.78	2.47	1.57	9.60
2.	OEB-219	98.75	2.10	1.42	7.45
3.	KMR-204	99.78	2.30	1.38	7.70
	CD (5%)	8.13	0.22	0.06	0.92
	CV (%)	7.04	10.01	3.44	10.11

Table.2 Effect of nitrogen on yield contributing character of finger millets at maturity

S.N	Genotype	Effective tiller	Finger/ ear	Ear length (cm)	Ear weight (g)	No. of grain
1.	TNAU-1022	27.93	6.93	6.51	6.02	1806
2.	OEB-219	25.60	6.53	6.69	5.54	1647
3.	KMR-204	26.88	6.71	6.82	5.79	1701
	CD (5%)	2.31	0.48	0.44	0.53	129
	CV (%)	7.39	7.22	6.39	8.92	6.76

Fig 1: Growing stage

Fig 2: Maturing stage

Fig 3: harvesting stage

References

Anil Kumar, B. H., Sharanappa, Krishnegowda, K. T. and sudhir, K. (2003). Growth, yield and nutrient uptake as influenced by integrated nutrient management in dry land finger millet., Mysore Journal of Agricultural Science, 37(1): 24-28.

Arunachalam, A. A, Veerabadaraan, V. and Muthusahkaranara, A. (1995). Integrated nitrogen supply system for finger millet. Indian Journal of Agronomy. 36(1): 55-60.

Ali, N and Ahmad, S (2004). Response of finger millet (*Eleusine coracana* L. Gaertn.) varieties to nitrogen levels under rainfed condition. Journal of Research. 16 (1): 51-54

Badiyala, D. and Jaroch, K. (1995). Response kangri (*Setariaa italica*) genotypes to nitrogen under dry temperate condition. Journal of Hill Research. 8 (2) 247-248.

Dubey, O.P and Shrivas, D.N. (1999). Response of finger millet (*Eleusine coraacana*) genotype to nitrogen. Indian Journal of Agronomy. 44 (3): 564-566.

Gautam, R.C. and kaushik, S.K (1997). Response of pearl millet advanced to entries to nitrogen under rainfed condition. Annuals of Agricultural Research. 18 (4): 526-527.

Jackson, M.L. (1967). Soil chemical analysis. Asia Publication House, New Delhi.

Muthuswamy, P. (1985). Response of rainfed ragi to NPK and split application of nitrogen. Madras Agricultural Journal. 72(10): 541-545.

Kononova, M.M. (1966). Soil Organic Matter. Pergamon press, London, pp.377.

Shiva Kumar (1999). Effect of farmyard manure, urban compost and NPK fertilizer on growth and yield of finger millet. M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Bengaluru.

Satyanarayana, T., Badanur, V. P. and Havangi, G. V. (1978). Nitrogen and phosphorus fertilizer of red soil of Bengaluru. Indian Journal of Agronomy. 23(1): 37-39.

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