Vol. 13, No. 1, Page No. 58–62 (2024)
Received : May, 2024, Accepted : June, 2024

Effect of Different Nitrogen Levels on Growth and Yield of Pearl millet (*Pennisetumglaucum L.*) varieties in Agra Region

Shobha[1] and Uma[2]
[1]M.Sc. Scholar, Dept. of Agronomy, R.B.S. College, Bichpuri, Agra
[2]Assistant Professor, Dept. of Agronomy, R.B.S. College, Bichpuri, Agra
Department of Agronomy
Raja Balwant Singh college, Bichpuri, Agra- 283105 (U.P.) India
Corresponding author: E-mail:shobha85030@gmail.com

Abstract

A field experiment was conducted at agriculture research farm of R.B.S. College, Bichpuri, Agra during kharif season of 2022. The experiment was laid out in complete Randomized block design with three replication and it consist two level of pearl millet variety Pramukh-91 (V_1) and 12 KM-91 (V_2) and four levels of nitrogen 0 kg/ha(N_0), 80 kg/ha(N_1), 100 kg/ ha(N_2) and 120 kg/ha(N_3). The results showed that variety Pramukh-91 produced conspicuously higher growth of plant stand per meter row length (24.34m), plant height (194.27cm), number of tillers (5.46), dry matter accumulation at different growth stages (57.70g), stover yield (87.28q/ha) and grain yield (31.45 q/ha) of pearl millet, than that of 12KM-91. Plant stand per meter row length (25.05 cm), plant height (183.48 cm), number of tillers(5.13), dry matter accumulation (58.68g), stover yield (89.34 q/ha)and grain yield(35.88 q/ha) were significantly increased with every increase in the rate of nitrogen application up to 120 kg N/ha. Based on the results, it can be concluded that dominant variety Pramukh-91 with application of 120 kg N/ha gave high grain yield in agro-climatic condition of south-western region of Uttar-Pradesh.

Key words: *Nitrogen, Varieties, Growth, Grain yield, Stover yield, Pearl Millet.*

Introduction

India is the largest producer of millets in the world and pearl millet accounts for about two-thirds of millet production in the country. Pearl millet (*Pennisetumglaucum L.)* as dual-purpose grown in light to medium textured soils of dry regions of arid and semi-arid areas for food grain and green/dry fodder in India[2]. Pearl millet has now been emphasized as nutri-cereal food for resource-poor villagers. It is nutritionally better than various cereals as it is a good source of protein having greater digestibility (12.1%), fats (5.0%), carbohydrates (69.4%) and minerals (2.3%). Pearl millet occupies 6.93 million ha with an average production of 9.62 million tonnes and productivity of 1436 kg/ha during 2021-22 (Directorate of Millets Development, 2022; Project Coordinator Review, 2020).The data on area, production, and productivity of pearl millet indicates a slight increase of 2% in the cultivated area during the initial two years, while productivity has seen a significant rise of 19%. The major pearl millet growing states are Rajasthan, Maharashtra, Gujarat, Uttar Pradesh and Haryana which account for more than 90% of pearl millet acreage in the country and commonly grown in rainy (*kharif*) season. It is also cultivated in summer season (Feb.-May) in parts of Gujarat, Rajasthan and Uttar- Pradesh and during the post-rainy season (*rabi*) at a minor scale in Maharashtra and Gujarat. Pearl millet requires a significant amount of nitrogen for optimal growth and yield. The response to nitrogen application can

vary depending on the amount and timing of the application. Nitrogen plays a pivotal role in the formation of chlorophyll, a fundamental compound responsible for the process of photosynthesis. Through this intricate mechanism, plants are able to efficiently convert sunlight into the energy they require for growth and survival. However, multiple studies have demonstrated that the application of nitrogen can significantly enhance millet production[5]. Plants experiencing a lack of nitrogen tend to exhibit stunted growth, delayed development, diminished flower yield, and shriveled grains. it plays a crucial role in enhancing the protein content of food grains, thereby improving their quality. Additionally, nitrogen contributes to the overall nutritional value of fodder, making it more beneficial for livestock consumption. To know the effect of different nitrogen level requirement for higher grain yield and quality in summer pearl millet, this experiment was conducted.

Materials and methods

The field experiment was carried out during summer (*kharif)* season of 2022 at Agricultural Research Farm, Dept. of Agronomy, R.B.S. College, Bichpuri, Agra (U.P.). The research farm is situated at about 11km to the west of Agra on Agra-Bharatpur Road at Latitude of $27^0$2' N and longitude of $77^0$9' E with an elevation of 163.4 m above the mean sea level. The soil was sandy loam in texture with pH 7.89, organic carbon % 0.31 available N 181.90 kg/ ha, P_2O_5 27.5 kg/ha and potash 285.0 kg/ha. The trial was laid out in 'Randomized Block Design' having 8 treatments and three replications. The treatments consisted of four level of nitrogen 0 kg/ha(N_0), 80 kg/haN_1), 100 kg/ha(N_2), 120 kg/ha(N_3)and two varieties *Viz*. Pramukh-91 (V_1) and 12KM-91 (V_2). The field was given a pre-sowing irrigation at proper tilth and two ploughing was done by tractor followed by planking. Then field was laid out into plots leaving irrigation channels and bunds in between treatments. Sowing of pearl-millet varieties by manually on 24-July-2022 with the onset of monsoon at row spacing 45 cm with seed rate of 4 kg/ha. Nitrogen, phosphorus and potash were supplied through Urea, DAP and MOP respectively. Half dose of nitrogen and full doses of phosphorus and potash were applied at the time of sowing as basal application and remaining nitrogen was applied after 20 days of sowing as top dressing of urea. Germination count after 15 days of sowing by counting plant number in one meter row length in 2 rows pernet plot randomly. The data of crop stand per meter row length, plant height, number of tillers and dry matter accumulation were recorded after 20 days of sowing with 20 days interval, till harvest.

Results and Discussion

Growth parameter

Results indicated that the plant stand per meter row length, plant height, number of tillers and dry matter accumulation of plant influenced by different varieties of pearl millet at different growth stages.Pramukh-91 outperformed 12 KM-91 in practically every stage of crop growth. Variety pramukh-91 (V_1) recorded significantly plant stand per meter row length (24.88, 25.42, 24.34 m), number of tillers per plant (0.17, 0.19, 0.18), and dry matter accumulation of plant (1.52, 2.34, 2.90 g) at 40 DAS, 60 DAS and at harvest expect

Table 1 Effect of different nitrogen levels on growth and yield of pearl millet

Treatments	Plant stand per meter row length				Plant height (cm)				Number of Tillers plant^{-1}				Dry matter accumulation of plant (g)			
	20 DAS	40 DAS	60 DAS	At harvest	20 DAS	40 DAS	60 DAS	At harvest	20 DAS	40 DAS	60 DAS	At harvest	20 DAS	40 DAS	60 DAS	At harvest
Varieties																
Pramukh-91 (V_1)	9.94	24.88	25.42	24.34	12.78	122.58	181.39	194.27	3.44	4.48	4.84	5.46	2.83	28.32	47.17	57.70
12KM-91 (V_2)	9.79	23.35	23.83	21.85	12.75	116.82	172.45	184.68	3.40	4.28	4.63	4.62	2.81	26.55	43.92	54.57
SEm±	0.23	0.50	0.51	0.48	0.26	2.17	2.95	3.10	0.026	0.06	0.07	0.06	0.05	0.52	0.80	0.99
CD (P=0.05)	NS	1.46	1.50	1.40	NS	NS	8.64	9.11	NS	0.17	0.19	0.18	NS	1.52	2.34	2.90
Levels of Nitrogen (Kg N/ha)																
0 (N_0)	9.30	21.65	22.72	18.85	12.52	116.15	161.54	174.18	3.38	3.52	3.69	3.81	2.72	24.42	40.20	50.94
80 (N_1)	9.96	23.38	25.23	21.92	12.60	118.12	173.26	185.04	3.40	4.10	4.64	4.69	2.80	26.64	44.12	54.60
100 (N_2)	10.02	25.17	27.21	24.86	12.92	120.17	183.40	195.68	3.80	4.50	4.68	4.88	2.82	28.71	47.44	58.18
120 (N_3)	10.04	25.20	27.24	25.05	12.92	120.20	183.48	196.26	3.90	3.56	4.90	5.13	2.86	28.73	48.16	58.68
SEm±	0.26	0.57	0.59	0.55	0.30	2.51	3.40	3.59	0.030	0.07	0.08	0.07	0.06	0.59	0.92	1.14
CD(P=0.05)	NS	1.68	1.73	1.61	NS	NS	9.98	10.51	NS	0.20	0.22	0.20	NS	1.74	2.70	3.35

*Note- Non- significant (NS)

20 DAS respectively. Significant maximum plant height (8.64, 9.11 cm), recorded at 60DAS and at harvest expect 20DAS and 40DAS. Higher plant height with the variety Pramukh-91 might be due to genetic characters of the variety. Dry matter accumulation in plant showed increasing trend with the growth of crop. Every increase in the rate of nitrogen application up to 120 kg N/ha at all stages of crop growth resulted in a significant increase in the plant stand per meter row length (25.20, 27.24, 25.05 m), plant height (183.48, 196.26 cm), number of tillers per plant (3.56, 4.90, 5.13), and dry matter accumulation of plant (28.73, 48.16, 58.68 g), at 40, 60DAS and at harvest exception of 20 DAS and 40 DAS in the case of plant height. The application of nitrogen significantly enhanced growth parameter like plant stand per meter row length, number of tiller per plants and the accumulation of dry matter in the plant[1,4].

Yield

Results revealed that the yield of pearl millet influenced by different varieties of pearl millet. Variety Pramukh-91 produced a significantly higher grain yield (31.45 q/ha) and straw yield (87.28 q/ha)than variety 12 KM-91 showed below in the (Table.2.). Yield attributes such as the number of earhead plants, weight of earhead, grain weight per earhead, grain weight per plant and 1000 grain weight, also showed significant difference with variety and nitrogen level. Variety Pramukh-91also produced appreciably higher straw yield than 12 KM-91. Growth parameter like plant height and number of tillers also had similar trends to that recorded in case of straw; it's also responsible for higher straw yield. Grain yield (35.88 q/ha) and straw yield (89.34 q/ha) of pearl millet significantly enhanced with every increase of nitrogen application up to 120 kg N/ha[3].

Table 2 effect of different nitrogen levels on growth and yield of pearl millet

Treatments	Grain yield (q/ha)	Stover yield (q/ha)
Varieties		
Pramukh-91 (V_1)	31.45	87.28
12KM-91 (V_2)	29.44	82.65
SEm±	0.41	1.26
CD(P=0.05)	1.21	3.74
Levels of Nitrogen (Kg N/ha)		
0 (N_0)	26.85	72.49
80 (N_1)	29.35	77.48
100 (N_2)	32.77	82.25
120 (N_3)	35.88	89.34
SEm±	0.61	1.58
CD(P=0.05)	1.71	4.64

Conclusion

Based on the results one year, it can be concluded that dominant variety pramukh-91 and 120 kg N/ha gave high grain yield net profit /ha in agro-climatic conditions of south-western region of Uttar Pradesh.

References

1. Akhilkumar Gowd, K., Kumar S., Sharma J., L. Sravankumar and Malikarjun, (2023). Effect of Nitrogen and Phosphorus levels on Growth and Yield of Pearl millet. *The Pharma Innovation Journal,* 12 (9): 1971-1973.
2. Anchra, S., Bairwa, R.C., Abhishek, M.K.R. and Meena, A.K., (2020).Yield and qualitative Evaluation of fodder pearl millet (Pennisetumglaucum) varieties under different Fertility levels. *The Pharma Innovation Journal*; 10(09):24-26.
3. Bharati, N.K. and Thakare, R., (2022). Soil properties, yield and quality of pearl millet influenced by integrated nutrient management on vertisol. *The Pharma Innovation Journal*; SP-11(5):885-888.
4. Kadam S., Pawar, S., Jakkawad, S., (2019). Impact of Integrated Nutrient Management on Growth, Yield of Summer pearl Millet. *Trends in Biosciences,*12(4):ISSN0974-8431.
5. Singh, B., Rana, D.D., Joshi, U.N. and Dhaka, A.K., (2012). Fodder yield and quality of pearl millet genotype as influenced by nitrogen levels. *Forage Research,* 38(1): 62-63.