Original Research Article

Pearl millet (*Pennisetum glaucum L.*) var ABV-04 as influenced by Nitrogen & Phosphorus effects on growth parameters and Yield.

ABSTRACT

In the field, there were examination conducted kharif cropping season of 2021 at the C.R.F. Education Wing of the Department of Agronomy at Shaits, Prayagraj, Uttar Pradesh. Research seeks to find out the impact of nitrogen & phosphorus on Indicators of growth parameter & productivity of *cumbu* under Randomized block Design comprising of 9 treatments of which treatments (T1-T9) with different combination of nitrogen along with phosphorus which are replicated thrice. Highest plant height (214.37 cm), the highest plant dry weight (46.74 g), ear head length (20.77 cm), the number of grains/ear head (1972.0), grain yield (2.6 t/ha) and harvest index were achieved by 60 kg P/ha + 120 kg N/ha (41.49 percent).

Key words- Growth, Pearl millet, Phosphorus, Nitrogen Yield,

INTRODUCTION

Comment [CM1]: Missing elements to achieve a good introduction. Please provide factual background, a clearly defined problem, a brief survey of the literature, and the scope and rationale for the work performed.

Bajra (Pearl millet), the world's hardiest warm-season cereal crop (**Reddy** *et al*., **2013)**, is an essential arid land semi-arid crop of India, farmed as a dual-purpose (food and feed) crop on over 8.3 million ha, ranking fourth among total cereals This grain is thought to have originated in India or Africa. *Cumbu, spiked millet* are Alternative names in English; *bulrush* or cattail in Hindi; *dukhn* in Arabic*; mil-à-chandelles* or petit millet The French term *mhunga;* the South African word *mahango* & *bajra* in Hindi. Despite its proximity to Africa, this millet is a mainstay of the diets of many Indians from lower socioeconomic strata. Many sections of India, particularly those that receive cold waves, have relied on cumbu as a staple food during the winter months. The iron, protein, and fibre in bajra help the body's digestion in addition to its warming effects. Additionally, it helps to raise haemoglobin levels and decrease cholesterol while also keeping you full and energised during the colder months. Healthy neural systems be maintained by eating foods high in vitamin B. There are many anti-aging and anti-cancer properties in bajra because of its high concentration of powerful antioxidants such phytic acid, tannins, and flavonoids. The catechins in it also help the kidneys and liver get rid of toxins.

Comment [CM2]: This information must be supported by scientific references.

Crop plants depend heavily on the nutrient nitrogen (N). Growth, leaf area expansion, and biomass yield production are all aided by this compound. Excess NUE can help plants function better and produce more food. Increasing the amount of nitrogen in the soil improves the quality and yield of crops as well as their tolerance to environmental challenges, such as water scarcity and saline soil. Plant growth and development can be impeded by a lack of nitrogen (N). Root growth, volume, area, diameter, total and main root lengths, dry mass, and nutrient uptake can all be improved by nitrogen, as can nutritional balance and the generation of dry mass itself. The rise in nitrogen levels was found to boost yield qualities, as was also observed by **(Ali *et al.*, 2010).** *cumbu*

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production efficiency can be improved by using nitrogen, according to numerous research **(Singh *et al.*, 2012).**

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Deficiencies in other nutrients, such as phosphorus, are more readily apparent in plants. Stunted, thin-stemmed, and spindly plants with dark, almost blue-green leaves are common signs of phosphorus deficiency. As a result, phosphorus-deficient plants often appear to be completely normal unless there are many larger, healthy plants present to make a comparison. It is possible for leaves to become yellowed and shrivelled in the most severe phosphorus shortage conditions. Although other stresses, such as cold temperatures, can also induce purple pigmentation, certain plants' leaves and stems develop purple hues as a result of phosphorus deficiency. Cells in meristematic tissues, which are quickly proliferating and expanding, require a considerable amount of phosphorus. The "Bottleneck of World Hunger" has been referred to as this.

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MATERIALS & METHODS

A area trial changed into carried out in the course of kharif season of 2021, at C.R.F of wing of Agronomy located at 25°24'42" N latitude, 81°50'56" E longitude and 98 m above mean sea degree (MSL), the study was conducted in Shaits *Prayagraj* to assess the effects of phosphorus & nitrogen on pearl millet (Pennisetum glaucum L.) growth parameters & productivity. The trial was laid out within Randomized Block plan comprising of nine remedies that be multiplied thrice. Every treatment internet plot length is 3m × 3m. The treatment be classified as with recommended dose Potash with sources of Muriate of Potash, further with Nitrogen thru Urea and Phosphorus via DAP when applied in combinations as follows, (T1) 80 kg N/ha + 20 kg P/ha , (T2) a hundred kg N/ha + 20 kg P/ha,(T3) one hundred twenty kg N/ha + 20 kg P/ha, (T4) 80 kg N/ha + forty kg P/ha,(T5) one hundred kg N/ha + forty kg P/ha, (T6) one hundred twenty kg N/ha + 40 kg P/ha,(T7) 80 kg N/ha + 60 kg P/ha,(T8) a hundred kg N/ha + 60 kg P/ha,(T9) a hundred and twenty kg N/ha + 60 kg P/ha. The pearl millet crop was harvested remedy smart at harvesting maturity stage. increase parameters viz. plant height (cm), dry rely accumulation plant were Hand-recorded on five random subjects decided on consultant plants from Graphs for each replication of every plot one at a time and after harvesting, we separated the seeds from each plot and dried them under solar a three-day period. Eventually, seed production per ten thosand square meters was computed & expressed in tonnes based on hectares after winnowing, cleaning, and preparing seeds. After ten days of sun drying, each plot's stover production was recorded and expressed in tonnes per hectare. The statistics were calculated and analysed using the **Gomez & Gomez** (1984) statistical approach. The benefit: the fee ratio was reworked after the fee value of seed was replaced with straw and the general value of crop cultivation was protected.

RESULTS & DISSCUSIONS

Effect on growth parameters:

Plant height

Height of the plant rise as crop growth progressed, as shown in Table 1. The maximum height measured at harvest for treatment T9 (60P+120N kg/ha) was 214.37cmPlant

tallness was assessed at harvest in T9 and treatments T8 were found statistically equal to those of T9. Due to the constant provision of nutrients throughout all growth stages, as well as the positive relationship between Nitrogen and Phosphorus along with Potassium, the highest plant height was found in treatment T9. Increased plant height is a result of nitrogen's effect on the plant's vegetative growth. Similar to **Rathore** *et al* **(2006**), these results were found). In cells, phosphorus is a structural component and metabolically active molecule, is likely responsible for the rise in Plant tallness in the appliance of 60 kg/ha Phosphorus. Phosphorus plays a critical role in various physiological and biochemical processes essential to plant growth and development, which may explain why higher phosphorus levels boost pearl millet growth. According to Sharma et al., (2012 the same results were found.

Dry matter of plant

Maximum accumulation of dry matter was 46.74 (g) at harvesting for the treatment T9 (60P+120N kg/ha) and for the treatment T8 (60 kg P/ha). Since the other vegetative features dry matter build-up, it is more significant. Due to the addition of nitrogen & phosphorus, pearl millet's dry weight rose considerably. **Reddy & Kumar** *et al*. (2004). (2009 found rise of the same kind in dry matter production with increasing N levels in Pearl millet crop growth at all stages. Presence of phosphorus in the soil may have supplied the plants with a more favourable nutritional environment. According to assessments of nutrient concentration, pearl millet plant sections had a considerable increase in the nitrogen and phosphorus amount. An increase in meristematic activity and applied growth led to an increase in dry matter accumulation, the plant's photosynthetic surface increased as a result. They found the same results as Sharma & co-worker's (2012).

Yield and Yield Attributes:

Ear head length

According to the statistical research, ear head length had a significant impact. Significant and maximum ear head lengths were seen in the treatment of (60P+120N kg/ha) (20.77). Only (60P+120N kg/ha) recorded statistical parity with other treatments. Nitrogen treatment stimulates cell proliferation & elongation in plants. Due to the fact that nitrogen is a component of chloroplast porphyrins, increasing nitrogen fertilisation led to an increase in crop ear head length. **Reddy *et al.*, 2016** and **Munirathnam,** 2002 have also found that varying quantities of nutrients can have varying effects on the length of the ears. Increased P & other nutrients delivered to plants as a end result of phosphorus application could explain the rise in dry matter build-up. The findings of **Azad** (2000), **Sharma *et al***. (2000), and others are likewise consistent with these findings (2012).

Number of grains in the ear

Grain count per ear head was found to have a significant impact on statistical analysis. There was a substantial and maximum quantity of grains per ear head with the treatment (60P+120N kg/ha) (1972). Any how, statistically, (60P+100N kg/ha) and (60P+120N kg/ha) were equal. N helps plants grow more quickly and make more cells. In order to boost photosynthates production, nitrogen fertiliser rise the number of grains per ear head of the crop because nitrogen is a component of chlorophyll. **Reddy *et al.*, (2004)** and **Munirathnam & Gautama, (2002**) have also found that the number of grains/ear head can vary depending on the amount of nutrients in a plant (2016). Rise in dry matter accumulation may be attributed to rise phosphorus & other nutrients being supplied to plants, as a result of phosphorus application. A possible explanation for the higher quantity of grains/ear heads is the earlier availability of nutrients to plants during the flower primordial initiation stage. The findings of **Azad *et al* (2000**), **Sharma *et al.* (2000),** and others are likewise consistent with these findings **(2012).**

Grain yield

Different combinations of Nitrogen, Phosphorus & Potassium can have a significant effect on grain production. A grain yield of 2.68 ta/ha was obtained with a treatment of (60P+120N kg/ha) however, (60P+100N kg/ha) yielded results statistically equivalent to those of (60P+120N kg/ha). Increasing the amount of nitrogen and phosphorus applied greatly boosted pearl millet grain yields. This suggests that rising the nitrogen supply may have enhanced all growth indices, yield-related features. **Gautam & Munirathnam**, **2002. Kalaghatagi &Guggari**, **2005**; **Singh *et al.*, 2010** have all observed increased grain yield as a result of altering nutrient levels. Grain yield influences the biological yield. As a result, enhanced grain yield qualities could be credited with a large rise in biological yield when phosphorus is used.

Stover yield

The stover yield output of the pearl millet crop had also been greatly altered by the treatment of Nitrogen & Phosphorus. In terms of stover yield (3.77 ta/ha), the highest was observed at (60P+120N kg/ha); however, (60P+100N kg/ha) was shown to be statistically equivalent to (60P+120N kg/ha) With the addition of nitrogen and phosphorus, pearl millet yielded substantially more stover yield than it did without them. Growth of plant & dry matter production may have increased as a result of greater photosynthesis. In this way, rise of nitrogen supply may have boosted all growth metrics and yield features, which finally contributed to rise of stover production. Straw production affects biological yield. As a result, enhanced straw yield qualities might be blamed for a large rise in biological yields following the addition of phosphorus. The findings of **Azad *et al* (2000**), **Sharma *et a*l. (2000**), and others are likewise consistent with these findings (2012).

CONCLUSION

120 kg N/ha + 60 kg phosphorus/ha be found best for farmers, with 214.37-inch plant height, 46.74-gm plant dry weight, 1972 grains per ear head, and 2.68-ta/ha grain and stover yields, respectively.

Comment [CM6]: The author should improve the conclusions. She must present necessary and sufficient elements to make clear the results obtained in the work, the fulfillment or non-fulfilment of the objectives and, in general, she must make clear to the reader the general characteristics of the research carried out.

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Comment [CM7]: Not all references listed at the end of the manuscript were cited in the text.
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Table 1. Effect of Nitrogen and Phosphorus on growth parameters of pearl millet at harvest

T.No.	Treatments	Plant height (cm)	Dry Weight(gm)
T_1	20Kg P/ha + 80 kg N/ha	202.57	36.62
T_2	20 kg P/ha + 100 kg N/ha	204.64	37.37
T_3	20 kg P/ha +120 kg N/ha	207.05	40.26
T_4	40 kg P/ha+80 kg N/ha	206.51	39.66
T_5	40 kg P/ha+100 kg N/ha	209.19	42.50
T_6	40 kg P/ha+120 kg N/ha	210.26	43.37
T_7	60 kg P/ha+80 kg N/ha	208.47	41.23
T_8	60 kg P/ha+100 kg N/ha	213.69	44.37
T_9	60 kg P/ha+120 kg N/ha	214.37	46.74
	SEm (±)	1.28	1.02
	CD (P 0.05)	3.78	3.02

Table2. Nitrogen & Phosphorus influence on Cumbu Yield and Characteristics

T. No	Treatments	Ear head length (cm)	No. of grains/ear head	Grain Yield (ta ha)	Stover Yield (ta ha)
T_1	20Kg P/ha + 80 kg N/ha	16.13	1671	2.21	3.26
T_2	20 kg P/ha + 100 kg N/ha	16.87	1699	2.28	3.36
T_3	20 kg P/ha +120 kg N/ha	17.50	1784	2.42	3.51
T_4	40 kg P/ha+80 kg N/ha	17.20	1747	2.36	3.44
T_5	40 kg P/ha+100 kg N/ha	18.70	1861	2.51	3.60
T_6	40 kg P/ha+120 kg N/ha	19.37	1885	2.55	3.64
T_7	60 kg P/ha+80 kg N/ha	18.33	1833	2.47	3.56
T_8	60 kg P/ha+100 kg N/ha	20.19	1942	2.65	3.742
T_9	60 kg P/ha+120 kg N/ha	20.77	1972	2.68	3.77
	SEm (±)	0.18	14.56	0.03	0.024
	CD (P 0.05)	0.53	43.27	0.07	0.07