

Effect of varieties and integrated nutrient management on growth, yield attributes and yield of barnyard millet

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ABSTRACT

A field experiment was carried out on sandy clay loam soils during *khariif* 2024 at Agricultural College Farm, Bapatla to assess the Response of barnyard millet varieties to integrated nutrient management. The experiment was laid out in Randomised block design with factorial concept (FRBD) with 3 Varieties *viz.*, CBYMV-1, DHBM 93-3, VL 207 as factor I and Integrated nutrient management treatments *viz.*, 100%RDN, 75%RDN, 100%RDN+Biofertilizer consortia, 75%RDN+Biofertilizer consortia and Biofertilizer consortia as factor II and replicated thrice. The results of the investigation revealed that among the varieties, DHBM 93-3 recorded maximum plant height (155.2 cm), higher number of tillers plant⁻¹ (6.8), maximum number of panicles hill⁻¹ (4.3), grain yield (2305 kg ha⁻¹) and stover yield (5742 kg ha⁻¹) whereas maximum plant height (160.6 cm), number of tillers plant⁻¹ (7.4), number of panicles hill⁻¹ (4.5), grain yield (2403 kg ha⁻¹) and stover yield (4548 kg ha⁻¹) was recorded with application of 100%RDN+Biofertilizer consortia which was on par with 100% RDN and significantly superior to all the other treatments tested

Keywords: *Barnyard millet, Climate-resilient crops, Dryland agriculture, Integrated Nutrient Management*

Millets are hardy, small-seeded cereals of the Poaceae family, valued for their nutritional and ecological significance. As C4 plants, they possess high photosynthetic efficiency, tolerate to heat and drought stress effectively, making them suitable for climate-resilient farming. Among them, barnyard millet (*Echinochloa frumentacea*) is notable for its short duration, adaptability to drylands and low input requirements. It serves as both nutritious food grain and a valuable fodder crop, being rich in dietary fiber, iron and digestible protein. Despite its benefits, barnyard millet cultivation remains limited due to the lack of improved varieties and inadequate crop management, particularly in regions like Krishna Zone of Andhra Pradesh, where poor soil fertility and erratic rainfall hinder productivity. Integrated Nutrient Management (INM) involving the combined use of biofertilizers and chemical fertilizers, offers a sustainable strategy to improve soil health and nutrient efficiency. INM can enhance yield, reduce environmental impacts and support long-term agricultural sustainability. Therefore, the present study was undertaken to evaluate the performance of

barnyard millet varieties under different INM treatments in coastal Andhra Pradesh conditions.

MATERIAL AND METHODS

A field experiment was conducted at Agricultural College Farm, Bapatla, Andhra Pradesh during *khariif*, 2024. The soil of the experimental field was sandy clay loam in texture, neutral in reaction with pH 7.05, electrical conductivity 0.44 dS m⁻¹, non-saline, low in organic carbon, low in available nitrogen, medium in available phosphorus and high in available potassium. Average mean maximum temperature was 33.8 °C and mean minimum temperature was 24.8 °C during the crop growth period. The total amount of rainfall received was 576.8 mm in 24 rainy days. The experiment was laid out in Randomised block design with factorial concept (FRBD) with 15 treatments replicated three times. Factor I represents Varieties *i.e.*, V₁: CBYMV-1, V₂: DHBM 93-3, and V₃: VL 207. Factor II represents Integrated nutrient management treatments *i.e.*, N₁:100% RDN, N₂:75% RDN, N₃:100%RDN+Biofertilizer consortia,

N₄:75%RDN+Biofertilizer consortia and N₅:Biofertilizer consortia. The recommended dose of 20 kg of each P₂O₅ and K₂O kg ha⁻¹ was applied uniformly in the form of single super phosphate and muriate of potash as basal as per the treatments. The scheduled quantity of nitrogen was applied in two equal splits as per the treatments, half as basal and remaining half as top dressing at 30 DAS. *Azospirillum*, PSB and KRB each @ 1.25 l ha⁻¹ each were incubated with FYM @ 500 kg ha⁻¹ at room temperature for 15 days and incorporated in the soil thoroughly with the help of spades before sowing as per the treatments. Sowing of seed was done with a spacing of 30 cm x 10 cm. Irrigation was given at weekly intervals based on soil conditions. Five plants from each plot were selected randomly to record the biometric observations like plant height, number of tillers plant⁻¹, yield attributes and yield. Crop was harvested at maturity and threshed separately; grain yield and straw yield were recorded separately for each plot. All the data was analyzed statistically following the standard procedures as described by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Growth parameters

Growth parameters were significantly affected by different varieties and integrated nutrient management treatments, but their interaction remained non significant. Among the varieties tested maximum plant height at harvest (155.2 cm), number of tillers plant⁻¹ at harvest (6.9) and Drymatter accumulation (8047 kg ha⁻¹) was recorded with DHBM 93-3 which was on par with CBYMV-1 (Table 1) and the lowest (147.0 cm, 5.9 tillers plant⁻¹ and 5279 kg ha⁻¹) respectively was recorded with VL 207. Application of 100% RDN+Biofertilizer consortia resulted in maximum plant height at harvest (160.6 cm), higher number of tillers plant⁻¹ at harvest (7.4) and Drymatter accumulation (7365 kg ha⁻¹) which was on par with 100% RDN (160.6 cm, 6.9 and 7036 kg ha⁻¹) and was significantly superior to the application of 75%RDN with Biofertilizer consortia and 100% RDN alone (Table 1) whereas, the application of Biofertilizer consortia alone recorded the lowest height at harvest 122.3 cm, number of tillers plant⁻¹ at harvest 3.5 and Drymatter accumulation at harvest 5023 kg ha⁻¹ which

Table 1. Plant height(cm), Number of tillers plant⁻¹, Drymatter accumulation at harvest (kg ha⁻¹) as influenced by varieties and integrated nutrient management

Treatments	Plant height at harvest (cm)	Number of tillers plant ⁻¹ at harvest	Drymatter accumulation at harvest (kg ha ⁻¹)
Varieties			
V ₁ - CBYMV-1	152	6.8	7744
V ₂ - DHBM 93-3	155.2	6.9	8047
V ₃ - VL 207	147	5.9	5279
SEm (±)	1.85	0.22	167.56
CD (P=0.05)	5.54	0.68	502.7
Integrated nutrient management			
N ₁ - 100% RDN	152.7	6.9	7036
N ₂ - 75% RDN	132	4.7	5762
N ₃ - 100% RDN + Biofertilizer Consortia	160.6	7.4	7365
N ₄ - 75% RDN +Biofertilizer	141.5	6	6405
N ₅ - Biofertilizer Consortia	122.3	3.5	5023
SEm (±)	3.11	0.29	204
CD (P=0.05)	8.45	0.87	612
CV (%)	7.6	14.01	11.5
Interaction (V × N)			
SEm (±)	5.55	0.52	388
CD (P=0.05)	NS	NS	NS

Table 2. Number of Panicles hill⁻¹, Grain and Straw yield (kg ha⁻¹) as influenced by varieties and integrated nutrient management

Treatments	Number of panicles hill ⁻¹	Grain yield (kg ha ⁻¹)	Stover yield (kg ha ⁻¹)
Varieties			
V ₁ - CBYMV-1	4.2	2193	5615
V ₂ - DHBM 93-3	4.3	2305	5742
V ₃ - VL 207	3.6	2016	3263
SEm (±)	0.07	41.94	55.31
CD (P=0.05)	0.22	125.8	165.9
Integrated nutrient management			
N ₁ - 100% RDN	4.2	2250	4786
N ₂ - 75% RDN	3.5	1874	4308
N ₃ - 100% RDN + Biofertilizer Consortia	4.5	2403	4962
N ₄ - 75% RDN + Biofertilizer Consortia	3.8	2057	4548
N ₅ - Biofertilizer Consortia	3.1	1250	3128
SEm (±)	0.09	54.13	73.06
CD (P=0.05)	0.28	162.4	219.2
CV (%)	7	7.5	7.7
Interaction (V × N)			
SEm (±)	0.17	97.1	130
CD (P=0.05)	NS	NS	NS

was inferior to all the integrated nutrient management treatments studied. These findings are similar with Krishnaveni (2018).

Yield attributes

In barnyard millet among the varieties tested, the maximum number of panicles hill⁻¹ (4.3) were recorded in DHBM 93-3 which was on par with CBYMV-1 by producing 4.2 panicles hill⁻¹. The lowest number of panicles hill⁻¹ (3.6) were observed in VL207. Among the integrated nutrient management treatments tested, application of 100%RDN+Biofertilizer consortia resulted in highest number of panicles hill⁻¹ (4.5), which was similar with 100% RDN (4.2) indicating that the addition of Biofertilizer consortia to the 100% recommended dose of nitrogen did not significantly increase the number of panicles hill⁻¹ but maintained a similar performance. The number of panicles hill⁻¹ obtained in 100% RDN + Biofertilizer consortia and 100%RDN were significantly superior to the addition of 75% RDN+Biofertilizer consortia and 75% RDN alone. However, Biofertilizer consortia alone recorded the lowest number of panicles hill⁻¹ (3.1). The

interaction effect of varieties and integrated nutrient management was non significant.

Yield

Among the varieties tested, maximum grain yield 2305 kg ha⁻¹ and stover yield 5742 kg ha⁻¹ was recorded with DHBM 93-3 which was comparable with CBYMV-1 (2193 and 5615 kg ha⁻¹) respectively and the lowest was noticed in VL-207 (Table.2). The highest grain yield 2403 kg ha⁻¹ and stover yield 4962 kg ha⁻¹ was recorded with 100% RDN+Biofertilizer consortia which was similar with 100%RDN and significantly superior to the application of 75%RDN+Biofertilizer consortia and 75%RDN. Application of Biofertilizer consortia alone recorded the lowest grain and stover yield (Table 1). The interaction effect of varieties and integrated nutrient management remained non significant. These results are in accordance with Balaji *et al.* (2019) and Kumar *et al.* (2020).

CONCLUSION

Based on the findings, it is concluded that, among the barnyard millet varieties tested DHBM 93-3

recorded maximum grain and stover yield which was on par with CBYMV-1 and among the five different integrated nutrient management treatments evaluated, application of 100%RDN+Biofertilizer consortia resulted in higher grain and stover yield which was on par with application of 100%RDN.

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