



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating (2026): 5.20
www.agronomyjournals.com
2026; 9(8): 1361-1365
Received: 14-06-2026
Accepted: 18-07-2026

VR Najan
Ph.D. Scholar, Department of
Agronomy, MPKV, Rahuri,
Maharashtra, India

RM Gethe
Associate Professor, Department of
Agronomy, MPKV, Rahuri,
Maharashtra, India

US Surve
Associate Professor, Department of
Agronomy, MPKV, Rahuri,
Maharashtra, India

SR Shelke
Associate Professor, Department of
Soil Science and Agricultural
Chemistry, MPKV, Rahuri,
Maharashtra, India

SV Damame
Assistant Professor, Department of
Biochemistry, MPKV, Rahuri,
Maharashtra, India

MR Patil
Associate Professor, Department of
Agricultural Statistics, MPKV,
Rahuri, Maharashtra, India

Corresponding Author:
VR Najan
Ph.D. Scholar, Department of
Agronomy, MPKV, Rahuri,
Maharashtra, India

Impact of genotypes, fertilizer levels and cutting management on growth and yield of hybrid Napier

VR Najan, RM Gethe, US Surve, SR Shelke, SV Damame and MR Patil

DOI: <https://www.doi.org/10.33545/2618060X.2026.v9.i8q.6431>

Abstract

Field experiment was conducted to study the effect of genotypes, fertilizer levels and cutting management on the growth, yield of Hybrid Napier during 2023-2025. The growth parameters viz., plant height, number of tillers, number of leaves and L:S ratio were significantly higher with Phule Gunwant with 150% RDF and 60 days interval. Phule Gunwant (G_1) recorded higher plant height (191.79 cm), maximum tillers plant⁻¹ in pooled analysis (47.39) and higher leaves bunch⁻¹ (414.24), while BNH-10 (G_3) recorded the highest leaf: stem ratio (1.04) in pooled analysis. Total green forage yield (262.17 and 286.11 t ha⁻¹; pooled 274.14 t ha⁻¹) and total dry matter yield (52.56 and 56.11 t ha⁻¹; pooled 54.34 t ha⁻¹) were highest with Phule Gunwant, followed by BNH-10, whereas Phule Jaywant recorded the lowest values. Among fertilizer levels, application of 150% RDF (F_3) recorded the highest plant height (186.88 cm pooled), maximum tillers plant⁻¹ (50.28), leaves bunch⁻¹ (445.09), total green forage yield (270.89 t ha⁻¹) and total dry matter yield (54.63 t ha⁻¹), followed by 125% RDF (F_2), whereas 100% RDF (F_1) recorded the lowest values. The highest leaf: stem ratio (1.06) was recorded with 100% RDF and was at par with 125% RDF, while 150% RDF recorded the lowest ratio (0.82). Among cutting intervals, the 75-day cutting interval (C_3) recorded higher plant height (181.16 cm pooled), maximum tillers plant⁻¹ (44.30) and leaves bunch⁻¹ (396.78), whereas the 45-day interval (C_1) recorded the highest leaf: stem ratio (1.11). Total green forage yield (277.59 t ha⁻¹) and total dry matter yield (53.03 t ha⁻¹) were highest with the 60-day cutting interval (C_2), followed by 45 days, while 75 days recorded the lowest values.

Keywords: Genotypes, fertilizer, cutting management, Hybrid Napier

Introduction

Agriculture remains the backbone of the Indian economy, with the livestock sector playing a vital role in rural livelihoods, employment, income generation and nutritional security, particularly for small and marginal farmers (NAAS, 2024) [10]. India has emerged as the world's leading milk producer, with milk production reaching 230.58 million tonnes during 2022–23, reflecting the continued growth and importance of the dairy sector in the national economy (DAHD, 2024; NAAS, 2024) [10]. Livestock production also contributes substantially to the food and nutritional security of rural households and provides an important source of regular income. However, despite India's large livestock population and leading position in milk production, productivity per animal remains relatively low, mainly because of inadequate availability and quality of feed and fodder, limited genetic potential and insufficient adoption of scientific feeding, breeding and management practices (Kona, 2025) [8]. The shortage of quality green fodder is particularly important because cultivated fodder occupies only a small proportion of the total cultivated area, while crop residues and other available feed resources are often nutritionally poor. Therefore, improving the availability of high-quality fodder, along with better genetic resources, balanced nutrition and scientific dairy management, is essential for increasing livestock productivity, improving farm income and ensuring sustainable livestock production in India (NAAS, 2024; Kona, 2025) [10, 8].

Materials and Methods

The field experiment was conducted during 2023-24 and 2024-25 in consecutive two years at Post Graduate Institute Farm, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahilyanagar (Maharashtra State). The soils of the experimental field were clayey in texture. The soil was low in available Nitrogen (193.25 kg ha⁻¹), medium in available phosphorous (15.75 kg ha⁻¹) and very

high in potassium (288.36 kg ha⁻¹). The soil organic carbon content, pH and EC was 0.48 per cent, 8.27 and 0.39 dSm⁻¹ respectively. The soil moisture constants viz., field capacity (34.42%), permanent wilting point (17.43%), bulk density (1.31 g cm⁻³) and porosity (47.94%) indicate that soil was good in water retention capacity. The field experiment was laid out in split-split plot design. The experiment was laid out in a split-split plot design with three replications and twenty seven treatments combinations comprising three genotypes G1- Phule Gunwant, G2- Phule Jaywant and G3- BNH-10 as main plot treatments; three fertilizer levels F1- 150% RDF, F2- 125% RDF and F3- 100% RDF as sub plot treatments and three cuttings C1- 75 Days interval, C2- 60 Days interval and C3-45 days interval as a sub-sub plot treatments. The gross plot and net plot size were 6.00 m x 5.40 m and 5.80 m x 3.60 m, respectively. The experiment was conducted during two years on fixed site without changing the randomization. The periodical observations on growth studies, growth analysis and yield contributing characters and yield were recorded at 45, 60 and 75 days interval. The growth parameters viz., plant count, plant height (cm), number of tillers per bunch⁻¹, number of leaves plant⁻¹; physiological parameters viz., chlorophyll content (%); Yield contributing characters viz., green fodder yield (t ha⁻¹) and dry matter yield (t ha⁻¹). The land was ploughed twice by a tractor with chisel ploughing followed by harrowing in the experimental field. The field was brought to fine tilth and laid out in to proper plot size (m). The Hybrid Napier fodder slips were planted at 90 x 60 cm spacing and the first irrigation was done on the same day of planting and thereafter as and when required. The necessary after care operations such as hand weeding were done as per the requirement. Also 5 plants were tagged in each plot initially on 15th day to study the growth parameters of the fodder crop on 60 days after planting (DAP) as first cut and subsequent cut as per treatments. The growth and yield observations were recorded from the net plots. The data collected on growth parameters between treatments were subjected to Analysis of Variance (ANOVA) by split-split plot design to find the significant difference between treatments and interpretation of data was done as per the procedure described by Gomez and Gomez (1984) [4].

Results and Discussion

The results of the experiment were presented based on the pooled data of 2020, 2021 and 2022. The data on growth components viz., plant height, number of leaves, number of tillers and number of leaves/ tillers as well as yield components i.e., per plant yield and total yield (t/ha/year) as influenced by different treatments were presented in Table 1 and 2 respectively.

Effect of Genotypes

The genotypes included in the present investigation were G₁–Phule Gunwant, G₂–Phule Jaywant and G₃–BNH-10. However, the growth and yield parameters differed significantly among the genotypes. Phule Gunwant (G₁) recorded significantly higher plant height (191.79 cm), maximum tillers per plant in (47.39), and higher number of leaves per bunch (414.24). BNH-10 (G₃) recorded the highest leaf: stem ratio (1.04), while Phule Jaywant (G₂) recorded the lowest values for most growth parameters. The superior vegetative growth of Phule Gunwant resulted in significantly higher total green forage yield (262.17 and 286.11 t ha⁻¹; pooled 274.14 t ha⁻¹) and total dry matter yield (52.56 and 56.11 t ha⁻¹; pooled 54.34 t ha⁻¹), followed by BNH-10, whereas Phule Jaywant produced the lowest yields. The superior performance of Phule Gunwant may be attributed to its inherent genetic potential for vigorous vegetative growth, efficient nutrient

utilization, greater leaf area development and enhanced photosynthetic efficiency, which resulted in greater internodal elongation and stem growth. Genotypes possessing greater vegetative vigour generally exhibit higher tillering potential, resulting in increased forage productivity. Genotypic variation in forage crops plays a significant role in determining morphological characters such as leaf production, tiller number and overall biomass accumulation. The higher L:S ratio observed in BNH-10 may be attributed to its greater leaf production relative to stem biomass, indicating a more desirable forage morphology. Since leaves contain higher concentrations of digestible nutrients than stems, genotypes with a higher L:S ratio generally possess superior forage quality and nutritive value. The higher L:S ratio observed in BNH-10 may be attributed to its greater leaf production relative to stem biomass, indicating a more desirable forage morphology. Since leaves contain higher concentrations of digestible nutrients than stems, genotypes with a higher L:S ratio generally possess superior forage quality and nutritive value. Similar genotypic differences in Hybrid Napier grass have been reported by Tessema *et al.* (2010) [15], Turano *et al.* (2016) [18]. The higher green forage yield of Phule Gunwant may be attributed to its superior genetic potential, greater plant height, higher tiller production, increased leaf number and overall better vegetative growth, resulting in greater biomass accumulation. The superior dry matter yield of Phule Gunwant may be attributed to its higher green forage yield, greater plant height, higher tiller production and increased leaf production, which contributed to greater biomass accumulation and dry matter production. Similar findings were reported by Tessema *et al.* (2010) [15], Kumar *et al.* (2012) [9], Aruna *et al.* (2024) [11] and Tomar *et al.* (2024) [17].

Effect of Fertilizer Levels

Growth and yield parameters were significantly influenced by fertilizer application. Application of 150% RDF (F₃) recorded the highest plant height (186.88 cm pooled), maximum tillers per plant (50.28), highest number of leaves per bunch (445.09), total green forage yield (270.89 t ha⁻¹) and total dry matter yield (54.63 t ha⁻¹). It was followed by 125% RDF (F₂), while 100% RDF (F₁) recorded the lowest values for these parameters. In contrast, the highest leaf: stem ratio (1.06) was recorded under 100% RDF (F₁) and was at par with 125% RDF (F₂), whereas 150% RDF (F₃) recorded the lowest leaf: stem ratio (0.82). Overall, application of 150% RDF promoted vigorous vegetative growth and produced the highest forage and dry matter yields, demonstrating its superiority over lower fertilizer levels. The increased plant height under higher fertilizer application may be attributed to greater availability of nitrogen, phosphorus and potassium, which enhanced chlorophyll formation, photosynthetic activity, cell division, cell elongation and protein synthesis, thereby promoting rapid vegetative growth. Nitrogen, being a major constituent of chlorophyll and amino acids, plays a vital role in stem elongation and biomass production. The increase in tiller production with higher fertilizer levels may be attributed to enhanced availability of nitrogen and other essential nutrients, which promoted rapid cell division, increased bud initiation, improved root development and greater photosynthetic activity. Adequate nitrogen supply stimulates the emergence and development of basal buds, resulting in increased tillering capacity and higher vegetative growth. The reduction in L:S ratio under higher fertilizer application may be attributed to enhanced stem elongation and increased stem biomass resulting from vigorous vegetative growth, which proportionally exceeded the increase in leaf biomass. Although higher fertilizer levels substantially improved overall biomass production, stem growth was relatively greater,

thereby reducing the leaf: stem ratio. Similar findings have been reported by Ubi and Omaliko (2006) ^[19], Damame *et al.* (2017) ^[2], Patil *et al.* (2024) and Sutar *et al.* (2024) ^[14] in forage grasses. The increase in green forage yield with higher fertilizer application may be attributed to the enhanced availability of essential nutrients, particularly nitrogen, which promoted vigorous vegetative growth, increased tillering, greater leaf area, enhanced photosynthetic activity and efficient utilization of solar radiation, ultimately resulting in higher biomass production. Similar findings were reported by Kumar *et al.* (2012) ^[9], Shalini *et al.* (2020) ^[12] and Aruna *et al.* (2024) ^[1] who concluded that increasing fertilizer application enhanced morphological development and forage accumulation, resulting in significantly higher green forage yield. The increase in dry matter yield with increasing fertilizer levels may be attributed to improved nutrient availability, particularly nitrogen, which enhanced vegetative growth, leaf area development, photosynthetic efficiency and biomass accumulation. Increased nutrient uptake promoted higher assimilate production and dry matter partitioning, resulting in greater dry matter yield. These findings are in close agreement with those reported by Pathan (2013) ^[11] and Damame *et al.* (2017) ^[2].

Effect of Cutting

The different cutting intervals had no significant effect on the initial and final plant population, indicating uniform crop establishment and plant survival under all cutting management practices. However, growth and yield parameters were significantly influenced by cutting interval. The 75-day cutting interval (C₃) recorded the highest plant height (181.16 cm pooled), maximum tillers per plant (44.30) and highest number of leaves per bunch (396.78), whereas the 45-day cutting interval (C₁) recorded the highest leaf: stem ratio (1.11). In contrast, the 60-day cutting interval (C₂) produced the highest total green forage yield (277.59 t ha⁻¹) and total dry matter yield (53.03 t ha⁻¹), followed by the 45-day cutting interval, while the 75-day cutting interval (C₃) recorded the lowest forage and dry matter yields. Overall, the 60-day cutting interval proved to be the most suitable cutting management practice for maximizing forage productivity of hybrid Napier under the experimental conditions.

The higher plant height observed under longer cutting intervals may be attributed to the availability of a longer growth period before harvest, allowing continuous photosynthesis, greater accumulation of assimilates, increased internodal elongation and enhanced stem development. Frequent harvesting at shorter intervals restricted vegetative growth by reducing the time available for canopy development and reserve carbohydrate accumulation. Similar observations have been reported by Damame *et al.* (2017), Shalini (2020) ^[12], Tomar *et al.* (2024) ^[17] and Sutar *et al.* (2024) ^[2] ^[14]. The higher number of tillers under the longer cutting interval may be attributed to the availability of a longer recovery period between successive harvests, allowing greater accumulation of carbohydrate reserves, enhanced root growth and improved development of axillary buds. Frequent cutting at shorter intervals limits reserve accumulation and suppresses the emergence of new tillers. Similar observations have been reported by Shalini *et al.* (2020) ^[12], Hindoriya *et al.* (2021) ^[5] and Sutar *et al.* (2024) ^[14]. The increase in leaf production with higher fertilizer levels may be attributed to improved nutrient availability, particularly nitrogen, which enhanced chlorophyll synthesis, photosynthetic efficiency, leaf initiation and expansion, thereby promoting vigorous vegetative growth. Enhanced nutrient supply also favours rapid cell division and differentiation, resulting in the production of more leaves. Similar findings have been reported by Kumar *et al.* (2012) ^[9], Damame *et al.* (2017) ^[2] and Singh *et al.* (2018) ^[13]. Increasing cutting interval significantly enhanced leaf production and forage yield of Napier grass due to prolonged vegetative growth. Similar findings have been reported by Pathan *et al.* (2013) ^[11] and Sutar *et al.* (2024) ^[14]. The higher L:S ratio under shorter cutting intervals may be attributed to the harvesting of younger forage, which contains a greater proportion of leaves and less stem development. As the crop matures with increasing cutting intervals, stem elongation and lignification become more pronounced than leaf development, resulting in a progressive decline in the leaf: stem ratio. This finding is consistent with the well-established relationship between forage maturity and morphological composition. Similar observations were reported by Tessema *et al.* (2003) ^[16].

Table 1: Growth of Hybrid Napier as influenced by Genotypes, fertilizer levels and cutting management on pooled mean basis (2023-25)

Treatment	Plant height (cm)			No. of tillers plant ⁻¹			Number of leaves bunch ⁻¹			L:S Ratio		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Main plot: Genotypes (G)												
G ₁ : Phule Gunwant	198.16	185.41	191.79	40.54	54.24	47.39	409.59	418.89	414.24	0.94	1.02	0.98
G ₂ : Phule Jaywant	166.66	156.45	161.56	33.71	45.87	39.79	328.56	359.74	344.15	0.84	0.94	0.89
G ₃ : BNH-10	188.60	177.03	182.09	38.17	51.26	44.45	376.46	419.12	397.79	1.09	0.99	1.04
SEm ±	0.03	0.99	0.78	3.01	3.15	3.43	4.13	4.11	4.47	0.10	0.05	0.06
CD (P = 0.05)	0.12	3.89	4.72	9.02	9.57	10.62	13.53	16.15	12.45	0.31	0.15	0.19
Sub-plot: Fertilizer levels (F)												
F ₁ : 100% RDF	176.32	162.90	169.61	31.51	42.97	37.24	323.66	333.47	328.57	1.00	1.12	1.06
F ₂ : 125% RDF	185.14	172.99	178.94	37.52	50.72	44.12	367.50	397.55	382.53	1.07	1.00	1.04
F ₃ : 150% RDF	191.97	183.00	186.88	43.40	57.68	50.28	423.46	466.72	445.09	0.80	0.83	0.82
SEm ±	0.05	0.62	1.02	3.03	3.14	3.55	4.28	2.06	5.96	0.10	0.05	0.05
CD (P = 0.05)	0.14	1.91	3.52	9.35	8.43	10.89	16.86	6.35	20.62	0.31	0.18	0.17
Sub-sub plot: Cutting management (C)												
C ₁ : 45 days interval	181.06	170.34	175.64	39.23	47.86	43.55	372.71	375.96	374.33	1.15	1.06	1.11
C ₂ : 60 days interval	184.45	173.33	178.63	37.49	50.08	43.79	373.40	396.73	385.06	0.89	0.98	0.93
C ₃ : 75 days interval	187.92	175.22	181.16	45.70	53.43	44.30	368.51	425.06	396.78	0.83	0.91	0.87
SEm ±	0.06	0.38	0.37	3.05	3.11	2.82	3.40	1.78	4.62	0.10	0.09	0.05
CD (P = 0.05)	0.18	1.10	1.11	9.25	9.30	7.45	12.13	5.10	13.74	0.33	0.28	0.16
General Mean	184.47	172.96	178.47	40.80	50.45	43.87	371.53	399.25	385.39	0.95	0.98	0.97

Table 2: Yield of Hybrid Napier as influenced by Genotypes, fertilizer levels and cutting management on pooled mean basis (2023-25)

Treatment	Green Fodder Yield (t ha ⁻¹)			Dry Matter Yield (t ha ⁻¹)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Main plot: Genotypes (G)						
G ₁ : Phule Gunwant	262.17	286.11	274.14	52.56	56.11	54.34
G ₂ : Phule Jaywant	232.20	236.77	234.47	43.12	45.95	44.53
G ₃ : BNH-10	243.79	266.24	255.00	49.35	49.70	49.53
SEm ±	0.78	0.51	5.40	0.14	0.04	0.84
CD (P = 0.05)	3.04	1.99	17.20	0.54	0.17	5.10
Sub-plot: Fertilizer levels (F)						
F ₁ : 100% RDF	228.18	245.93	237.02	43.29	45.12	44.20
F ₂ : 125% RDF	247.56	263.84	255.70	48.41	50.71	49.56
F ₃ : 150% RDF	262.42	279.36	270.89	53.34	55.93	54.63
SEm ±	0.41	0.65	1.40	0.09	0.11	0.35
CD (P = 0.05)	1.27	2.00	4.85	0.28	0.33	1.21
Sub-sub plot: Cutting management (C)						
C ₁ : 45 days interval	259.06	277.63	268.34	52.18	53.39	52.79
C ₂ : 60 days interval	268.12	287.05	277.59	51.30	54.76	53.03
C ₃ : 75 days interval	210.98	224.44	217.67	41.55	43.62	42.58
SEm ±	3.42	3.67	0.76	0.46	0.57	0.35
CD (P = 0.05)	9.80	10.53	2.25	1.31	1.64	1.03
General Mean	246.05	263.04	254.53	48.34	50.58	49.46

The superior forage yield recorded under the 60 day cutting interval may be attributed to an optimum balance between vegetative growth and harvesting frequency. Harvesting at 60 day intervals provided sufficient time for regeneration and biomass accumulation while permitting more harvests during the year than the 75 day interval. In contrast, longer cutting intervals reduced the number of harvests, leading to lower cumulative annual forage yield despite greater plant maturity at each harvest. Similar findings were reported by Ishrath (2018) ^[6], Shalini *et al.* (2020) ^[12] and Tomar *et al.* (2024) ^[17] who concluded that cutting frequency is one of the most important management practices influencing forage productivity, with intermediate cutting intervals producing maximum annual biomass while maintaining satisfactory forage quality. The higher dry matter yield obtained under the 60-day cutting interval may be attributed to an optimum balance between forage maturity and harvesting frequency. This interval allowed sufficient time for biomass accumulation and dry matter deposition while maintaining a greater number of harvests during the year. In contrast, the 75-day cutting interval reduced the cumulative annual dry matter production due to fewer harvests despite greater maturity of individual plants. These findings are in conformity with the results reported by Jagdeesh *et al.* (2017), Shalini *et al.* (2020) ^[12] and Sutar *et al.* (2024) ^[14].

References

1. Aruna P, Soumya B, Bharathi G, Ravi Chandra K, Ramakrishna C. Evaluation of suitable Hybrid Napier Bajra varieties for Southern Agro Climatic Zone of Andhra Pradesh, India. *Biological Forum – An International Journal*. 2024;16(12):86-88.
2. Damame SV, Gore SB, Sinare BT, Gavit MG, Pardeshi HP. Forage quality of Bajra × Napier hybrid cv. Phule Jaywant as influenced by nitrogen levels. *Indian Journal of Animal Nutrition*. 2017;34(3):318-322.
3. Department of Animal Husbandry and Dairying. 20th livestock census of India. Government of India; 2022.
4. Gomez KA, Gomez AA. Statistical procedures for agricultural research handbook. New York: John Wiley and Sons; 1984. p. 139-153.
5. Hindoriya PS, Kumar R, Kumar S, Bhattacharjee S. Performance evaluation of Bajra Napier hybrids under different management practices. *Forage Research*. 2021;47(2):123-128.
6. Ishrath S, George T, Nair KM. Effect of cutting intervals on yield and quality of hybrid Napier (*Pennisetum purpureum* × *Pennisetum glaucum*) var. Suguna. *Journal of Tropical Agriculture*. 2018;56(2):165-169.
7. Jagadeesh CH, Reddy YR, Nagalakshmi D, Mahender M, Nalini Kumari N, Sridhar K, *et al.* Effect of stage of harvest on the yield, chemical composition, *in vitro* and *in sacco* digestibility of hybrid Napier (*Pennisetum purpureum*) variety APBN1. *Indian Journal of Animal Research*. 2017;51(1):116-120.
8. Kona SR. Perspectives in milk production in India. *Agricultural Systems*. 2025. Advance online publication.
9. Kumar R, Ram H, Meena RK. Effect of nitrogen levels on growth and yield of multicut fodder crops. *Forage Research*. 2012;38(1):1-9.
10. National Academy of Agricultural Sciences. Increasing livestock productivity in India: Technological interventions. New Delhi: National Academy of Agricultural Sciences; 2024.
11. Pathan SH. Effect of planting material, cutting management and fertilizer levels on growth, yield and quality of Bajra × Napier hybrid (RBN-13). Rahuri, Maharashtra: Mahatma Phule Krishi Vidyapeeth; 2013.
12. Shalini K, Patil SL, Ghorpade PB. Development and evaluation of Bajra × Napier hybrids for green fodder yield and nutrient uptake. *Forage Research*. 2020;46(3):215-220.
13. Singh P, Nepalia V, Singh D. Response of Bajra Napier hybrid grass to nitrogen fertilization and nutrient uptake. *Forage Research*. 2018;44(2):95-100.
14. Sutar SB, Vasave VM, Desale RJ, Chaudhari DM. Evaluation of silage quality and palatability of hybrid Napier cv. Phule Gunwant. *International Journal of Research in Agronomy*. 2024;7(10):544-547.

15. Tessema ZK, Baars RMT, Alemu Y. Effect of nitrogen fertilization on biomass yield and nutritive value of Napier grass. *African Journal of Range and Forage Science*. 2010;27(1):21-27.
16. Tessema ZK, Mihret J, Solomon M. Effect of defoliation frequency on growth, yield and nutrient uptake of Napier grass (*Pennisetum purpureum*). *Tropical Grasslands*. 2003;37:138-145.
17. Tomar RK, Singh VP, Yadav RS, Mishra AK. Comparative performance of forage grasses under irrigated conditions in eastern Uttar Pradesh. *Forage Research*. 2024;50(3):210-215.
18. Turano B, Baldini M, Maughan M. Evaluation of Napier grass genotypes for biomass and quality traits. *Biomass and Bioenergy*. 2016;94:62-68.
19. Ubi BE, Omaliko CPE. Evaluation of nitrogen fertilizer levels on the growth of elephant grass (*Pennisetum purpureum*) in southeastern Nigeria. *Journal of Agriculture, Forestry and the Social Sciences*. 2006;4(2):1-6.