



RESEARCH PAPER

Evaluation of yield potential of CO₅ BN napier *Bajra* hybrid crop under irrigated condition in Rohilkhand region of U.P.

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Abstract : A field trial on CO₅BN was conducted at ICAR-IVRI, Izatnagar during 2013-14 to 2017-18 to study the effect of harvesting season/time on green, dry matter yield and morphological characters. Data shows that yield of CO₅BN was increased from first year 2013-14 to third year 2015-16 and decreased in fourth year of plantation of crop. Re-growth of ratoon crop was good as it was in first year crop, it may be concluded that crop can be grown upto 5-6 years. The crop yield of first year and second year as par with fifth year. Maximum green fodder yield 307.7 q/ha in 2015-16. In 5th year (2017-18), ratooning yield was at par 301.3 q/ha with 2nd to 4th year (2014-15 to 2016-17). Good package of practices are recommended for ratooning to get good yield as well as economic production for long time 5-6 years of ratooning. The crop CO₅BN produced maximum green fodder yield (307.7 q/ha) in Aug-Sep.

Key Words : Napier hybrid, Nutrients, Crop, Animal nutrition, rainfall, dry matter

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INTRODUCTION

Napier grass (*Pennisetum purpureum* Schumach.) is a fastgrowing perennial grass native to Sub-Saharan Africa that is widely grown across the tropical and subtropical regions of the world. It is a multipurpose forage crop, primarily used to feed cattle in cut and carry feeding systems. Characterization and diversity studies on a small collection of Napier grasses have identified a moderate level of genetic variation and highlighted the availability of some good agronomic expertise on precise phenotyping, genotyping and the

application of molecular technologies to Napier grass improvement using modern genomic tools which have been applied in advancing the selection and breeding of important food crops.

Sustainable livestock production is highly dependent on the availability of quality feed and forage resources. Napier grass, also known as elephant is one of the most important tropical forage crop. It is widely used in cut and carry feeding systems. and is of growing importance in other agricultural systems. Napier grass possesses many desirable characteristics, including high yield per unit area, tolerance to intermittent drought and high water

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use efficiency, making it a forage of choice. It has the ability to withstand repeated cutting and will rapidly regenerate, producing palatable leafy shoots. Consequently, enhancing the knowledge-based use and conservation of the available Napier grass resources promises to substantially benefit livestock value chains.

Elephant grass, as implied by its name, is important source of forage for elephants in Africa, Elephant grass is analysis plant. Hybrid Napier CO₅ grass is one of the widely cultivated fodder grass because of its high nutritive value. This grass is an interspecific hybrid between elephant grass and bajra grass. Compared to other fodder crops hybrid. This grass is called as “King of Napier grass”. Super Napier grass is best suited to higher rainfall areas, but it is drought-tolerant and can also grow well in dry areas. It does not grow well in waterlogged areas. Hybrid Napier is a perennial grass which needs to be retained in the field formore years to reduce crop cultivation costs. Compared to Napier grass, Hybrid napier produces larger and softer leaves. Its ease of regeneration and high productivity make it perfect for the feeding of cattle, amongst other crop eating creatures.

MATERIAL AND METHODS

A field trial was conducted on one acre of land of fodder form of ICAR-IVRI, Izatnagar, Bareilly (UP), India during 2013-14 – 2017-18. The crop BN CO₅ was planted in rows 60 x 60 and plant to plant 50 x 50 cm.

Soil were sandy loam, medium in M, P and K availability and pH 7.2, water holding capacity, soil structure, soil texture and organic matter content (-1) needs to be analysed. Harvesting of crop was scheduled at 60 days. As T₁- April-May(Spring), T₂-June-July (Summer), T₃- August-September (Rainy), T₄- Oct-November, T₅- December-January-February-March (Lean Period/ Winter Season). Data were collected under RBD with three replications. Samples were analysed for yield, dry matter and morphological characters. All recommended agronomic practices such as manure and fertilizer applications, weed management, plant protection including irrigation at moisture deficit. Organic manure 5t ha⁻¹ was applied of the time of field propagation. Fertilizer doses maintained at every year.

RESULTS AND DISCUSSION

The data shows that the morphological characters, green forage and dry matter, yield were significantly influenced with the year of cultivation and season/months of harvesting.

Effect on morphological parameters :

The plant height, leaf length, leaf width, number of lears per clum and number of tillers per clump are contributing traits to forage biomass were affected significantly during the time of harvest. Harvesting during July-August-Sep these trait increased significantly as

Treatments	2013-14	2014-15	2015-16	2016-17	2017-18
Apr-May	230.1	222.5	210.4	196.4	182.5
Jun.-Jul.	270.3	288.1	292.3	207.6	197.4
Aug.-Sep.	285.4	305.6	307.7	298.6	301.3
Oct.-Nov.	215.6	295.7	282.4	186.3	170.6
Dec.-Feb.-Mar.	308.2	175.4	103.6	124.5	105.4
C.D. (P=0.05)	7.02	11.04	9.04	7.09	6.08

Treatments	Plant height (cms)	No. of leaves per clump	No. of tillers per clump	Stem leaf ratio	Leaf length (cm)	Leaf width (cm)
Apr.-May	52.4	95.6	18.8	0.72	72.6	3.2
June-July	54.3	107.3	27.3	0.74	94.3	3.6
Aug.-Sep.	57.1	103.1	30.2	0.81	101.4	4.7
Oct.-Nov.	42.5	101.6	32.2	0.82	104.7	4.3
Dec.-Mar.	31.7	89.7	30.3	0.98	90.6	3.1
C.D. (P=0.05)	0.12	2.54	3.56	0.01	4.23	0.75

compare to harvesting months during December-January-February. Availability of rains/ moisture and long days hours, high temperature might influenced the plant

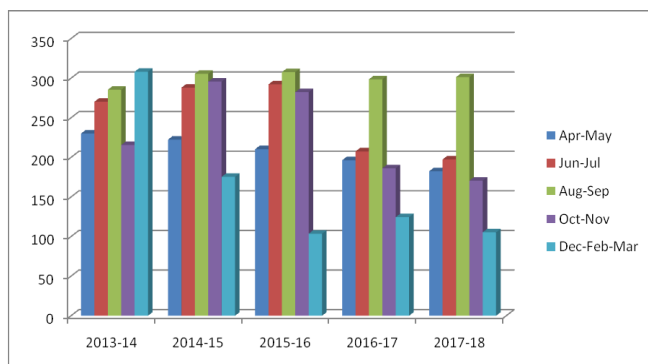


Fig. 1: Forage yield qha⁻¹ of CO₂ BN as influenced by harvesting time and ratooning years

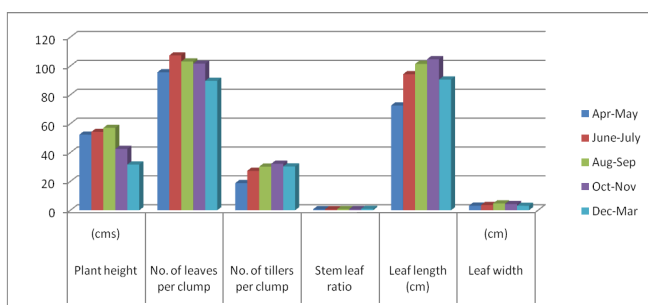


Fig. 2 : Morphological characters CO₂ BN at harvesting time/year

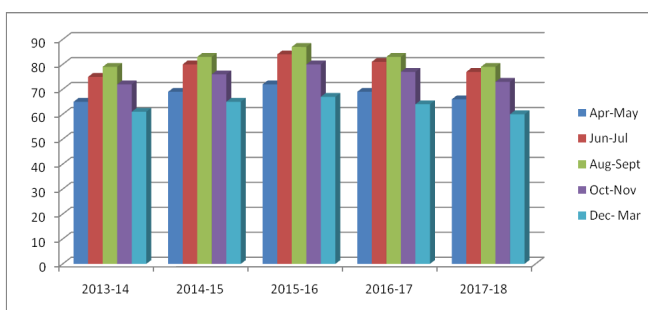


Fig. 3 : Dry matter yield as influenced by harvesting time (years)

Table 3 : Dry matter yield as influenced by harvesting time (years)

Treatments	2013-14	2014-15	2015-16	2016-17	2017-18
Apr.-May	65.6	69.7	72.3	69.1	66.2
Jun.-Jul.	75.4	80.1	84.4	81.8	77.4
Aug.-Sept.	79.3	83.6	87.6	83.3	79.7
Oct.-Nov.	72.5	76.4	80.8	77.5	73.1
Dec.-Mar.	61.9	65.9	67.4	64.6	60.5
C.D. (P=0.05)	3.25	4.16	3.61	5.29	3.96

physiology, higher photosynthates accumulation, better availability of moisture in root zone and reduction in abiotic plant stress conditions, alongwith sufficient availability of plant nutrients near root tips might be the reason to produce the significantly higher measures of the above traits.

While, during the December-January-February due to low temperature (minimum and maximum) and short days hours in the Rohilkhand region increased plant stress on CO₂BN crop and enhanced reduction in traits measurement.

Effect on forage yield :

Forage yield was recorded higher while crop was harvested in summer and rainy season () as compared to winter months (). This period may be called as lean period for forage production of CO₂ (BN). This significantly reduction in yield might be due to favourable and unfavourable conditions to the plant. CO₂ (BN) is tropical climate loving plant but in Rohilkhand Region falls under the sub-tropical climatic conditions and low temperature (minimum – below 10⁰C and maximum below 20⁰C) in December, January, February where is plant growth was found dormant. Hence, harvesting is suitable in last week and of March month. During this winter period of short duration inter crop like Barley, Berseem, Mustard or pea can be recommended to boost the ratoon crop from December to February. This practiced may increase CO₂ BN forage yield and quality (leguminous- Barley/lucerne).

Effect of nutrient management and ratooning/ regeneration :

Yield of crop was increased upto three years from 2013-14 to 2015-16 and found stable during ratoon two years from 2016-17 to 2017-18. The nutrition of crop is important besides NPK application of Bio-manures, FYM, vermi-compost, Bio-fertilizers, or organic manure. Mixing in inter rows is necessary to maintain regrow

with and yield of 5 years ratoon crop. To control weeds in rows after rainy season sowing of inter crop like mustard, berseem, Barley is recommended. This crop may be incorporated in February-March by weeder or tractor tiller which will increase organic matter in the soil and availability of nutrients. Pea, Central, Menthi, or Palak will best the soil structure and fertility. Under trial Berseem was found better than Annual Rye Grass and Barley when there were sown in November to February in rows to control weeds.

Effect of irrigation on ratoon crop of CO₅BN :

CO₅ BN was found better when soil mixture was maintained throughout the year. Sufficient water in rest zone provided abiotic stress free environment. To take ratoons of CO₅ BN for five years every month irrigation is important. It was found that where irrigation was delayed or nutrition was not applied at time the growth and yield was reduced.

Effect of weed management :

During five years of crop ratooning it was found that clums of crop increased every year. Number of tillers per clum were maximum in 2017-18. To maintain yield potential, it is recommended that every year plants become thinner than first year. Therefore, proper weeding inter culture of crop, maintain and irrigation is necessary. Weeds compete with crop and reduce re-growth of tillers.

Effects of harvesting on yield and forage quality :

Harvesting at right time is important. If harvesting is delayed every week crop become harder, unpalatable and increase in dry matter. Sweetlant leaves and stems are essential to increase digestibility. During rainy season crop growth faster than winter and summer season. Delayed crop found high in dry matter and undigestible content like lignin. During summer April-May-June crop shows ear head appearing. Reproductive stage/seed formation stage is a sign of physiological matter of crop. Therefore, roots with balanced nutrition, Irrigation weed free conditions are pre requisite of ratoon crop for five years of evaluation. Cutting with proper equipment manual on mechanical method is necessary alongwith proper height of plant at right time as well as proper

water and fertilizer application after every harvest.

Conclusion :

Data shows that yield and quality of forage of CO₅BN was affected by several factors like harvesting time, harvesting year, integrated nutrient and weed management, alongwith maintenance of regime of water in root zone according to season especially during February-March-April-May and June before rainy season and post rainy season like october-November too. Plant is fast growing and needs frequent nutrition and water applications without proper percentage of agronomic practices crop may not sustain for five years. Because uptake of nutri boots and water is higher due to high biomass (1500 q /ha/year) production over the other multicut crops. Hence, crop with good package of practices can be grown upto 5th years as a ratoon of CO₅ Napier Hybrid.

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