

RESEARCH ARTICLE

Studies on effect of Judicious integrated doses of nitrogen fertilizer and biofertilizer on yield performance of hybrid *Napier* grass (CV.RBN-9)

Bendre KB¹, Patil AM¹ and Rathod MM²

¹Nanasaheb Y.N. Chavan Arts Science and Commerce College Chalisgaon 424101 (MS)

²S.S.M.M. Arts Commerce & Science College Pachora 424201 (MS)

*Corresponding author email: dr.k.b.bendre@gmail.com

Manuscript details:	ABSTRACT
<p>Available online on http://www.ijlsci.in</p> <p>ISSN: 2320-964X (Online) ISSN: 2320-7817 (Print)</p> <p>Editor: Dr. Arvind Chavhan</p> <p>Cite this article as: Bendre KB, Patil AM and Rathod MM (2015) Studies on effect of Judicious integrated doses of nitrogen fertilizer and biofertilizer on yield performance of hybrid <i>Napier</i> grass (CV.RBN-9), <i>Int. J. of Life Sciences</i>, Special issue, A3: 115-118.</p> <p>Copyright: © Author, This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>In recent times fertilizers are responsible for 50 percent increase in crop yield. Due to progressive intensification of agriculture and production of high yielding varieties; fertilizers consumption has increased very much accounting to 23.6 metric tonnes of nutrients every year through crop removal. Over use in certain potential areas and sub optimum use in larger areas are crucial issues; and indiscriminate use of chemical fertilizer is creating lots of problems especially soil degradation and pollution. Therefore, emphases should be to reduce the use of inorganic fertilizers and to improve fertilizer use efficiency. Hence, a strategy for integrated nutrient supply is evolved by judicious combination of chemical fertilizers, organic manures and biofertilizers. Therefore, attempts were made during present study to observe the effect of integrated fertilizer dose (urea + biofertilizers) on productivity of popular forage crop hybrid <i>Napier</i> (cv.RBN-9). Study also includes investigation on percentage increase in the yield of forage crop and saving of nitrogenous fertilizer due to use of biofertilizer.</p> <p>Keywords: Hybrid <i>Napier</i>, Nitrogen fertilizer, Biofertilizer, Integrated dose, Yield.</p>
	<p>INTRODUCTION</p> <p>Fertilizer used to supply N, P and K play crucial role in plant production. Proper soil and crop husbandry linked up with input of chemical fertilizer is a common practice to push up and stabilize yield of crop plants (Wasnik, 1992; Umesha and Purushottam, 1996; Singh et al., 1998 Jha et al., 2013). In recent time fertilizers are responsible for 50 percent increase in crop yield. Due to progressive intensification of agriculture and production of high yielding varieties; fertilizer consumption has increased very much accounting to 23.6 metric tonnes of nutrients every year through crop removal. Over use in certain potential areas and suboptimum use in large areas are crucial issues; and indiscriminate use of chemical fertilizer is creating lots of problems essentially soil degradation and pollution.</p>

Therefore, emphasis should be to reduce the use of inorganic fertilizers and to improve fertilizers use efficiency. Hence, come the integrated concept of nutrient supply, where efficient use of chemical, organic and biological source is practiced (Surekha and Rao, 1995). Use of inorganic fertilizers has become essential part of the crop production and a balance form of fertilizer use is always a prerequisite to obtain higher yield. However, these fertilizers are costly and also pollute the environment, hence a strategy for integrated nutrient supply is evolved by using judicious combination of chemical fertilizer, organic manure and biofertilizer (Panwar et al., 2001). A combine effect of chemical fertilizer along with biofertilizer was studied by several workers (Mohan and Pradhan, 2001; Gautam and Pant, 2002; Mahajan et al., 2002; Dubey et al., 2014). Hence, attempts were made during present study to observe the effect of integrated fertilizer dose (nitrogenous fertilizer along with biofertilizers) on productivity of forage crop Hybrid Napier (cv. RBN9). This study also includes investigation on percentage increase in the yield of fodder crop and saving of nitrogenous fertilizer due to the use of biofertilizer.

MATERIALS AND METHODS

During present investigation, the fodder crop Hybrid Napier (cv. RBN9) recommended by Mahatma Phule Krushi Vidyapith Rahuri, Maharashtra was selected for treatment with integrated dose of nitrogenous fertilizer and biofertilizers. The fodder crop was cultivated at Maharashtra Sheli va Mendhi Vikas Prakshetra, Bilakhed, Chalisgaon (MS) during summer season in 2000-2001. The soil was analysed by government soil analyzing laboratory, Jalgaon (2000) of its nutrient content before sowing. The soil was poor in phosphorous, moderate in nitrogen and potash with a normal pH 7.8.

A piece of land measuring about 360 sq. m. (15m x 24m) was prepared by ploughing and cross ploughing while preparing the land compost prepared on farm was added at the rate 3000 kg/ ha. The land was then divided into 24 plots each with an area of 15 sq m for sowing the crop. The plots were arranged in

randomized block design. The crop sown in 45/60 cm apart in rows by hand. All crops were raised under irrigated condition. The seed rates were used as per the recommendations. Nitrogenous fertilizer was used in the form of urea while biofertilizer Azospirillum.

Crop received eight fertilizers treatment through urea and biofertilizers alone or in combination were N0, N60, N120, N180, N240 i.e. 0, 60,120, 180, 240 kg/ha. BF (biofertilizer alone), Bf + N60 and Bf+N120 kg/ha. The plot which did not received fertilizer were treated as control plot. The biofertilizers were used at a rate of 2 kg./ha. Fifty percent of the dose of fertilizer nitrogen was applied as basal dose and remaining half after a month of crop growth, while biofertilizer (Bf) were applied directly to the seeds at a rate of 2 kg/ha the crop were cultivated under irrigated condition and the use of insecticide and pesticide were evolved. The crop were harvested from three replica every time at preforming stage from the net size of plot harvested was 13.72 m². The weight of the green fodder obtained from each plot was measured and the samples of green fodder were immediately brought to the laboratory for analysis. The sample were chopped into 2 to 3cm pieces and dried in an electric oven at 75± 5^oc till constant weight for dry matter (DM) determination. Dried sample were ground to a fine powder and are used for estimation of crude protein (CP). Nitrogen (N) content was determined in duplicate by Microkjeldahl method (Bailey, 1967). The value of crude protein (CP) was expressed as N x 6.25.

RESULT AND DISCUSSION

RBN-9 variety of hybrid Napier grass cultivated during the field trial responded satisfactory to fertilizer nitrogen (N) application which produced succulence in plant with lushness in the foliage. Biofertilizer (Azospirillum) alone elicited significant increase in yield over the control. When the biofertilizer (inoculation) was integrated with fertilizer application, the fodder yield increased progressively with an increase in dose of nitrogen as was observed by George et al (1998) and Mishra, etal (2008).

Table 1: Details of the cultivation practices and harvesting of Hybrid Napier (cv.RBN-9) grass.

Crop	Cultivar	Duration	Seed rate (Slips/ha)	No of harvest	Fertilizer treatment (kg/ha)
Hybrid Napier	RBN-9	20 March 2000 to 13 July 2000	25000 slips	1 cut + 1 regrowth	N0, N60, N120, N180, N240, Bf, N60+Bf, N120+Bf

Table 2: Effect of integrated fertilizer dose on the yields of green fodder, dry matter and crude protein from hybrid Napier (cv. RBN-9) Duration 20 March 2000 to 13 July 2000

Date of Harvest	Type of cut and age of the crop (in days)	Fertilizer treatment (Kg/ha)	Green Fodder		Yield (Kg/ha)		
			% DM	N% of DM	Green fodder	Dry matter	Crude protein
5 June 2000	1 cut (78)	N0	21.0	1.65	43916	9222	951
		N60	18.0	1.72	47360	8524	916
		N120	19.5	1.77	49513	9655	1068
		N180	21.5	1.78	50590	10876	1210
		N240	21.0	1.82	54465	11437	1300
		Bf	22.0	1.68	45208	9945	1044
		N60+Bf	18.0	1.74	51235	9222	1002
		N120+Bf	22.0	1.80	52742	11603	1305
13 July 2000	1 regrowth (38)	N0	20.0	1.62	42805	8561	866
		N60	19.0	1.70	45735	8689	923
		N120	20.0	1.75	48524	9704	1061
		N180	21.0	1.80	49325	10358	1165
		N240	22.0	1.80	53400	11748	1321
		Bf	21.0	1.70	43890	9216	979
		N60+Bf	19.0	1.75	50660	9625	1052
		N120+Bf	21.5	1.78	51246	11017	1225
Total in 116 days		N0			86721	17783	1817
		N60			93095	17213	1839
		N120			98037	19359	2129
		N180			99915	21234	2375
		N240			107865	23185	2621
		Bf			89098	19161	2023
		N60+Bf			101895	18847	2054
		N120+Bf			103988	22620	2530
C.D.(P= 0.05)				5912	2411	128	
F value	Replicate			8.09**	NS	9.14**	
	Treatment			14.26**	7.57**	51.46**	

*Significant, ** Highly significant NS – non significant

Table 3: Effect of Integrated fertilizer doses on the yields from Hybrid Napier (cv.RBN-9)

Treatment	Green fodder yield (kg/ha)	% increase in yield		Dry matter yield (kg/ha)	Crude protein yield (kg/ha)
		Over control	Over respective N level		
N0	86721	-	-	17783	1817
N60	93095	07	-	17213	1839
N120	98037	13	-	19359	2129
N180	99915	15	-	21234	2375
N240	107865	24	-	23185	2621
BF	89098	02	02	19161	2023
N60+Bf	101895	17	09	18847	2054
N120+Bf	103988	19	06	22620	2530

At the first cut, which was harvested 78 days after sowing, dry matter (DM) content was between 18 to 24 percent. At the regrowth cut taken 38 days after first cut, the foliage on control plots had 20 percent

dry matter (DM) which showed significant change due to other treatment, but amendment with nitrogen increased N content in foliage from 1.65 to 1.82 percent at the first cut, while from 1.62 to 1.80 percent

at regrowth cut (Table 2) was noticed. In the two harvests taken in 116 days, the crop yielded 86721, 17783 and 1817 kg/ha green fodder, dry matter and crude protein respectively, without fertilizer treatment. Application of nitrogen significantly increased the yields to as high as 107865, 23185 and 2621 kh/ha for GF, DM and CP respectively.

Biofertilizers (BF) alone yielded 89098, 19161 and 2003 kg/ha green fodder, dry matter and crude protein respectively. The results were comparable to those reported by Biswas et al (2001). The yield gradually increased with fertilizer nitrogen (N120 + BF) to 103988, 22620 and 2530 kg/ha respectively in total 116 days. The value of 'F' also indicates significant effect of fertilizer application (Table-2). Effect of integrated fertilizers dose on percent increase in yield over control and respective nitrogen level is given in Table 3. Increase in yield over control ranged from 2 to 24 percent while in maximum 24 percent increase in the yield was observed on plots treated with 240 kg N/ha in 116 days and minimum 02 percent increase in the yield due to biofertilizer (BF) was reported. The results were comparable with these reported by Pisal et al. (1991). Patel et al. (1992) and Biswas et al. (2001). The biofertilizer alone treated plots shown minimum 02 percent increase in yield over respective nitrogen level while maximum 09 percent increase in yield was recorded in plots treated with N60+BF in 116 days.

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