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EFFECT OF INTEGRATED DOSES OF NITROGEN FERTILIZERS AND BIOFERTILIZERS ON YIELD PERFORMANCE OF HYBRID NAPIER GRASS (cv.NB-21)

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Abstract: In recent times fertilizers are responsible for a 50% increase in crop yield. Due to the progressive intensification of agriculture and the production of great yielding varieties, fertilizer consumption has increased very much, accounting for 23.6 metric tonnes of nutrients every year through crop removal. Overuse in certain potential areas and sub-optimum use in larger areas is primary issues, and the uncontrolled use of inorganic fertilizer is leading a lot of problems, mainly soil fertility and pollution. So, the target should be to minimize the use of chemical fertilizers and to enhance and boost fertilizer usage. Therefore, a strategy for integrated nutrient supply is evolved by a judicious combination of chemical fertilizers, organic manures, and biofertilizers (Panwar et al. 2001). Therefore, attempts were made during the present study to observe the effect of integrated fertilizer dose (urea + biofertilizers) on the productivity of famous forage crop hybrid Napier (cv.NB-21). The research includes an investigation on the percentage increase in yield of forage crops and minimizing the use of nitrogenous fertilizer using bio fertilizer.

Index Terms **- Hybrid Napier, NB-21, Nitrogen fertilizer, Bio-fertilizer, integrated dose, yield.**

I. INTRODUCTION

Fertilizers used to supply N, P, and K are essential in crop yield. Use of Proper soil and crop husbandry linked up with the feeding of inorganic fertilizer is a general practice to push up and stabilize the yield of crop plants (Wasnik, 1992 and Umesha and Purushottam, 1996 Singh et al. 1998 Jha et al., 2013).

Recently fertilizers are responsible for a 50% increase in crop yield. Due to the progressive intensification of agriculture and the production of great yielding varieties, fertilizer consumption has increased very much, accounting for 23.6 metric tonnes of nutrients every year through crop removal. Overuse in particular areas and sub-optimum use in more extensive areas are important issues, and the uncertain application of inorganic fertilizer is creating lots of problems, primarily soil degradation and pollution. Therefore, the target should be to minimize the use of chemical fertilizers and to promote fertilizers use effectively. Hence, come the integrated notion of nutrient supply, where efficient use of chemical, organic, and biological sources is practiced (Surekha and Rao 1995). The use of inorganic fertilizers has become an essential part of crop production, and a balanced form of fertilizer use is always a priority to obtaining more yields. But, these fertilizers are costly and also pollute the environment; hence a plan for combined nutrient supply is developed by using a judicious combination of chemical fertilizer, organic manure, and biofertilizer (Panwar et al. 2001). Several workers studied the combined effect of chemical fertilizer along with biofertilizer (Mohan and Pradhan 2001, Gautam and Pant 2002, Mahajan et al. 2002, Dubey et al. 2014). thus, trials were made during the present study to observe the effect of integrated fertilizer dose (nitrogenous fertilizer along with biofertilizers) on the productivity of forage crop Hybrid Napier (cv. NB-21). This study includes an investigation on a percentage increase in the yield of fodder crops and the saving of nitrogenous fertilizer due to the use of biofertilizer.

II. Materials and Methods:

During the present investigation, the fodder crop Hybrid Napier (cv. NB-21) suggested by Mahatma Phule Krushi Vidyapith Rahuri, Maharashtra, was chosen for treatment with an integrated dose of nitrogenous fertilizer and biofertilizers. Maharashtra Sheli va Mendhi Vikas Prakshetra, Bilakhed, Chalisgaon (MS) cultivated the fodder crop during the summer season in 2015-2016. The soil was analyzed by government soil analyzing laboratory, Jalgaon (2015) of its nutrient content before sowing. The land was deficient in phosphorous, moderate in nitrogen and potash with an average pH of 7.8.

A small piece of land measuring about 360 sq. m. (15m x 24m) was developed by plowing and cross plowing while preparing the land compost prepared on-farm was added at the rate 3000 kg/ ha. Twenty-four plots made on land, each with an area of 15 sq m for sowing the crop. The small plots were arranged in a randomized block design. The crop is planted in 45/60 cm apart in rows by hand.

All crops were raised under irrigated conditions. The seed rates were decided to use as per the suggestions. Nitrogenous fertilizer was provided in the form of urea while biofertilizer Azospirillum.

Crops undergone through eight fertilizer 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. Those plots that have not received fertilizer were treated as a control plot. The biofertilizers were provided at a rate of 2 kg./ha. 50% of the dose of fertilizer nitrogen was supplied as a basal dose and remaining half after one month of crop growth. At the same time, bio fertilizer (Bf) were provided to the seeds at a rate of 2 kg/ha the crop was cultivated under the irrigated condition and the use of insecticide and pesticide were evolved.

The crop was harvested from three replicas every time at the performing stage from the net size of the plot harvested was 13.72 m2. Green fodder obtained from each plot was weighed, and the samples of green fodder were immediately brought to the laboratory for analysis. The sample was cut into 2 to 3cm small pieces and dried in an electric oven at 75± 5^0c until constant weight for dry matter (DM) determination. The dried sample ground to a fine powder and is used for the calculation of crude protein (CP). Nitrogen (N) content was decided in duplicate by the Microkjeldahl method (Bailey, 1967). The value of crude protein (CP) was expressed as N x 6.25.

III. Result and Discussion:

NB-21 variety of hybrid Napier grass cultivated during the field trial responded satisfactorily to fertilizer nitrogen (N) application, which produced succulence in the plant with lushness in the foliage. Biofertilizer (Azospirillum) alone elicited a luminous increment in production over the control. When the biofertilizer (inoculation) was mixed with fertilizer application, the fodder production increased definitely with an increase in the dose of nitrogen, as was observed by George et al. (1998) and Mishra, et al. (2008).

At the first cut, which was harvested 78 days after sowing, dry matter (DM) content was between 17.5 to 21.5%. Regrowth cut took 38 days after the first cut, the foliage on control plots had 19.5% dry matter (DM) which showed luminous change due to other treatment, but alteration with nitrogen increased N content in foliage from 1.65 to 1.75% at the first cut, while from 1.62 to 1.80% at regrowth cut (Table 2) was noticed. In the two harvests taken in 116 days, the crop yielded 86521, 17683, and 1797 kg/ha green fodder, dry matter, and crude protein, respectively, without fertilizer treatment. The application of nitrogen significantly increased the yields to as high as 107865, 23085, and 2601 kg/ha for GF, DM, and CP, respectively. Biofertilizers (BF) alone yielded 88952, 19061, 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 103788, 22520, and 2510 kg/ha, respectively, in total 116 days. The value of 'F' also indicates a significant effect of fertilizer application (Table-2).

The effect of integrated fertilizer dose on the % increase in yield over control and the respective nitrogen level is provided in Table 3. An increase in yield over control ranged from 2 to 22 %, while in maximum 22% increment in the yield was observed on plots treated with 240 kg N/ha in 116 days and a minimum 02% increase in the yield due to biofertilizer (BF) was reported. The results were compared with these reported by Pisal et al. (1991). Patel et al. (1992) and Biswas et al. (2001). The biofertilizer alone treated plots results in a minimum 02% increase in yield over different nitrogen levels while a maximum 08% increase in yield was recorded in plots treated with N60+BF in 116 days.

Table 1
Details of the cultivation practices and harvesting of Hybrid Napier (cv.NB-21) grass

Crop	Cultivar	Duration	Seed rate (Slips/ha)	No of harvest	Fertilizer treatment (kg/ha)
Hybrid Napier	NB-21	20 March 2015 to 13 July 2015	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. NB-21)
Duration 20 March 2015 to 13 July 2015

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 2015	1 cut (78)	N0	20.5	1.60	43516	9122	931
		N60	17.5	1.67	47260	8424	902
		N120	19.0	1.72	49413	9555	1048
		N180	21.0	1.73	50290	10776	1190
		N240	20.5	1.76	54265	11337	1280
		Bf	21.5	1.63	45008	9845	1024
		N60+Bf	17.5	1.69	51035	9122	982
		N120+Bf	21.5	1.75	52542	11503	1285
13 July 2015	1 regrowth (38)	N0	19.5	1.57	42605	8461	846
		N60	18.5	1.65	45535	8589	903
		N120	19.5	1.70	48324	9604	1041
		N180	20.5	1.75	49125	10258	1145
		N240	21.5	1.75	53200	11648	1301
		Bf	20.5	1.65	43690	9116	959
		N60+Bf	18.5	1.70	50460	9525	1032
		N120+Bf	21.0	1.73	51046	10917	1205
	Total in 116 days	N0			86521	17683	1797
		N60			93008	17113	1819
		N120			97953	19259	2109
		N180			99715	21134	2355
		N240			107865	23085	2601
		Bf			88952	19061	2003
		N60+Bf			101695	18747	2034
		N120+Bf			103788	22520	2510
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.NB-21)

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	86521	-	-	17683	1797
N60	93008	06	-	17113	1819
N120	97953	13	-	19259	2109
N180	99715	15	-	21134	2355
N240	107865	22	-	23085	2601
BF	88952	02	02	19061	2003
N60+Bf	101695	15	08	18747	2034
N120+Bf	103788	18	06	22520	2510

References:

[1] Bailey, R. L., 1967 Techniques in Protein Chemistry II Edn. Elsevier Publishing Co. Amsterdam.
[2] Biswas B.C., Soumitra Das Kalwe, S. P. 2001 Fertilizer news 46(2): 15.
[3] Dubey Rajiv, Sharma R. S. and Dubey D.P., 2014 Int. J.Curr.microbioL. App.Sci. 3(2) : 381.
[4] Gautam, P. and Pant L. M. 2002 Indian farmers digest 35(5): 32
[5] George Sheoran, Rana D.S. and Sharma H. R. 1998 Forage Res. 24(2): 93
[6] Jha, A.K., Shrivastava, A., Raghuwanshi, N. S., and Singh A. K. 2013 JNKVV Research Journal 47(2): 2013.
[7] Mahajan A, Chaudhary A. K. and Bhagat R.M. 2002 Indian Farmer Digest 15(7):29
[8] Mishra Seema, Sharma Satyavati, Vasudevan Padma, 2008 J.Sci.Food.Agric. 88:1667.
[9] Mohan J and Pradhan S. 2001 Indian farming 51(3):33
[10] Panwar, J.D.S., Saikia, S. P. and Naidu, V.S.G.R. 2001 Indian Farming 51(1):56.
[11] Patel, J.R., Sadhu, A.C., Patel, D.C. and Patel, B. G. 1992 Forage Res 18 (1): 42
[12] Pisal, D. A., Patil S. K. Khol, R. B. and Desale, J. S. 1991, Forage Res. 17 (1): 55
[13] Singh H.N. Sing S. Singh K and Singhania R. A. 1998 Forage Res 24 (3):135.
[14] Surekha K. and Rao I.S. 1995 Intensive Agri 33:12
[15] Umesha, K. and Purushottam S. 1996 Indian J. Agron 41(4): 659.
[16] Wasnik, K. 1992, Indian Farmer times 10:6.