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EFFECT OF PLANTING MATERIAL ON PRODUCTIVITY OF BAJRA X NAPIER HYBRID

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SUMMARY

Field experiment was conducted to study the effect of planting material on the growth, yield and quality of B x N hybrid during 2014-15 to 2016-17. Planting of B x N hybrid with two eye bud cuttings were produced significantly maximum green forage yield (179.46 t/ha/yr), dry matter yield (40.65 t/ha/yr) and crude protein yield (3.74 t/ha/yr).The crude protein content, ADF, NDF, IVDMD, nitrate content and oxalate content in B x N hybrid was not influenced significantly due to different planting materials. The planting of B x N hybrid with two eye bud cutting produced significantly higher with gross monetary returns (Rs. 1,65,929/ha/yr), net monetary returns (Rs. 1,01,371 /ha/yr) and B:C ratio (2.62) than remaining planting materials. However, it was at par with the planting with rooted slips and three eye bud cuttings. The soil available nutrients after harvest *i.e.* nitrogen (174.77 kg/ha) and potassium (439.76 kg/ha) were recorded significantly higher in the single eye bud rooted cuttings as compared to other treatments of planting material. While, soil available phosphorus remained unaffected due to different planting materials used under experimentation.

Key words : Planting material, forage quality parameters, Bajra × Napier hybrid

India has large number of livestock population as compared to the other countries of the world. In spite of having huge livestock population, milk productivity is very low due to inadequate quality forage. In recent years, it has been observed that, animal husbandry occupies an important role and there is a big gap between demand and supply of green forage. Bajra x Napier hybrid is a perennial cereal crop an important for livestock feed which provides 150-200 t/hagreen fodder per year through periodical cuttings at 50 to 60 days interval.

The Bajra x Napier hybrid is an inter specific hybrid (2n=3x=21) between pearl millet (*Pennisetum glaucum, L.)* x napier grass (*Pennisetum perpurium Schum*). Bajra x Napier hybrid variety RBN-13 (Phule Jaywant) is developed by Mahatma Phule Krishi Vidyappeth, Rahuri (M.S.) and released for cultivation during the year 2006 for Maharashtra state (Anonymous, 2006). Thereafter, this hybrid is also released at National level during 2009 for the Central and Sothern Zone (Anonymous, 2009).

Presently, Bajra x Napier hybrid is propagated through the use of rooted slips as a planting material is the most common practice in India andcould be maintained as a perennial crop up to 3-4 years, propagation through rooted slips is costlier, time consuming and labour intensive. Therefore, it is necessary to find out and evaluate the alternate propagating material of the Bajra x Napier hybrid under field condition to minimize the cost on planting material, easy availability and easy to transport.

In order to plant more area through stem cutting, present experiment was planned. Due to use of stem cuttings multiplication ratio is increased. From one plant 6-7 two eyes budded sets can be obtained in addition to one rooted slip. Therefore, present the research work on above agronomic management aspects was undertaken.

MATERIALS AND METHODS

The field experiment was conducted during 2014-15 to 2016-17in consecutive three years at AICRP on Forage Crops and Utilization, Mahatma Phule Krishi Vidyapith Rahuri, (MS). The soil of the experimental field wasmedium black with low in available nitrogen (142.00 kg/ha), medium in available phosphorus (13.15 kg/ha) and high in available potassium (418.00 kg/ha). It was moderately alkaline in reaction (pH 8.73) with 0.24 dS/m electrical conductivity. The organic carbon content was 0.36 per cent.

The field experiment was laid out in Randomized Block Design. The treatment consist of four planting material *viz.,* P_1 - Single eye bud rooted cutting, P_2 - Two eye bud rooted cutting , P_3 - Three eye bud rooted cutting and P_4- Rooted slips. The treatments were replicated five times. Bajra x Napier hybrid planted vertically on ridges and furrows at spacing of 90 cm x 60 cm and having 6.00 x 4.50 m^2 gross plot size and 5.40 x 2.70 m^2 net plot size. Well-rotted 10 t FYM was applied before plantingand Bio fertilizers (*Azotobacto*r *culture*) was applied @ 250 g/ 1000 rooted cuttings/ slips at the time of planting.Recommended dose of fertilizer 150:50:40 kg/ha $N:P_2O_5:K_2O$ were applied in following splits as basal dose (25:50:40 kg $N:P_2O_5:K_2O$ ha^{-1}) and remaining dose of nitrogen (25 kg N/ha) applied after harvest of each cut. Single eye bud cutting were raised in coco pit, while two and three eye bud cuttings were raised on flat bed.

At harvest of each cut, observations regarding plant height, number of tillers/bunch, leaf:stem ratio and fresh yield of green forage were recorded. First common cut of green forage was taken at 65 days from planting for all the treatment and subsequent cut were taken at 60 days interval. The dry matter yield of net plot was calculated by multiplying green forage yield with dry matter percentage as per formula given below.

$$\text{DMY (q/ha)} = \frac{\text{Green forage yield (q/ha) x Dry matter content (\%)}}{100}$$

The standard analytical methods were used for plant analysis viz., nitrogen (%) estimated through Parkinson and Allen (1975), phosphorus and potassium (%) by Jackson (1973), crude protein and crude fibre content (%) by A.O.A.C.,(2005) while., NDF, ADF, IVDMD, nitrate content, silica (%) by Van Soest (1975) and Oxalic acid (%) by Abaza *et al*. (1968).

The available NPK in soil was estimated through standard analytical methods given by Olsen *et al*. (1954) and Kundsen *et al.*, (1982). The recommended packages of practices were followed during the experimentation. Cut wise data of three years were pooled and statistically analyzed.

RESULTS AND DISCUSSION

Growth attributing characters

Growth parameters *viz.*, number of tussock/ ha and plant shoots per tussock did not differed significantly due to different planting materialon pooled mean basis (Table 1). Numerically, higher plant shoots (68.43) were recorded at two eye bud cuttingas compared to rotted slips, one and three eye buded sets used for planting purpose. Whereas,plant height was recorded significantly higher under planting of B x N hybrid with two eye bud cutting (123.89 cm)and it was at par with planting with three eye bud cutting under experimentation.This might be due to increases in cell turgidity, cell multiplication and cell elongation resulted in increase in plant heightas compared to other planting material under experimentation. However, leaf: stem ratio remained unaffected due to different planting material on pooled mean basis.These results are in the line with Taye Bayble *et al.* (2007), Bora *et al.* (2011) and Pathan *et al*. (2012).

Yield parameters

The planting of B x N hybrid with two eye bud cutting produced significantly higher green forage

TABLE 1

Growth, yield and quality attributes of Bajra x Napier hybrid as influenced by planting material on pooled mean basis (2014-15 to 16-17)

Treatment	No. of tussock/ ha	Plant shoot/ tussock	Plant height (cm)	Leaf : stem ratio	GFY (t/ha)	DMY (t/ha)	CPY (t/ha)	CPC (%)	ADF (%)	NDF (%)	IVDMD (%)	Nitrate content (%)	Oxalate content (%)
Planting material (4)													
P_1-Single eye bud rooted cutting	17475	59.37	109.50	0.99	157.48	34.39	0.28	8.26	42.64	60.83	59.26	1434	2.01
P_2-Two eye bud rooted cutting	18187	68.43	123.89	1.08	179.46	40.65	0.37	9.34	43.95	61.74	59.02	1447	2.05
P_3-Three eye bud rooted cutting	17742	63.63	119.53	1.05	172.19	38.94	0.35	9.05	44.86	62.12	59.29	1506	2.08
P_4-Rooted slips.	18142	64.77	117.91	1.02	171.01	38.00	0.33	8.71	42.88	59.28	60.30	1549	2.04
S. Em±	324.87	2.93	2.67	0.05	4.15	1.20	0.01	0.33	0.71	0.67	0.97	55.58	0.02
C. D. (P=0.05)	NS	NS	7.65	NS	11.90	3.45	0.04	NS	NS	NS	NS	NS	NS
General Mean	17887	64.05	117.71	1.03	170.04	37.99	0.34	8.84	43.58	60.99	59.47	1484	2.04

Note : GFY-Green forage yield, DMY-Dry matter yield, CPY-Crude protein yield, CPC-Crude protein content, ADF-Acid detergent fibre, NDF- Neutral detergent fibre, IVDMD- In- vitro dry matter digestibility.

TABLE 2
Economicof various treatments, Soil available nutrients and Soil studies after harvest of Bajra x Napier hybrid as influence by planting material on pooled mean basis. (2014-15 to 16-17)

Treatment	Economic (Rs./ha/yr)				Soil available nutrients (kg/ha)		
	Gross monetary	Cost of	Net monetary	B : C	Nitrogen	Phosphorus	Potassium
Planting material (4)							
P_1-Single eye bud rooted cutting	145458	66634	78823	2.27	174.77	13.80	439.76
P_2-Two eye bud rooted cutting	165929	64557	101371	2.62	147.20	13.17	415.12
P_3-Three eye bud rooted cutting	158918	66696	92222	2.46	157.41	13.40	417.38
P_4-Rooted slips.	157828	65000	92828	2.49	162.60	13.49	426.00
S. Em±	3846	-	3846	0.06	4.43	0.29	4.95
C. D. (P=0.05)	11031	-	11031	0.18	13.64	NS	15.24
General Mean	145458	65722	91311	2.46	160.50	13.46	424.57

yield, dry matter yield and crude protein yield (179.46,40.65 and 3.74 t/ha/yr, respectively) than rest of the treatments (Table 1).However, it was at par with the planting of B x N hybrid with three eye bud cutting and rooted slips. These results are in close vicinity to those reported by Pathan and Bhilare (2010) and Pathan *et al.* (2012).

Quality studies

The pooled data on quality parameters *viz*., crude protein content, ADF, NDF, IVDMD, nitrate content and oxalate content presented in Table 1 remained unaffected due to planting material and the differences were found non-significant in respect to all quality parameters because the planting material was of same origin. The similar trend was also indicated by Bora *et al.* (2011), Reddy and Reddy (2012) and Pathan *et al.* (2012).

Economics

Planting of Bajra x Napier hybrid with two eye bud cuttings registered significantly maximum gross monetary returns (Rs. 1,65,929/- ha/yr), net monetary returns (Rs. 1,01,371/- /ha/yr) with B:C ratio (2.62) on pooled meanbasis (Table 2).However, it was at par with planting of B x N hybrid with rooted slips and three eye bud cuttings. This might be due to more green forage yield obtained in the two eye bud cuttings, rooted slips and three eye bud cuttings. These results are in agreement with those reported by Jayanthi (2007), Pathan and Bhilare (2010), Sharma *et al*. (2012) and Pathan *et al.* (2012).

Soil studies

The initial values of available nitrogen, phosphorus and potassium in soil were 142.00, 13.15, 418.00 kg/ha, respectively. The soil available nutrients after harvest *i.e.* nitrogen (174.77 kg/ha) and potassium (439.76 kg/ha) were recorded significantly higher in the single eye budrooted cuttings as compared to other treatments of planting material. Significantly the lowest residual soil fertility was observed in two eye budrooted cuttings (147.20 and 415.12 kg/ha, respectively). This might be because of the nutrient uptake was significantly higher in two eye bud sets of B x N hybrid hence the residual fertility was observed lower. These results are in agreement with the findings of Pathan *et al*. (2012). While, soil available phosphorus remained unaffected due to different planting materials used under experimentation (Table2).

It can be concluded that planting of Napier hybrid with two eye bud rotted cuttings at 90 x 60 cm distance recorded higher green forage yield and dry matter yield and found economical with higher gross monetary returns, net monetary retunes and B:C ratio.

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