

PREPLANTING SETT TREATMENTS ON SPROUTING AND PERFORMANCE OF BAJRA NAPIER HYBRID GRASS CO (BN) 5

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ABSTRACT

A field experiment was conducted in TNAU, Coimbatore during 2017 - 2018 to 2018 - 2019 to evaluate the effect of sett treatments on the growth, fodder yield, quality and economics of BN hybrid grass. The variety taken was CO (BN) 5 as a single bud in a RBD with 13 sett treatments and two replications. The result showed that higher sprouting, establishment percentage, growth attributes with higher number of tillers, green fodder (58.6 t/ha/cut) and dry fodder yield (12.6 t/ha/cut) were recorded with water soaking for 12 hours and 24 hours incubation (T_1). Quality parameter viz., crude protein, crude fibre, crude fat and total ash content (%) showed non significant difference. Higher gross return (Rs.117222) and net return (Rs.79428) were recorded with water soaking for 12 hours and 24 hours incubation (T_1). The lower cost of cultivation (Rs. 37794) was observed with water soaking for 12 hours and 24 hours incubation (T_1).

Key Words: Bajra napier, Singlebudded setts, Sett treatment, Sprouting percentage, Fodder quality and yield.

INTRODUCTION

Livestock holds a major position in the economy of rural India by providing employment and supplementary family income through balanced and nutritional food in the form of milk, meat and egg to the millions of people. The population of livestock that the country currently house's is about 535.78 million which is an increase of 4.6% over the livestock census-2012. The business of livestock and related sectors alone contributes approximately 4.5% of national GDP and 27.6% of the agriculture GDP. Recent surveys about livestock in India shows that the country has about 15%

of world cattle population and due to ever increasing population pressure of human, most of the arable land is mainly used for food and cash crops, thus there is little chance of having good quality arable land available for fodder production. Until milk production becomes remunerative to the farmers as compared to other field crops there will be the scope for fodder cultivation in arable lands.(Meena and Singh 2014).

India's forage resources are mainly derived from crop residues, cultivated forages and grazing from pastures and grasslands. India is currently facing a mesh shortfall of around 64 per cent feeds, 61.1 per cent green fodder and 21.9 per cent dry crop residues (Datta, 2013). Chronic shortage of feeds and forages together with

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poor nutritive value of available feeds has lowered the productive capacity and fertility of Indian livestock. This gap in requirement and availability would further aggravate due to increase in livestock population. One of the main impediments in the way of improvement of livestock production is quantitative and qualitative insufficiency of fodder (Pathan *et al.*, 2012). Bajra napier is believed to be the perfect crop to meet these demands.

Bajra Napier hybrid grass CO (BN) 5 is an interspecific hybrid between fodder Cumbu IP 20594 (*Pennisetum glaucum*) and Napier grass FD 437 (*P. Purpureum Schumacher*). It is widely distributed in tropical and sub-tropical regions of Asia, Africa, southern Europe and India (Kadam *et al.*, 2017). But the issue with bajra napier is that it behaves more like sugarcane with somewhat similar planting method and resource requirements. The planting materials are not cost effective and need to be transported which adds additional cost. The large quantity of planting material required in normal planting system also leads to problems with logistics, storage, and loss of bud viability. (Moraes *et al.*, 2018).

The availability of quality setts in huge quantity is also a major problem (Tudu *et al.*, 2007). Further the current method of planting double budded setts not only increases the cost but also consume resources. Nalawade *et al.* (2018) concluded that the single budded setts also match the germination of double budded setts if protected with sett treatment. Planting single budded sett not only reduces the material requirement but also has a huge economic benefits. With the deficit of

fodder increasing fodder requirement every year, it is essential to develop efficient crop establishment method on growth & yield of bajra napier grass. By keeping these factors as an objective this study was conducted to evaluate the best sett treatment for good establishment and to improve the growth, yield and economics of bajranapier hybrid grass.

MATERIALS AND METHOD

A field experiment to evaluate the effect of sett treatments on the performance of bajranapier hybrid grass CO (BN) 5 was conducted during 2017-18 and 2018-19 at the Eastern block of Department of Agronomy, Tamil Nadu Agricultural University – Coimbatore. The soil of experimental field was sandy clay loam in texture. The chemical composition of the soil comprised of pH 8.49, EC 0.55 dS/m, organic carbon 0.57%, available nitrogen 204 kg/ha, available phosphorus 32 kg/ha and available potassium 769 kg/ha.

The experimental field was laid out in a randomized block design (RBD) with thirteen treatments and two replications. The treatment comprised with thirteen sett treatments viz, water soaking for 12 hours and 24 hours incubation (T_1), water soaking for 30 minutes (T_2), hot water soaking at 40°C for 20 minutes (T_3), cowdung slurry (1:1) soaking for 30 minutes (T_4), panchagavya (3%) soaking for 30 minutes (T_5), panchagavya (5%) soaking for 30 minutes (T_6), beejamruth (soaking concentrated solution for 30 minutes) (T_7), beejamruth (50% dilution) soaking for 30 minutes (T_8), GA3 (5 ppm) soaking for 15 minutes (T_9), GA3 (10 ppm) soaking for 15

minutes (T_{10}), ethrel (50 ppm) soaking for 15 minutes (T_{11}), ethrel (100 ppm) soaking for 15 minutes (T_{12}), control (without sett treatment) (T_{13}). The field was thoroughly ploughed and applied with recommended dose of NPK 75:50:40 kg/ha as basal and subsequently 75 kg/ha of nitrogen was applied at 30 DAP.

The single budded setts were treated as per treatment schedule and planted vertically in their respective plots with a spacing of 60X50 cm. First irrigation was given at the time of planting and life irrigation was provided on 3 DAP. Subsequent irrigations were given at 10 days interval. Hand weeding was done on 20 DAP. Observations were taken on sprouting at 10, 15, 20 DAP and establishment at 30 DAP, plant height (cm), number of tillers, number of leaves per clump, tussock perimeter (cm), leaf area index, leaf stem ratio, green fodder and dry fodder yields (t/ha/cut) at the time of harvest. The standard analytical methods were used for plant analysis viz., crude protein and crude fibre, crude fat and total ash content (%) by A.O.A.C., (2005). The prevailing market prices were taken out in order to work out the economics of different treatments.

RESULTS AND DISCUSSION

Mean of two years results on sprouting, establishment, growth, yield, quality and economics of sett treatment are presented.

Sprouting and establishment

Sprouting percentage on 10, 15 and 20 DAP showed a significant difference among the sett treatment (Table 1). Higher sprouting percentage were observed with water soaking for 12 hours and 24 hours incubation (T_1) 60 %, 61% and 70 % respectively on 10,15 and 20 DAP and this was on par with beejamruth (soaking concentrated solution for 30 minutes) (T_7). This is mainly because of the improved metabolic activity from the water soaking. The high water content on setts will promote conversion of carbohydrates into reducing sugars, the higher concentration of reducing sugars might be the reason for the high sprouting percentage observed in water soaking for 12 hours and 24 hours incubation (T_1), since hydrolysis of sugar from complex into simple form helps to readily utilize in the synthesis of auxins and proteins (Sabongari and Ailero, 2004). The auxins thus produced helps to soften cell walls which in turn facilitate the growth and readily utilize the proteins for the production of new tissues. Another possible reason is that it may also leach germination inhibitors from setts and fasten metabolic events in the treated setts. These positive effects are probably due to the stimulatory effects of sett treatment on the early stages of germination process by mediation of cell division in germinating setts (Golezani *et al.*, 2010). Lower sprouting percentage was observed with T_{13} control (without sett treatment) 28 %, 46% and 51% respectively on 10,15 and 20 DAP.

Table 1: Effect of preplanting sett treatments on sprouting and establishment percentage (%) of B. N. hybrid grass.[mean of two years (2017-18 & 2018-19)]

Treatments	10 DAP	15 DAP	20 DAP	30 DAP
T ₁	60 (93)	61 (95)	70 (100)	70 (100)
T ₂	46 (25)	54 (53)	67 (65)	65 (65)
T ₃	41 (50)	54 (75)	63 (85)	60 (83)
T ₄	55 (55)	62 (65)	68 (85)	68 (85)
T ₅	42 (40)	54 (65)	62 (80)	62 (75)
T ₆	35 (45)	51 (65)	55 (80)	55 (75)
T ₇	53 (70)	60 (80)	68 (88)	68 (88)
T ₈	36 (63)	54 (75)	60 (85)	61 (85)
T ₉	44 (40)	57 (60)	65 (60)	64 (75)
T ₁₀	49 (50)	59 (70)	68 (80)	66 (80)
T ₁₁	45 (35)	55 (60)	64 (70)	64 (70)
T ₁₂	41 (30)	54 (60)	60 (65)	60 (65)
T ₁₃	28 (20)	46 (45)	51 (55)	49 (53)
S.Ed	3.6	3.2	4.3	3.8
CD(P=0.05)	7.9	7.1	9.4	8.4

Figures in parenthesis are original values – arcsine transformation was carried out

Establishment percentage was higher with water soaking for 12 hours and 24 hours incubation (T₁) (70%) this was comparable with beejamruth (soaking concentrated solution for 30 minutes) (T₇). This is mainly because when a sett has a surplus or an adequate amount of water, the cells will not offer any resistance or

minimal resistance to the water movement towards bud and root primordial, which can facilitates the build-up of requisite water content in the bud and root primordia, thus improving the establishment percentage of setts soaked in water. Sett treatment may improve germination by accelerating imbibitions, which in turn would facilitate

the emergence phase and the multiplication of radicle cells (McDonald, 2004). The lower establishment percentage was observed with T₁₃ control (without sett treatment) 49%.

Growth parameters

The growth parameters observed were number of tillers per clump, numbers of leaves per clump, tussock perimeter (cm), leaf area index showed significant difference between treatments (Table 2). But there is no significant difference were observed with plant height and leaf stem ratio.

The treatment water soaking for 12 hours and 24 hours incubation (T₁)

recorded higher number of tillers per clump (27.0), numbers of leaves per clump (316), tussock perimeter (160.5cm) and leaf area index (24.4). This might be due to the increased shoot production associated with water soaking, which in turn increases the production of photosynthate for the developing roots, efficient roots leads to better nutrient uptake thus improves the overall all growth parameters (Basra *et al.*,2005).

The lower values were observed with T₁₃ control (without sett treatment) for number of tillers per clump (19.6), numbers of leaves per clump (230), tussock perimeter (118.5cm) and leaf area index (12.9).

Table 2: Effect of preplanting sett treatments on growth of B. N. hybrid grass. [mean of two years (2017-18 & 2018-19)]

Treatments	Plant height (cm)	Number of tillers/clump	Number of leaves/clump	LAI	Tussock perimeter (cm)	Leaf stem ratio
T ₁	245.9	27.0	316	24.4	160.5	0.45
T ₂	196.4	20.3	235	13.8	121.2	0.41
T ₃	218.4	24.3	275	21.7	149.8	0.43
T ₄	218.6	24.9	286	22.7	153.0	0.44
T ₅	212.0	22.0	256	17.2	136.0	0.42
T ₆	215.5	23.8	263	18.7	138.9	0.43
T ₇	240.6	25.9	307	23.8	156.9	0.45
T ₈	224.1	25.3	301	23.0	155.7	0.45
T ₉	210.2	21.6	252	16.9	132.5	0.42
T ₁₀	217.0	24.1	270	20.2	146.8	0.43
T ₁₁	207.3	21.0	242	15.8	127.8	0.42
T ₁₂	200.1	20.4	244	14.8	122.8	0.41
T ₁₃	193.0	19.6	230	12.9	118.5	0.40
S.Ed	NS	1.0	13.2	1.0	6.7	NS
CD(P=0.05)		2.1	28.8	2.2	14.5	

Table 3: Effect of preplanting sett treatments on fodder yield and economics of B. N. hybrid grass. [mean of two years (2017-18 & 2018-19)]

Treatments	Green fodder yield (t/ha/cut)	Dry fodder yield (t/ha/cut)	Cost of cultivation Rs./ha/cut	Gross return Rs./ha/cut	Net return Rs./ha/cut
T ₁	58.6	12.9	37794	117222	79428
T ₂	29.4	6.7	37794	58712	20917
T ₃	46.2	9.7	37794	92369	54575
T ₄	50.3	10.7	38494	100580	62086
T ₅	38.1	8.5	47694	76052	28358
T ₆	40.2	8.9	54394	80388	25994
T ₇	55.9	12.4	50289	111807	61518
T ₈	53.7	11.7	46124	107228	61104
T ₉	36.4	8.2	39074	72738	33664
T ₁₀	43.8	9.2	40434	87656	47222
T ₁₁	33.6	7.8	44184	67141	22957
T ₁₂	31.3	7.3	50589	62631	12042
T ₁₃	27.0	6.1	37794	53917	16123
S.Ed	3.5	0.7			
CD(P=0.05)	7.7	1.5			

Green and dry fodder yields

Green fodder and dry fodder yields showed significant difference among the sett treatments (Table 3). Mean results showed that higher green (58.6 t/ha/cut) and dry fodder yield (12.9 t/ha/cut) were observed with water soaking for 12 hours and 24 hours incubation (T₁) this was on par with treatment beejamruth (soaking concentrated solution for 30 minutes) (T₇), beejamruth (50% dilution) soaking for 30 minutes (T₈).

The higher green and dry fodder yields associated with the treatment

water soaking for 12 hours and 24 hours incubation (T₁) might be due to the reason that, soaking the setts in water increased the growth promoting effect as well as rapid and regulated production of emergent metabolites on the plant at the initial and later developmental stages contributes to the increased number of tillers per clump, number of leaves per clump, leaf area index, tussock perimeter, number of nodes per tiller. This in turn produces higher green and dry fodder yield. Lower green (27.0 t/ha/cut) and dry fodder yield (6.1 t/ha/cut) were recorded with control (without sett treatment) (T₁₃).

Table 4: Effect of preplanting sett treatments on quality of B. N. hybrid grass. [mean of two years (2017-18 & 2018-19)]

Treatments	Crude protein content (%)	Crude protein yield (t/ha)	Crude fibre content (%)	Crude fat content (%)	Total ash content (%)
T ₁	14.51	1.86	30.43	5.18	12.08
T ₂	13.50	0.90	29.86	4.72	10.53
T ₃	14.06	1.36	30.32	4.90	11.25
T ₄	14.11	1.50	30.34	4.96	11.41
T ₅	13.71	1.17	30.21	4.76	10.71
T ₆	13.82	1.22	30.25	4.80	10.96
T ₇	14.47	1.79	30.41	5.14	11.95
T ₈	14.23	1.66	30.36	5.02	11.72
T ₉	13.62	1.11	30.18	4.74	10.62
T ₁₀	13.94	1.28	30.26	4.82	11.03
T ₁₁	13.53	1.06	29.92	4.75	10.57
T ₁₂	13.47	0.98	29.75	4.70	10.45
T ₁₃	13.39	0.81	29.44	4.67	10.38
S.Ed	NS	0.09	NS	NS	NS
CD(P=0.05)		0.20			

Quality parameters

Quality parameters of bajra napier hybrid grass showed non significant difference on crude protein, crude fibre, crude fat and total ash content (%) (Table 4). Whereas, crude protein yield showed significant difference on sett treatment. Sett treatment with water soaking for 12 hours and 24 hours incubation (T₁) recorded higher crude protein yield (1.86 t/ha). This was due to increased bud germination with adequate plant population which would inturn produced more dry matter production leading to higher crude protein yield (Singh *et al.*, 2016). This was also found to be on par with the treatment beejamruth (soaking concentrated solution for 30 minutes) (T₇)

which recorded 1.79 t/ha of crude protein yield. Lower crude protein yield of 0.81 t/ha was recorded in control T₁₃ (without sett treatment).

Economics

Economics of the study showed that, higher cost of cultivation (Table 3) was recorded with panchagavya (5 %) soaking for 30 minutes (T₆) (Rs.54394). This might be due to increased cost of panchagavya preparation. Higher gross return (Rs.117222), net return (Rs. 79428) and lower cost of cultivation was observed with water soaking for 12 hours and 24 hours incubation (T₁). The reduced cost of cultivation is mainly due to less preparation

cost in treatment (T₁). Lower gross return (Rs.53917) and net returns (Rs.16123) was observed with control T₁₃ (without sett treatment).

Conclusion

It can be concluded from the present study that single budded setts with water soaking for 12 hours and 24 hours incubation is the best treatment to achieve higher sprouting (60, 61, and 70 % on 10, 15 and 20 DAP respectively), establishment percentage (70%), growth, green fodder yield (58.6 t/ha/cut), dry fodder yield (12.9 t/ha/cut), crude protein yield (1.86 t/ha) and net return (Rs. 79428/ ha/cut) of bajra napier hybrid grass CO (BN) 5. Further it is also proven that single budded setts with water soaking for 12 hours and 24 hours incubation can provide considerable economic benefits for the farmers.

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