

Entrepreneurship development potential of perennial forages

under rainfed semi-arid central India: a case study

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Perennial grasses like Napier Bajra hybrid, guinea and tri specific hybrid are important source of round the year green fodder. Their demand is increasing in recent year particularly from dairy farmer, peri-urban milkshed area, Gaushala, forest department, NGOs, etc. Farmer can plant rooted slips of the forage in July, take fodder for the whole year and then sale rooted slips in next July and August to get higher return. The paper assessed the multiplication behaviour, fodder production and entrepreneurship development potential of perennial forage crop under rainfed semi arid central Indian condition in this case study.

Key words: Entrepreneurship development, Perennial forages, Semi arid

Indian agriculture is an economic symbiosis of crop and livestock production. Livestock sector is contributing 24.72 and 4.36% to the agricultural and overall GDP, respectively. It plays an important role in livelihood security of farmers particularly in arid and semi arid region of India. Availability of quality feed and forage has been considered as the major bottleneck in harnessing the potential of the livestock productivity. The farmers in semi arid tropic are almost deficit in green nutritive fodder and there is ever increasing demand for quality green forage. Fodder and feed are known to constitute about 60% of the total cost of milk production. The major part of livestock feed is met either from crop by products (rice, wheat, barley, bajra, sorghum straw/stover and other crop residue) or from the less nutritious grass leading to low production and productivity of livestock. To maximize the milk production, it is essential to feed animals with quality green fodder.

NB Hybrid, Trispecific hybrid (TSH) and guinea grass are the most important perennial grasses in semi arid tropic. NB Hybrid grass is a potential perennial source of green fodder and it is popular owing to high yield, palatability and adaptability to varying climatic conditions. Trispecific hybrid (cross between three species *Pennisetum purpureum* × *P. squamulatum* × *P. glaucum*) has great potential for green forage production along with quality throughout the year under rainfed and irrigated condition. Guinea grass (*Panicum maximum* Jacq.) is one of the important pasture species suitable for higher forage production from community land, village grazing land and marginal land owned by the farmers. It has profuse tillers, quick regeneration and high leaf-stem ratio provides highly nutritious, digestible and palatable forage. Looking into these facts, a number of high yielding and nutritive varieties of Napier-Bajra hybrid, Tri Specific Hybrid (TSH) and guinea

grass have been developed in our country. These grasses have immense potential for green fodder production throughout the year.

However, Napier-Bajra hybrid, Tri Specific Hybrid (TSH), etc does not produce much viable seed so propagation is carried out through vegetative means (rooted slip and stem cutting) for faster establishment. Propagation by cutting also results in plants that are genetically identical to the parent plant. Very few information on its multiplication performance, tillering and also yield is available under rainfed condition, hence an attempt has been made through this field investigation. The increasing demand of rooted slips for above grasses particularly by dairy farmer, peri-urban farmer, government agency and department, forest department and NGOs in recent times opens new vistas for entrepreneurship development through perennial forage multiplication, and sale. Therefore, in present case study,

Table 1. Tillering behaviour (tillers/tussock) in perennial forage crops

Repli- cation	Guinea			Napier						TSH
	BG-1	BG-2	CO-3	NB-21	IGFRI-3	IGFRI-6	IGFRI-7	IGFRI-10	Thin napier	
1	88	81	25	46	16	32	29	37	13	38
2	85	40	33	48	27	22	24	34	18	25
3	102	65	18	50	26	24	25	25	28	35
4	53	50	24	41	15	20	20	20	19	50
5	75	150	28	65	27	36	37	25	45	40
6	145	71	33	40	23	15	21	47	43	40
7	80	80	35	75	31	26	40	25	23	75
8	165	100	45	55	10	24	39	24	23	65
9	81	64	70	30	21	22	18	24	26	30
10	80	90	45	14	25	30	21	13	25	41
11	84	65	26	48	24	25	30	17	17	35
12	81	78	27	49	26	26	33	31	45	25
13	74	35	28	31	13	30	36	32	45	29
14	100	103	23	22	22	38	22	30	33	75
15	61	140	25	13	23	29	25	25	17	25
16	85	102	37	41	29	33	35	43	26	50
17	96	59	28	49	32	37	33	39	22	35
18	89	92	39	33	37	29	29	45	30	62
19	75	68	25	46	28	30	39	36	27	41
20	105	82	33	37	30	41	37	44	28	49
Mean	90.2	80.75	32.35	41.65	24.25	28.45	29.65	30.8	27.65	43.25
SD	25.67	29.10	11.38	15.31	6.73	6.57	7.23	9.69	9.92	15.57
SE	5.74	6.50	2.55	3.42	1.51	1.47	1.62	2.17	2.22	3.48
CV %	28.46	35.99	35.19	36.75	27.77	23.08	24.40	31.45	35.88	36.00

multiplication, entrepreneurship potential, and economics of the above crops under rainfed condition is examined where farmer grow the crops in July, take fodder till next July and then sale the rooted slips.

Methodology

Studies on multiplication behaviour, fodder production and economics of three prominent perennial forage crops, viz., *guinea*, *napier* and *tri species hybrid* (TSH) were conducted at ICAR-Indian

Grassland and Fodder Research Institute, Jhansi during 2012-13 under rainfed semi-arid central Indian condition. The soil of the site was red gravelly sandy loam with medium in available nitrogen (N) (304 kg/ha), Phosphorus (P) (17.2 kg/ha) and Potassium (K) (143 kg/ha). The agro climate of the region is characterized by dry and hot summer, warm and moist rainy season and cool winter with occasional rain shower. Mean annual temperature ranges from 24 to 25 °C. The mean

summer (April-May-June) temperature is 34 °C which may rise to a maximum of 46 to 48 °C during the month of May and June. The mean winter temperature (December-January-February) is 16 °C which may drop to 2-5 °C in December and January. The annual rainfall of the Jhansi region varies from 600 to 1200 mm with an average of 908 mm. Different prominent perennial fodder genotypes used in case study is given in Fig. 1.

Rooted slips of two varieties of guinea (BG-1 and BG-2), seven varieties of Napier-Bajra hybrid (CO-3, NB-21, IGFRI-3, IGFRI-6, IGFRI-7, IGFRI-10 and thin napier) and TSH (a tri species hybrid comprising *Pennisetum glaucum*, *P. Purpureum* and *P. Squamulatum*) were planted at 100 cm row to row and 50 cm plant to plant spacing in blocks each of 800 square meter area during first week of August, 2012. Each variety was applied N @ 70 kg/ha, 40 kg as basal and 30 kg as top dressing after first cut. Two irrigations were applied during November and December, 2012. Similarly, the crops were inter cultivated manually twice during October and December for weed control and moisture conservation. The crops were harvested for green fodder four times during October, December, February and August. Twenty tussocks of each variety were selected randomly from each plot and tagged for data collection. The data

Table 2. Green forage yield (GFY) and economic perspectives in perennial forage crops under rainfed condition

Crop/variety	Green forage yield (t/ha)					Cost of cultivation (₹/ha) (a)	Gross return			Net return (b-a) (b)	B:C ratio (b-a)/a
	1 st cut	2 nd cut	3 rd cut	4 th cut	Total		From GFY	From rooted slips	total (b)		
Guinea											
BG-1	8.20	6.30	3.6	25.37	43.47	73,288	43,470	1,082,400	1,125,870	1,052,583	14.4
BG-2	9.57	7.05	4.20	28.53	49.35	73,288	49,350	969,000	1,018,350	945,062.5	12.9
Napier/Bajra- Napier Hybrid											
CO-3	7.92	6.10	3.13	25.46	42.61	73,288	42,610	388,200	430,810	357,522.5	4.9
NB-21	9.35	7.45	4.23	28.44	49.47	73,288	49,470	499,800	549,270	475,982.5	6.5
IGFRI-3	7.10	5.55	2.95	22.67	38.27	73,288	38,270	291,000	329,270	255,982.5	3.5
IGFRI-6	8.15	6.38	3.05	26.05	43.63	73,288	43,630	341,400	385,030	311,742.5	4.3
IGFRI-7	9.46	7.25	4.15	28.11	48.97	73,288	48,970	355,800	404,770	331,482.5	4.5
IGFRI-10	11.05	9.18	4.99	34.20	59.42	73,288	59,420	369,600	429,020	355,732.5	4.9
Thin napier	6.20	4.95	2.81	19.53	33.49	73,288	33,490	331,800	365,290	292,002.5	4.0
TSH	12.12	9.95	5.21	37.09	64.37	73,288	64,370	519,000	583,370	510,082.5	7.0

Note: The selling price of green fodder and rooted slips were @ ₹ 1/kg and ₹ 0.75/number, respectively.



Bundel Guinea - 1



Bundel Guinea - 2



BN Hybrid (IGFRI - 3)



BN Hybrid (IGFRI - 6)



BN Hybrid (IGFRI - 10)



Tri Specific Hybrid (TSH)

Fig. 1. Different prominent perennial fodder genotypes used in case study

on tillers/tussock, tussock diameter and fresh biomass/tussock were recorded at 3 (1st cut – 10 October, 2012), 5 (2nd cut – 10 December, 2012), 9 (3rd cut – 15 March, 2013) and 12 (4th cut – 5 August, 2013) months after planting and analysed. After the final cut in first week of August, it is assumed that the farmer

sales the rooted slips and economics was calculated accordingly.

Results

Tillering Pattern and Tussock Diameter: The average number of tillers/tussock varied from 53-165 and 35-150 in guinea variety BG-1 and BG-2, respectively (Table 1). On

an average, BG-1 produced 11.7% more tillers/tussock (90.2) than BG-2 (80.75). The tillers in BG-1 were more erect than BG-2, thus making it more suitable for intercropping. The leaves of BG-2 were broader and dropping type. The mean tillers/tussock was the highest in NB-21 (41.65) followed by CO-3 (32.35)

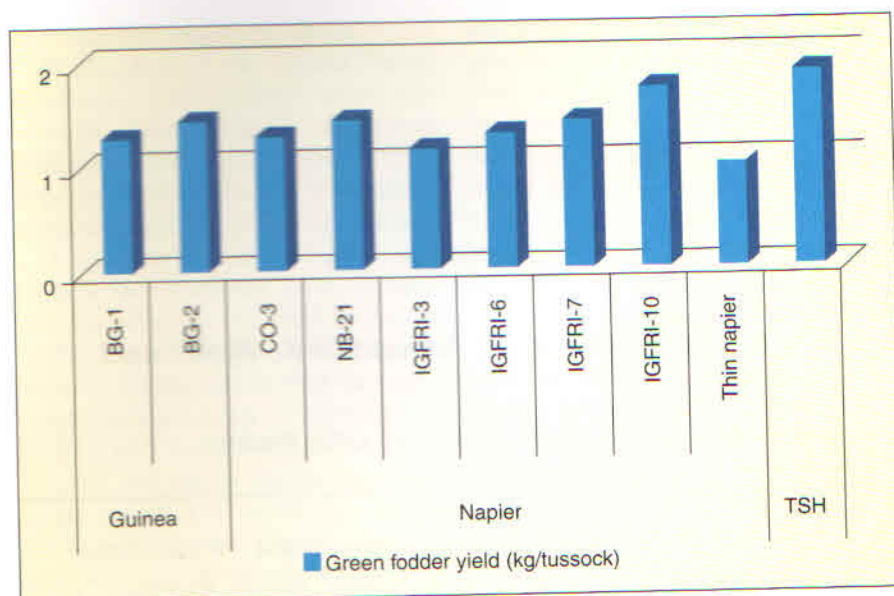


Fig. 2. Mean tussock fresh weight at 4th cut

and IGFR1-10 (30.8) and the least in IGFR1-3 (24.25) amongst the NB hybrids. The tillers/tussock ranged from 25-75 with mean value of 43.25 in Tri Species hybrid (TSH). The tillering potential was observed in order: guinea > TSH > napier. The number of tillers/tussock increased rapidly during initial 5 months and then almost got stabilized in all the crops and their varieties.

The mean tussock diameter was higher in guinea variety BG-2 (26.2 cm) than BG-1 (18.36 cm). Amongst the napier varieties, tussock diameter was in order of CO-3 (34.4 cm) > IGFR1-7 (32.1 cm) > IGFR1-6 (31.3 cm) > NB-21 (31 cm) > IGFR1-10 (30.6 cm) > thin napier (29.2 cm) > IGFR1-3 (27.7 cm). The mean tussock diameter was 32.6 cm in TSH.

Green fodder yield potential: The green fodder yield potential was measured both as kg/tussock and t/ha. The average green fodder yield potential as kg/tussock was measured at fourth cut and t/ha was calculated by adding green fodder yield obtained from all the four cuts. The average green fodder yield (kg/tussock) varied from 0.78-1.85 and 0.69-1.92 in guinea variety BG-1 and BG-2, respectively (table 2). On an average, BG-2 produced 12.6% more green fodder yield (1.43 kg/tussock)

than BG-1 (1.27 kg/tussock). Amongst napier genotypes, the mean green fodder yield was the highest in IGFR1-10 (1.71 kg/tussock) followed by NB-21 (1.42 kg/tussock) and IGFR1-7 (1.41 kg/tussock) and the least in thin napier (0.98 kg/tussock) (Fig. 2). The green fodder yield potential (kg/tussock) ranged from 1.53-2.45 with mean value of 1.85 in Tri Species hybrid (TSH). Therefore, under rainfed conditions, the green fodder yield potential was the highest in TSH followed by IGFR1-10 variety of napier bajra hybrid.

The green fodder yield potential under rainfed condition was also measured as t/ha and calculated by adding green fodder yield obtained from all the four cuts (Table 2). The average green fodder yield (t/ha) was 43.47 and 49.35 in guinea variety BG-1 and BG-2, respectively. BG-2 produced 13.5% more green fodder yield than BG-1. Amongst napier genotypes, the mean green fodder yield was the highest in IGFR1-10 (59.42 t/ha) followed by NB-21 (49.47 t/ha) and IGFR1-7 (48.97 t/ha) and thus, showed similar trend to green fodder yield recorded as kg/tussock. TSH was found to be the most suitable perennial fodder crop for rainfed condition as it recorded 64.37 t/ha green fodder yield which

was higher by 8.3 % compared to the next competitive IGFR1-10 NB hybrid genotype.

Entrepreneurship and economic potential: The economic returns and entrepreneurship potential are presented in table 2. The cultivation of these fodder crops for fodder alone is not much economical for initial year until and unless it is linked with animal production. The cost of cultivation for first year was quite high, however, there is no much cost during the later years and therefore, the system may become economically viable. If the farmer sales the rooted slips in the next July after taking 3-4 cuttings of fodder, the venture becomes highly profitable and it can be popularized in high rooted slip demand area. A farmer can earn ₹ 3-5 lakhs by growing varieties of such perennial crops which are in high demand and selling their rooted slips after one year. The profitability of guinea grass varieties is the highest because of their higher tillering behaviour but they are in low demand compared to NB hybrids (IGFR1 6 and 10). Moreover, guinea can also be established through seeds. Therefore, NB hybrid based entrepreneurship offers great opportunity.

Conclusion

Perennial fodder based entrepreneurship offers great opportunity to farmer as their demand is increasing from dairy farmers, peri-urban milkshed area, Gaushala, forest department, NGOs, etc. Thus, a farmer can not only get valuable green fodder for his household consumption but also can get high economic returns through sale of rooted slips by adopting such perennial fodder based entrepreneurship.

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