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Profitability and Impact of Sorghum-Sudan Grass Variety SSG-5000 through Frontline Demonstrations

Sunil Singh[1]*, A.K. Singh[1] and U.S. Gautam[2]

[1]ICAR - Krishi Vigyan Kendra, Unnao – 229881 (Uttar Pradesh), India
[2]ICAR-ATARI, Zone-III, Kanpur- 208002, (Uttar Pradesh), India

**Corresponding author*

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A B S T R A C T

Sorghum-Sudan grass is a known as multi cut chari and major fodder crop of Uttar Pradesh. Its plays a major role in raising the income of small and marginal farmers of Unnao district of Uttar Pradesh. One of the major constraints of traditional Sorghum-Sudan fodder cultivation is low productivity due to non-adoption of recommended package of practices and improved varieties. To overcome this anomaly Krishi Vigyan Kendra, Unnao were conducted frontline demonstrations in farmers' fields at various villages in the district with high yielding and no. of cutting variety *SSG-5000* and applying scientific practices in cultivation through broadcasting method. The Sorghum-Sudan grass productivity and economic returns under improved technologies were calculated and compared with the prevailing farmers' practice. Results revealed that *SSG-5000* variety under improved practices recorded higher yield of 28.76, 29.97 and 31.77 % during 2013-14, 2014-15 and 2015-16 and the recommended practice gave higher net returns of Rs 16965, 20230 and 24200 ha^{1} and B:C ratio of 2.22:1, 2.30:1 and 2.42:1, respectively as compared to farmers practice.

Introduction

Indian agriculture is an economic symbiosis of crop production and animal rearing and contributes nearly 14.1% of GDP (GOI, 2012-13). About 65-70% of the population is dependent on agriculture for livelihood. The livestock, a sub-sector of agriculture sector, adds 4% to national GDP and source of employment and ultimate livelihood for 70% population in rural areas. India is blessed with diversified type of livestock and its livestock sector is one of the largest in the world comprising 56.7% of world's buffaloes and 12.5% cattle (Anonymous, 2013). The feed cost alone accounts for 65 to 70% of the total cost of milk production. The fodder crops are the cheapest sources of nutrients for livestock. The country has only 4.9% of the cultivated area under fodder crops with an annual total forage production of 978.7 million tonnes (525.5 Mt green and 453.2 Mt dry fodders) whereas the annual forage requirement is1325.7 Mt (816.8 Mt green and 508.9 Mt dry fodders) to support the existing livestock population. At present, the country faces a net

deficit of 35.6, 10.95 and 44% for green fodders, dry crop residues and concentrate feed ingredients (Anonymous, 2013) Sorghum (Sorghum bicolour (L. Moench) is an important cereal fodder crop. In India, area under fodder sorghum is around 2.6 m ha (ICAR, 2012), grown mainly in western Uttar Pradesh, Haryana, Punjab, Rajasthan and Delhi which fulfils over 2/3rd of the fodder demand during kharif season. Due to its excellent growth potential, better nutritive value and quick regrowth, it is extensively grown in northern, central and north - western regions of the country. Multicut sorghum is capable of producing high-quality forage in mid to late summer when cool-season perennials have low production (Undersander *et al.,* 1990). Sorghum being an exhaustive crop, its, yield and quality suffers heavily if proper amount of fertilizers is not applied. Nitrogen fertilizer increases the production of forage sorghum with better nutritive value (Patel *et al.,* 1998). Its application increases crude protein and metabolizable energy, besides improving succulence and palatability of fodders. Hence, a field experiment was conducted to evaluate the Promotion of Sorghum-Sudan grass (SSG-5000) on yield and Economic parameters through front line demonstration in Unnao district of Uttar Pradesh.

Materials and Methods

Frontline demonstrations (FLDs) in Sorghum-Sudan Grass were conducted during 2013-14, 2014-15 and 2015-16 by Krishi Vigyan Kendra, Unnao at the farmers' fields in different locations of the district. A total of 32 demonstrations in 6 ha area were conducted in the selected villages. The improved variety *SSG-5000* was procured from Indian Grassland and Fodder Research Institute, Jhansi (Uttar Pradesh) for demonstration purpose. In case of local check plots, existing practice of broadcasting was followed by the farmers. The whole package approach demonstrated to farmers through FLD trials included components such as improved variety, broadcasting method sowing, recommended seed rate, seed treatment, weed and water management, fertilizers and plant protection measures (Table 1). In the demonstration plots critical inputs in the form of improved seed of *SSG-5000* variety and balanced fertilizers were provided to the farmers. The farmers involved in demonstrations were facilitated by KVK scientists in performing proper field operations monitoring like; timely sowing, cutting time and disease diagnosis and yield. During this period extension activities like field days, farmers' trainings, diagnostic visits *etc* were undertaken which benefitted the farmers. Data on Fodder yield were recorded by per square meter observation method randomly from 3 to 4 places from an FLD plot. The yield data were collected from both the demonstrations and farmers' fields and analyzed using simple statistical tools. The technology gap, extension gap and technology index (Samui *et.al.,* 2000) were calculated using the following equation:

- Technological gap: Potential yield – demonstration yield
- Extension gap: Demonstration yield – yield under farmer practice
- Technology index (%): (Potential yield - demonstration yield/potential yield) X 100

Results and Discussion

The fodder yield of Sorghum-Sudan grass recorded under demonstration was 436, 477 and 506 q ha-^{1} during 2013-14, 2014-15 and 2015-16, respectively as compare to farmers' practice (Table 2). The yield enhancement due to the improved practices was to the tune of 28.76, 29.97 and 31.77 per cent over the farmers' practice. Moreover, the number of cutting of fodder under demonstration was

recorded 3 times in each year's over the farmers' field. Yield enhancement in Sorghum and other fodder crops under frontline demonstration has amply been documented by Rana *et al.,* (2012), Haque (2000) and Tiwari *et al.,* (2001). The Extension gap of 97, 110 and 122 q ha-^{1} was observed during 2013-14, 2014-15 and 2015-16, respectively. The Extension gap emphasized the need to bring awareness among the farmers for adoption of improved varieties and production technologies and to revert the trend of wide extension gap. Results also revealed that the technological gap between the improved technology (Demonstration) and farmers' practice in tune of 84, 43 and 14 q ha-^{1} during 2013-14, 2014-15 and 2015-16, respectively. The technology gap observed may be attributed to difference in soil fertility status and agricultural practices, and may be overcome by adopting efficient management practices. The technology index indicates the feasibility of the evolved technology at the farmers' fields. Lower the values of technology index more is the feasibility of the technology demonstrated (Chauhan 2011). The technology index in the present study was 16.15, 8.27 and 2.70 per cent showing the efficacy of good performance of technical interventions. The reduction in the technology index from 16.15 per cent in the first year to 2.70 per cent in the third year exhibited the feasibility of the technology demonstrated (Table 4). The data on economics of the improved technology indicate that the cost of production in FLD was higher than that of the local practice (Table 3). The input and output prices of the commodities prevailing during the study were taken into account for calculating the net returns and B:C ratio. A higher net return of Rs 16965, 20230 and 24200 per ha was recorded during 2013-14, 2014-15 and 2015-16, respectively as compared to Rs 13960, 16340 and 18840 achieved as net returns in the farmers' practice. The benefit-cost ratio of sorghum-sudan grass fodder cultivation with *SSG-5000* variety under improved cultivation practices was 2.22, 2.30 and 2.42 during 2013-14, 2014-15 and 2015-16, respectively as compared to 2.11, 2.23 and 2.28 under farmers' practice. This may be due to higher yield obtained under improved technologies and proved variety as compared to farmer's practice. The results were agreement with Tiwari and Saxena (2001) (Fig. 1–3).

Table.1 Demonstration and farmers' practices of Sorghum-Sudan Grass under FLD for varietal evaluation

Sl. No.	Technology	Improved practices under flat sowing	Farmers practice	GAP (%)
1	Variety	*SSG-5000*	Non-descript	100
2	Land preparation	Ploughing, Harrowing and pudling	Ploughing, Harrowing and pudling	50
3	Seed rate	30 kg (Ha)	50 Kg (Ha)	High seed rate
4	Seed treatment	Thiarum	No application	100
5	Sowing method	Broadcasting	Broadcasting	50
7	Fertilizer dose	30-30-90 (N-P-K)	Indiscriminate application	100
8	Plant protection	IPM	Indiscriminate application	100

Table.2 Yield performances of *SSG-5000* under demonstration

Years	No. of Farmers	Area (Ha)	Fodder Yield (Q/ha)		Increased (%)	No of cutting	
			Demonstration	**Farmer practice**		**Demonstration**	**Farmer practice**
2013-14	10	2	436	339	28.76	3	1
2014-15	10	2	477	367	29.97	3	2
2015-16	12	2	506	384	31.77	3	2

Table.3 Comparative economics of Sorghum-Sudan Grass fodder cultivation between demonstration and farmers' practice

Years	Economics of demonstration (Rs./ha)				Economics of Farmer practice (Rs./ha)			
	Gross Cost	**Gross Return**	**Net Return**	**BCR**	**Gross Cost**	**Gross Return**	**Net Return**	**BCR**
2013-14	13800	30765	16965	2.22:1	12540	26500	13960	2.11:1
2014-15	15520	35750	20230	2.30:1	13200	29540	16340	2.23:1
2015-16	16950	41150	24200	2.42:1	14700	33540	18840	2.28:1

Table.4 Technology gap, extension gap and technology index in Sorghum-Sudan Grass (var. *SSG-5000*) under FLDs

Year	Technology gap (q ha^{-1})	Extension gap (q ha^{-1})	Technology index (%)
2013-14	84	97	16.15
2014-15	43	110	8.27
2015-16	14	122	2.70
Mean	47	109.66	9.04

Figure.1 Net income (Rs.) in Sorghum-Sudan Grass (var. *SSG-5000*) between demonstration and farmers practices

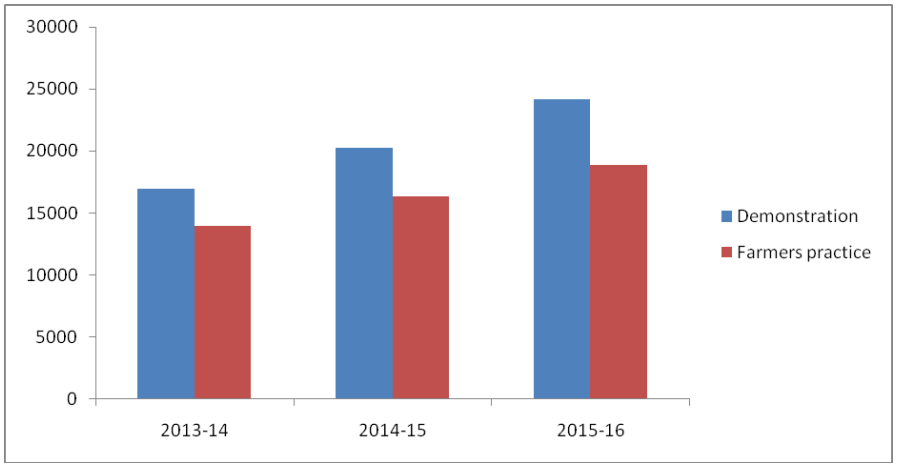


Figure.2 Benefit cost ration (B:C ratio) in Sorghum-Sudan Grass (var. *SSG-5000*) between demonstration and farmers practices

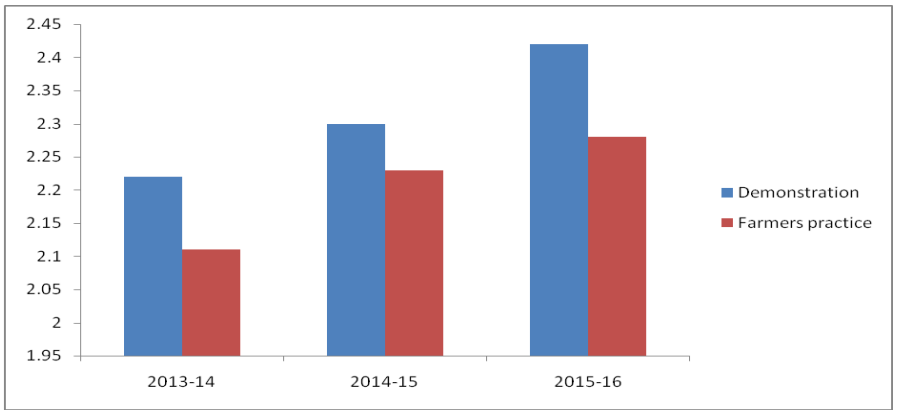
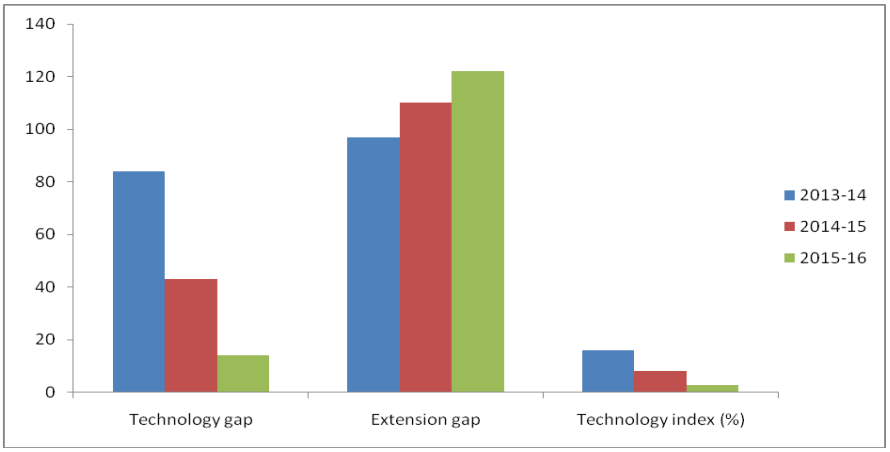


Figure.3 Technology gap, extension gap and technology index in Sorghum-Sudan Grass (var. *SSG-5000*) under various FLDs



In conclusion, the fodder yield potential of Sorghum-Sudan Grass cultivation increased to a great extent by conducting frontline demonstrations of the proven technologies. This substantially increased the income as well as rescues the scarcity of green fodder to livestock. This method gained a momentum in upscaling the Sorghum-Sudan Grass fodder productivity, which created a positive impact on livestock farming.

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