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Transfer of fodder production technologies through crop cafeteria among farming communities of Gorakhpur District, Uttar Pradesh

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Abstract
Crop Cafeteria serves as an effective facilitator in the process of technology transfer among farming communities by providing hands-on learning opportunities based on the principle of "seeing is believing" and by enabling direct, face-to-face interactions with KVK technocrats for the dissemination of technical know-how to farmers, rural youth, and extension functionaries. To address the issue of low adoption of improved fodder technologies, cafeteria plot demonstrations were conducted to evaluate the performance of improved fodder crop varieties under farmers' field conditions. The present study was carried out in Gorakhpur district of Uttar Pradesh, which falls under the North Eastern Plain Zone, during the rabi and kharif seasons from 2017–18 to 2020–21. Cafeteria plots on berseem (*Trifolium alexandrinum* L.) and multi-cut sorghum (*Sorghum bicolor* L. Moench) were implemented by Mahayogi Gorakhnath Krishi Vigyan Kendra (MGKVK), Gorakhpur, with the objective of identifying high-yielding and adaptable fodder crop varieties. The results revealed a consistent improvement in average green fodder yield of berseem from 681.25 q ha^{-1} in 2017–18 to 755.00 q ha^{-1} in 2019–20, indicating an overall increase of 10.83%. Varieties BL-42 and BL-43 recorded superior and stable performance across the years. Similarly, the average green fodder yield of multi-cut sorghum increased from 630.0 q ha^{-1} in 2018–19 to 733.0 q ha^{-1} in 2020–21, showing an overall improvement of 16.35%, with CSV 24 MF, Jumbo Gold, and CSH-20 MF emerging as high-performing varieties. The progressive yield enhancement observed in both fodder crops highlights the effectiveness of the cafeteria approach in promoting improved varieties and better crop management practices. The study concludes that cafeteria plot demonstrations are a practical and effective extension strategy for improving green fodder availability and supporting sustainable livestock production systems in the North Eastern Plain Zone of Uttar Pradesh.

Keywords: Berseem, multi-cut sorghum, cafeteria, green fodder yield, varietal evaluation

Introduction
Availability of adequate and quality green fodder is a major constraint in sustaining livestock productivity in India, particularly in regions dominated by small and marginal farmers. The widening gap between demand and supply of green fodder has been aggravated by shrinking grazing lands, increasing pressure on cultivated land, and limited adoption of improved fodder production technologies. In crop–livestock-based farming systems, fodder crops play a vital role in ensuring year-round feed availability and improving milk and meat production (ICAR, 2018).
Berseem (*Trifolium alexandrinum* L.) is one of the most important winter fodder crops due to its high biomass yield, excellent palatability, and superior nutritive value. Similarly, multi-cut sorghum (*Sorghum bicolor* L. Moench) is a widely cultivated summer fodder crop because of its rapid growth, high green fodder yield, and suitability for multiple harvests. These crops together contribute significantly to fodder security in the Indo-Gangetic plains; however, their productivity often remains below potential owing to the continued use of traditional varieties and sub-optimal crop management practices (Kumar *et al*., 2016) [3].
Varietal improvement and timely dissemination of high-yielding fodder genotypes are key strategies for enhancing fodder availability. The cafeteria approach, which involves the simultaneous evaluation of multiple varieties under uniform field conditions, has proven to be an effective extension tool for accelerating varietal adoption by farmers. This approach enables

farmers to visually compare crop performance and make informed decisions, thereby bridging the gap between research and field-level adoption (Singh *et al*., 2017) [8].

In this context, the present study was undertaken in Gorakhpur district of Uttar Pradesh under the North Eastern Plain Zone to evaluate the performance of berseem and multi-cut sorghum varieties through cafeteria plots implemented by Mahayogi Gorakhnath Krishi Vigyan Kendra. The study aimed to assess yield trends over years and identify high-performing fodder crop varieties suitable for improving green fodder availability under farmers' field conditions.

Materials and Methods

The present study was carried out in Gorakhpur district of Uttar Pradesh, which falls under the North Eastern Plain Zone of India and is characterized by a crop–livestock-based farming system. The region has predominantly alluvial soils with moderate fertility and good moisture-holding capacity, making it suitable for fodder crop cultivation. The climate of the area is subtropical, with hot summers, cool winters, and monsoonal rainfall during the kharif season.

Crop Cafeteria demonstrations on berseem (*Trifolium alexandrinum* L.) and multi-cut sorghum (*Sorghum bicolor* L. Moench) as fodder crops were implemented by Mahayogi Gorakhnath Krishi Vigyan Kendra (MGKVK), Gorakhpur during the rabi and kharif seasons from 2017–18 to 2020–21. The cafeteria approach involved the simultaneous evaluation of multiple improved and locally popular varieties of each crop in farmers' fields to enable direct comparison of their performance under identical management conditions. For berseem, cafeteria plots were conducted during the rabi seasons (2017–18 to 2019–20), while multi-cut sorghum was evaluated during the kharif seasons (2018–19 to 2020–21). The selection of varieties was based on their availability, adaptability, and relevance to local farming systems. Each variety was grown in uniform plot sizes within the same field, following recommended agronomic practices as per the ICAR package of practices for fodder crops. Standard crop management practices, including recommended seed rate, sowing time, nutrient management, irrigation, weed control, and plant protection measures, were uniformly followed for all varieties. Multi-cut harvesting was carried out at appropriate growth stages, and green fodder yield from each cut was recorded. The cumulative green fodder yield was expressed in quintals per hectare (q ha^{-1}). The data collected on green fodder yield were compiled variety-wise and season-wise. Average yield of individual varieties and mean yield across varieties for each season were calculated. Year-wise percentage increase in average fodder yield over the previous year was also worked out to assess productivity trends and the impact of the cafeteria demonstrations. This methodology facilitated the identification of high-yielding and stable fodder crop varieties suitable for dissemination under farmers' field conditions in the region.

Results and Discussion

The pooled results of Table 1 and Table 2 clearly demonstrate the effectiveness of cafeteria plots in improving green fodder productivity of berseem (rabi) and multi-cut sorghum (kharif) through systematic varietal evaluation over multiple years. Similar positive impacts of cafeteria and on-farm varietal demonstrations on fodder productivity have been reported earlier under KVK and ICAR-led programmes (Singh *et al*., 2017) [8].

Performance of Berseem Varieties

The average green fodder yield of berseem showed a steady increasing trend over three rabi seasons (2017–18 to 2019–20). During 2017–18, yields ranged from 565 q/ha (JB-1) to 840 q/ha (BL-43), with a mean yield of 681.25 q/ha. High-yielding varieties such as BL-42, BL-43 and BB-9 significantly outperformed traditional varieties, indicating their superior genetic potential and adaptability, as also reported by Kumar *et al*. (2014) [4] and Meena *et al*. (2020) [6].

In 2018–19, the overall average yield increased to 740.62 q/ha, recording an 8.71% increase over the previous year. The improvement was mainly attributed to the inclusion of improved varieties like BL-42, BL-43, BB-2 and BB-3, along with better adoption of recommended agronomic practices. Similar yield enhancement in berseem due to varietal replacement and demonstrations has been documented by Singh *et al*. (2017) [8] and Yadav *et al*. (2019) [20].

During 2019–20, the average yield further increased to 755.00 q/ha, showing a 1.94% increase over 2018–19. Although the incremental gain was comparatively lower, high-yielding varieties such as BL-43 (895 q/ha) and BL-42 (880 q/ha) maintained consistent superiority, reflecting yield stability under farmers' field conditions, as also observed by ICAR (2020).

Performance of Multi-cut Sorghum Varieties

A similar increasing trend was observed in multi-cut sorghum varieties evaluated under cafeteria plots during kharif seasons (2018–19 to 2020–21). In 2018–19, the average green fodder yield ranged from 580 q/ha (Pant Chari 6) to 720 q/ha (CSV 24 MF), with a mean yield of 630 q/ha. The superior performance of improved sorghum varieties has been widely reported under irrigated and semi-irrigated conditions (Kumar *et al*., 2016) [3].

During 2019–20, the total average yield increased markedly to 711.8 q/ha, registering a 12.98% increase over 2018–19. This improvement was largely due to the introduction of high-yielding varieties such as CSV 24 MF, Jumbo Gold and CSV 33 MF, along with improved ratoon management and farmer awareness. Comparable yield gains in fodder sorghum through frontline demonstrations have also been reported by Singh *et al*. (2018) [7] and Yadav *et al*. (2020) [11].

In 2020–21, the average yield further increased to 733 q/ha, reflecting a 2.98% increase over the previous year. Varieties such as CSV 24 MF, Jumbo Gold and CSH-20 MF continued to outperform others, although the rate of increase was relatively lower, possibly due to climatic variability and attainment of near-potential yield levels, as noted by Meena *et al*. (2021) [5].

Comparative Interpretation and Implications

Across both fodder crops, the cafeteria approach proved highly effective in identifying and popularizing superior varieties, resulting in progressive yield enhancement over years. Berseem showed relatively stable yield gains, whereas multi-cut sorghum exhibited sharper increases following varietal replacement. The consistent superiority of BL-42 and BL-43 in berseem, and CSV 24 MF and Jumbo Gold in sorghum, highlights the importance of genotype selection for improving fodder productivity, as emphasized by ICAR (2018, 2020) and Singh *et al*. (2021) [9].

Overall, the integrated results from Tables 1 and 2 confirm that cafeteria plots serve as a powerful extension tool for accelerating adoption of improved fodder crop varieties. Wider dissemination of identified high-yielding genotypes can substantially enhance year-round green fodder availability and support sustainable livestock production systems. Fig. 1. Trend in average green fodder yield (q ha^{-1}) of berseem and multi-cut sorghum under cafeteria plots across years.

Trend in average green fodder yield (q ha⁻¹) of berseem and multi-cut sorghum varieties under cafeteria plots across years

The figure depicts the year-wise variation in mean green fodder production of berseem during rabi seasons (2017–18 to 2019–20) and multi-cut sorghum during kharif seasons (2018–19 to 2020–21) under cafeteria plot evaluations. A progressive increase in average fodder yield was observed in both crops over successive years, indicating the positive impact of varietal replacement and improved crop management. Berseem showed a steady and stable upward trend, while multi-cut sorghum exhibited a sharper rise following the introduction of high-yielding varieties. The consistent superiority of improved varieties reflects their adaptability and productivity under farmers' field conditions, highlighting the effectiveness of cafeteria plots as a tool for identifying and promoting high-yielding fodder crop genotypes.

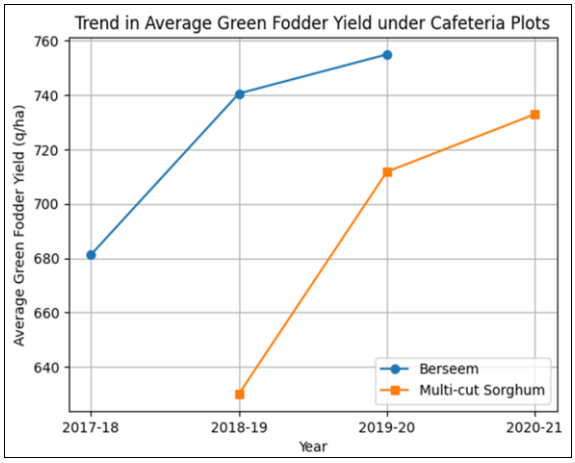

Fig 1: Trend in average green fodder yield (q ha⁻¹) of berseem and multi-cut sorghum under cafeteria plots across years.

Table 1: Average Green Fodder production (q/ha) of different varieties of Berseem crops under cafeteria plots

Session	Name of crops	Name of varieties	Avg. yield (q/ha)	Total avg. yield of different varieties (q/ha)	% increase over the previous year
2017-18	Berseem	Wardan	580	681.25	-
		Mescavi	640		
		BB-3	695		
		BB-9	710		
		BL-42	790		
		BL-43	840		
		JB-1	565		
		JB-2	630		
2018-19	Berseem	Wardan	615	740.62	8.71
		BB-2	810		
		BB-3	795		
		BB-9	760		
		BL-42	850		
		BL-43	840		
		JB-1	670		
		Mescavi	660		
2019-20	Berseem	Wardan	710	755.00	1.94
		HB-1	690		
		BB-3	810		
		JB 5	730		
		BL-42	880		
		BL-43	895		
		JB-1	645		
		Mescavi	680		

Table 2: Average Green Fodder production (q/ha) of different varieties of Sorghum crops under cafeteria plots

Session	Name of crops	Name of varieties	Avg. yield (q/ha)	Total avg. yield of different varieties (q/ha)	% increase over the previous year
2018-19	Sorghum (Multi-cut type)	Pusa Chari 615	645	630	-
		Pant Chari 6	580		
		CSH – 20 MF	610		
		PCH 10	595		
		CSV 24 MF	720		
2019-20	Sorghum (Multi-cut type)	Pusa Chari 615	630	711.8	12.98
		Pant Chari 6	654		
		CSV 33 MF	720		
		Jumbo Gold	745		
		CSV 24 MF	810		
		Mescavi	630		
2020-21	Sorghum (Multi-cut type)	Pusa Chari 615	610	733	2.98
		Pant Chari 6	675		
		CSH – 20 MF	765		
		Jumbo Gold	785		
		CSV 24 MF	830		

Conclusion

The present study clearly demonstrates that the crop cafeteria approach is an effective and practical extension tool for facilitating technology transfer and improving fodder crop productivity under farmers' field conditions. The cafeteria plot demonstrations conducted in Gorakhpur district of Uttar Pradesh enabled systematic evaluation of improved varieties of berseem and multi-cut sorghum and provided farmers with hands-on learning opportunities based on the principle of "seeing is believing". The results revealed a consistent and measurable increase in green fodder yield of both crops over successive years. In berseem, the average fodder yield increased by 10.83% during the study period, with BL-42 and BL-43 emerging as high-yielding and stable varieties. Similarly, multi-cut sorghum recorded an overall yield improvement of 16.35%, with CSV 24 MF, Jumbo Gold, and CSH-20 MF showing superior performance. These findings confirm the role of varietal replacement and improved crop management in enhancing fodder productivity. Overall, the study highlights that crop cafeteria demonstrations not only help in identifying and promoting superior fodder crop varieties but also strengthen farmer confidence, awareness, and adoption of improved technologies. Wider implementation of the crop cafeteria approach by Krishi Vigyan Kendras can significantly improve green fodder availability, contribute to sustainable livestock production, and support livelihood security in crop–livestock-based farming systems of the North Eastern Plain Zone of Uttar Pradesh.

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