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Effect of fodder demonstrations in rainfed conditions of Uttar Pradesh and Uttarakhand states of India

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Abstract
On-farm demonstrations of both sole and mixed fodder crops were conducted with 12 KVKs representing central (Lucknow, Sitapur II and Pratapgarh), eastern (Deoria, Basti and SRD Nagar) and western (Bareilly and Shahahjhanpur) regions in Uttar Pradesh (U.P.) and Bageshwar, Haridwar and Uttarkashi in Uttarakhand. The farmers were trained at district level followed by executing the technological modules at farmers' field by the KVKs. In total 18.5 ha area was covered under demonstrations involving 151 farmers in different districts of U.P. and Uttarakhand during kharif 2014-2015. Sorghum (PC-6) + cowpea (BL-2) demonstrated in an area of 2.0 ha covering 28 farmers recorded green fodder yield of 332 q/ha which was 27% higher as compared to local check (261q/ha). MP Chari demonstrated at district Shahjahanpur and Deoria in an area of 4.0 ha covering 18 farmers showed green fodder yield of 466 q/ha which was 16.5% higher as compared to local check (400q/ ha). The minimum yield advantage of 16% was obtained from sorghum (MP Chari) fodder. Study indicated that improved fodder varieties have potential to enhance the yield in all the crops demonstrated during kharif season.

Keywords: Fodder crops, Fodder yield, Inter-cropping, On-farm demonstration

Presently green and dry fodder availability is 64.66 and 64.23 million tons, respectively in Uttar Pradesh state of India. Thus the deficit of green fodder was 28.3%, but dry fodder was surplus by 14.1%. Whereas in Uttarakhand, green and dry fodder availability is 4.07 and 2.83 million tons, respectively with corresponding green and dry fodder deficits of 48.1 and 42.1%, respectively (Anonymous, 2015). There are many limitations viz., small land holding of farmers and their preferential need for food grains crops thereby affecting forage production (Anonymous, 2016). Besides, the limited availability of quality seed of improved varieties of fodder crops adds to the problem. Also, there is low priority for investment in fodder production by the farmers. Moreover, there are problems in soils also which may be acidic, salt affected and water logged in a given area. Even there is lack of post harvest management for surplus fodder. There is no priority for fodder seed production by the farmers/seed producing agencies. There is no MSP for any of the fodder crops and lack of mechanization in fodder farming. As a result, the balance ration with green fodder is not provided to the animals, which adversely affect the productivity and profitability. Indeed, the green fodder plays a very important role in rationing of livestock and ensuring its availability round the year is a matter of great concern (Kad *et al*., 2013). Demonstrations are the most persuading means for getting the technology accepted by the end users (IRRI, 1999). This is equally applied for the dissemination of fodder production technologies and improved varieties (Hazra, 2014). With this background a National Initiative on Fodder Technology Demonstration (NIFTD) was made across the county by involving 100 KVKs of varied soils and agro-climatic conditions with specific objective to demonstrate the different models of fodder production developed by the ICAR-IGFRI, Jhansi, India. As this project is in operation since 2014, after the completion of more than three years, it was imperative to ascertain the effect of fodder technology demonstrations and therefore, the above study was planned and executed.

The main focus behind NIFTD project was to ensure productivity enhancement of fodder at farmers' field by demonstrating the different options of fodder crops. At the first stage, zone wise forage related constraints were studied which helped to decide on conducting the on-farm demonstrations of both sole fodder crops and mixed fodder crops. Total of 12 KVKs were identified representing central (Lucknow, Sitapur II and Pratapgarh), eastern (Deoria, Basti and SRD Nagar) and western

(Bareilly and Shahahjhanpur) region in Uttar Pradesh and Bageshwar, Haridwar and Uttarkashi in Uttarakhand. The farmers were also trained at district level followed by executing the technological modules at farmers' field by the KVKs. Convergence and linkages were developed by ICAR-IGFRI, Jhansi and ICAR-ATARI, Kanpur. Total 38.5 ha area was covered under demonstrations by covering 251 farmers in different districts of UP and Uttarakhand during kharif 2014 as well as kharif 2015. The performance of demonstrations was ascertained district wise as well as fodder crop wise on the parameters of yield obtained (q/ha) and yield advantages (%). The crop productivity index was also calculated (Kisku *et al*., 2016). The feedback of the farmers was also ascertained for each fodder crop.

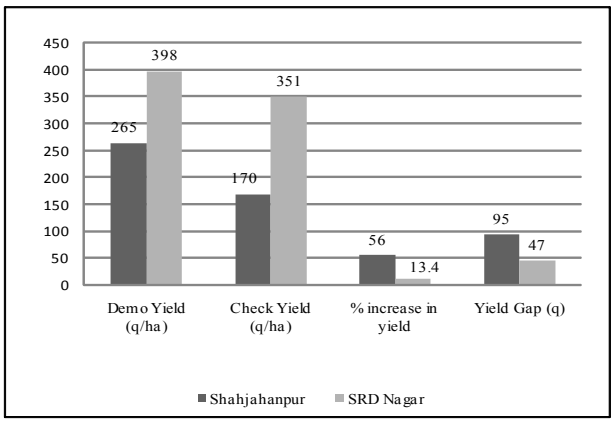

Fig 1. Demonstration on sorghum + cowpea intercropping

In the districts of Shahjahanpur and SRD Nagar of Uttar Pradesh, demonstrations were laid out on sorghum (PC-6) + cowpea (BL-2) in an area of 4.0 ha covering 58 farmers. The demonstrated cultivar showed green fodder average yield of 332 q/ha (ranging from 280 to 412 q/ha for both the years) which was 27% higher when compared to local check (261q/ha). MP Chari was demonstrated at Shahjahanpur and Deoria districts in Uttar Pradesh in an area of 8.0 ha covering 18 farmers. The demonstration indicated green fodder yield of 466 q/ha (ranging from 425 to 501 q/ha for both the years) which was 16.5% higher as compared to local check (400q/ha) (Fig 1).

Demonstrations were also laid out in Shahjahanpur on maize (J-1006) in an area of 2.0 ha on 10 farmers' field. The demonstration resulted green fodder yield of 235 q/ ha, which was 42% higher as compared to local check (165 q/ha). Maize (African tall variety) was demonstrated at Sitapur-II district in an area of 1.42 ha by covering 16 farmers. Green fodder yield was 460q/ha, which was 48 % higher as compared to local check. This variety is palatable, fast growing and soft in nature which is liked by the animals. Similar findings were made by Singh *et al*. (2007). Cowpea (BL-2) was demonstrated in Shahjahanpur, Sitapur-II, Bahraich and Deoria districts in an area of 4.98 ha covering 32 farmers. It was observed that the mixed cropping of sorghum (PC 6) and cowpea (BL 2) gave the yield range of 265-398 q/ha with the average yield advantage of 35% (Table 1). In the other districts of Uttar Pradesh, MP Chari, a variety of sorghum had the highest yield of 646 q/ha but with very low yield advantages (6%), which indicated that farmers might be having the sorghum variety with high yield potential. It was also observed that from the state of Uttarakhand, African tall which was a new introduction yielded as high as 450 q/ha. The demonstrations on cowpea indicated green fodder yield of 287 q/ha which is 9% higher as compared to local check (264q/ha) (Fig 2). Moreover, cowpea supplied green fodder for longer period and improves soil health. Similar findings were observed by Arya *et al*. (1994). In Uttarakhand, demonstrations on maize (African tall) were laid out in Bageshwar, Haridwar and Uttarakashi districts in an area of 2.2 ha of 63 farmers' field indicated average green fodder yield 362.33 q/ha.

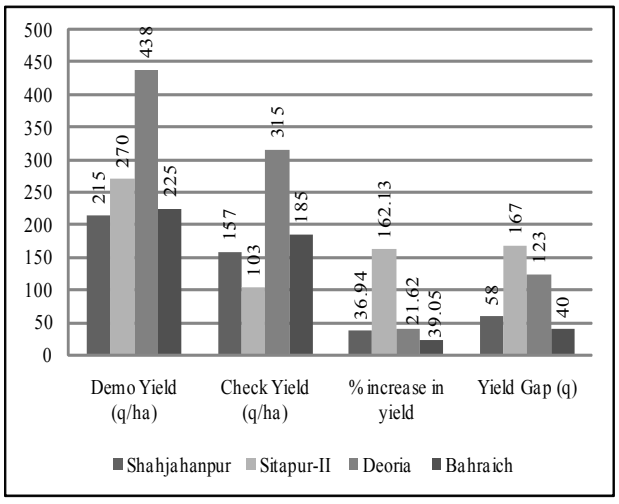

Fig 2. Demonstration on cowpea (BL-2)

Further analysis of the fodder crops and varieties demonstrated, was done to ascertain which fodder crop had relatively better yield and yield advantages. The highest yield advantage (87%) was obtained from cowpea (BL-2) even though the demonstration yield of this variety was less (Table 2). This indicated that there is need for complete replacement of planting material of this variety at the farmers' end. While the yield advantage of 27% was obtained from the mixed cropping of sorghum (PC 6) + cowpea (BL 2) with relatively good yield of check

Table 1. Performance of different fodder crops in the selected districts of Uttar Pradesh and Uttarakhand states (average of 2014 and 2015)

Name of KVK	Average check yield (q/ha)	Average demo yield (q/ha)	% increase in yield
A. Uttar Pradesh			
Performance of mixed cropping of sorghum (PC-6) + cow pea (BL-2) (n=56)			
Shahjhanpur (2.0 acre)	170	265	56.00
SRD Nagar (8.0 acre)	351	398	13.40
Performance of sorghum (MP chari) (n=56)			
Shahjhanpur (9.0 acre)	192	285	48.00
Deoria (11.0 acre)	609	646	06.07
Performance of cowpea (BL-2) (n=64)			
Shahjhanpur (9.0 acre)	157	215	37.00
Sitapur-II (8.5 acre)	103	270	16.20
Deoria (7.5 acre)	-	438	-
B. Uttarakhand			
Performance of fodder maize (African tall) (n=96)			
Haridwar (2 acre)	-	450	-
Bageshwar (5 acre)	-	400	-
Uttarkashi (4 acre)	-	237	-

Table 2. Performance of different fodder crops across the locations of Uttar Pradesh and Uttarakhand states

Fodder crops	Number of farmers	Area covered (acres)	Check yield	Demonstration yield	Yield advantage (%)	CPI (yield gap)
Sorghum (PC-6) + cowpea (BL-2)	56	10.0	261	331	26.82	0.772 (21.14%)
Sorghum (MP chari)	56	20.0	400	465	16.25	0.845 (13.98%)
Cowpea (BL-2)	64	25.0	130	243	86.92	0.694 (46.50%)
Fodder maize (African tall)	96	11.0	-	362	-	0.724 (-)
Total	272	37.0	130-400 (264)	350	43.33	-

CPI: Crop productivity index; Figures in parentheses indicate yield gap

Table 3. Farmers' feedback of different fodder crops utilized in demonstrations

Fodder crops taken	Number of farmers	Feedback	Frequency	Percent and rank
Sorghum (PC-6) + cowpea (BL-2)	28	Farmers are convinced for qualitative and quantitative fodder production	46	82.14(I)
		Palatable fodder	44	78.57(II)
Sorghum (MP chari)	28	Good yield and fast growing	50	89.28(I)
Cowpea (BL-2)	32	Higher green fodder yield as compared to local variety	60	93.75(I)
		More foliage than local	56	87.50(II)
		Provides green fodder for longer period	54	84.37(III)
		Nutritive fodder and good for soil health	50	78.12(IV)
Fodder maize (African tall)	63	Good fodder growth, liked by the milch animals	110	87.30(II)
		Resulted good green fodder with higher yield	118	93.65(I)

plots. The minimum yield advantage of 16% was obtained from sorghum (MP Chari) fodder since the yield was comparable with checks. The CPI was maximum for sorghum-MP chari (0.845), followed by the combination of sorghum and cowpea (0.772), cowpea as sole crop (0.694) and fodder maize (0.724).

In this study, there were different types of fodder crops, which were demonstrated to the farmers. However, farmers had different reasons for preferring different fodder crops. Based on the frequency of preference of the partner farmers, their percent score and ranking were worked out. For the fodder crop cowpea (BL 2), farmers had four different reasons for preferring it (Table 3). Majority of them (94%) stated that BL2 variety of cowpea gave higher yield as compared to the local variety and at the same time it had more foliage density over local (88%), ensured green fodder supply for relatively longer period of time (84%) and also improved soil fertility status as experienced by 78% of the farmers. Similarly, farmers from Uttarakhand for whom the green fodder maize (African tall) was the pririty crop, they opined that this fodder crop was extremely suitable for their situations, since it yielded large quantity of good quality green fodder (94%) which was acceptable to local animals (87%). Similarly the mixed cropping of sorghum (PC6) and cowpea (BL 2) created fairly good magnitude of conviction among the farmers about qualitative and quantitative suitability of this combination (82%) followed by the greater palatability of the mixture to the animals (79%).

It was concluded that improved fodder varieties have potential to enhance the yield in all the crops demonstrated during kharif season. There are also lots of options for fodder crops to be grown during kharif season to meet out the fodder requirements of livestock even under rainfed conditions of Uttar Pradesh and Uttarakhand states.

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References

Anonymous. 2016. State of Indian Agriculture 2015-16. Department of Agriculture, Cooperation and Farmers Welfare, Directorate of Economics and Statistics, Government of India, New Delhi. pp. 280.

Anonymous.2015. Socio-economic statistical information about India. https://www.indiastat.com/agriculture/2/animalhusbandrylivestock/48/fodder19952015/449338/stats.aspx (accessed on May 06, 2017).

Arya R. L., A. Singh and K.C. Arya. 1994. Strategies for raising food - fodder output. *Intensive Agriculture* XXXII: 27-30.

Hazra, C. R. 2014. Feed and forage resources for sustainable livestock development. *Range Management and Agroforestry* 35: 1-14.

IRRI.1999. Rice knowledge bank: Conduction field demonstrations. http://www.knowledgebank.irri.org/index.php ? option = com_zoo & task= item & item_id = 759 & Item id= 949 (accessed on May 06, 2017).

Kad, Sanjay, D. S. Brar, Rajiv Kale and Vishal Vairagar. 2013. Innovativeness and production practices of lucerne among the dairy farmers of Maharashtra, India. *Range Management and Agroforestry* 34: 209-213.

Kisku, Debkumar and S. Ghosh. 2016. Spatiotemporal variation in status of crop diversification and its impact on farming in West Bengal. *Journal of Community Mobilisation for Sustainable Development* 11: 29-38.

Singh A., A.K. Singh, L. Singh and R. Prasad. 2007. Yield advantage in fodder crops at farmer's field. *Range Management and Agroforestry* 28: 342-343.