

## Yield gap analysis of finger millet through Frontline Demonstrations in Davangere district of Karnataka

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### Abstract

*The study was conducted in 13 villages of Davangere district from 2006 to 2015 to analyze the yield gap of finger millet crop covering 102.2 hectares and 239 farmers through frontline demonstrations. The average demonstration yield was 2268.5 kg/ha., average yield of local check was 1594.9 kg/ha. and average increase of demonstration yield over local check yield was 42.70 per cent. The average technology gap for five finger millet varieties demonstrated found to be 802.9 kg/ha., extension gap was 673.6 kg/ha. and technology index was 25.5 per cent. Regarding economics of frontline demonstration, the average cost of cultivation for demonstration and local check was Rs. 15099.93 and Rs. 12119.14 respectively. The average gross returns was Rs. 33004.71 and Rs. 22905.14 and average increase in gross return was Rs. 45.75 per cent. The frontline demonstrations on finger millet helped farmers to get higher yield and income there by increased standard of living. The demonstrated varieties of finger millet produced higher quantities of fodder than local check varieties.*

**Key Words:** Yield gap, Potential yield, Frontline demonstration, Extension gap, Technology gap

### Introduction

Davangere district comprises of 3 agro-climatic zones namely; Northern Dry Zone (Zone-III), Central Dry Zone (Zone-IV) and Southern Transitional Zone (Zone-VII), The district receives annual normal rainfall of 656.9 mm. Finger millet is the third important cereal crop of the district after maize and rice in terms of area. It is grown in 14508 ha. area with production of 31837 ton and 2194 kg/ha. Productivity (Anon-2015). It is mainly grown in late kharif season, sowing takes place between August 1<sup>st</sup> week to September 1<sup>st</sup> week and harvesting from November to December under rain fed farming situation. ICAR-Taralabalu Krishi Vigyan Kendra and Department of Agriculture, Davangere have taken demonstrations on finger millet to reduce the time gap between technology generated and its adoption and to transfer the improved technologies to increase productivity. This helps field functionaries to elucidate production constrains and limitations in the

adoption of technologies in the farmers field and scientists to reorient their research accordingly.

## Objectives

- 1 To analyze the yield levels of different varieties of finger millet through frontline demonstrations.
- 2 To analyze the economics of frontline demonstrations in finger millet.

## Methodology

ICAR- Taralabalu Krishi Vigyan Kendra, Davangere conducted frontline demonstrations during the kharif season for consecutive ten years from 2006 to 2015 on finger millet in farmers field with an emphasis on Integrated Crop Management. A total of 239 demonstrations covering an area of 102.2 ha. and having similar number of traditional or local check were carried out in 13 villages in the district. The finger millet varieties namely; GPU-48 (Alur, Billahalli villages), GPU-28 (Kurki, Mallenahalli, Tholahunse, Mellakatte, Bidarekere, Taraganahalli, Bommenahalli, Garaga and Hunsihalli), MR-6 (Benakanahalli and Siddanuru), KMR-301 (Garaga, Bidarekere, Benakanahalli, Pandomatti) and ML-365 (Kadabagere) were introduced to farmers in different villages. In Frontline Demonstrations, technologies viz: proper seed rate, integrated nutrient management, high yielding varieties, seed treatment with bio-fertilizers and need based plant protection measures were thought. On the contrary in local check plots farmers practice improper seed rate, improper nutrient management, local (low yielding) varieties, no seed treatment and improper plant protection measures. The detailed data on yield, cost of cultivation, gross returns, net returns, additional cost, additional returns and benefit cost ratio for both demonstration and local check plots were calculated. Following procedure was applied for determining the performance indicators:

1. Benefit cost ratio= Gross return/Cost of cultivation.
2. Technology gap= Potential yield – Demonstration yield.
3. Extension gap= Demonstration yield-Local check yield.
4. Technology index= $[(Py-Dy)/Py] \times 100$ . Where Py=Potential yield and Dy=Demonstration yield.

## Results and Discussion

The potential yield and demonstration yield of the respective variety and year were compared along with local check yield to estimate yield gap which was further categorized in to technology and extension gaps. The technology gap (1970 kg/ha) was highest in the year 2011 (MR-6 variety) followed by 1470 kg/ha in 2010 (MR-6) and 1150 kg/ha in 2012 (GPU-28). The average technology gap was found to be 802.9 kg/ha for all the varieties. This may be due to previous crops grown in some land, variation in soil fertility and veracity in rainfall distribution etc. Hence, location specific recommendations are required to bridge the gap. Higher technology gap (1127 kg/ha) were also recorded by Jat and Gupta (2015) and Meena *et al* (2012).

Among the 14 batch of demonstration, eight times extension gaps were lower than technology gaps. This clearly indicates the efforts made by scientists to educate the farmers in adoption of improved technology to narrow down the gap. Technology index shows the feasibility or the adoptability of the evaluated technology in the farmers field. Lower the value of technology index, higher will be the adoption of technology. The technology index was lower (13.00 %) in 2010 (KMR-301) followed by 14.33 per cent in 2014 (KMR-301) and 16.32 per cent in 2015 (ML-365). The average technology index for all the years and varieties of finger millet was found to be 25.5 per cent. The similar findings were also reported by Jat and Gupta (2015) (40.98 %

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**Table 1. Yield and other parameters of finger millet in different villages of Davangere district of Karnataka**

Year	Village	Variety	Area (ha)	No. of Farmers	Highest yield of Demo (kg/ha)	Lowest yield of demo (kg/ha)	Average yield of demo (kg/ha)	Average yield of local check (kg/ha)	Per cent increase	Technology gap (kg/ha)	Extension gap (kg/ha)	Technology index
2006	Alur	GPU-48	8	20	2600	1800	2096	1659	26.34	404	437	16.16
2007	Kuki, Mellakatte and Tholahunase	GPU-28	10	24	2350	2050	2200	1400	57.14	800	800	26.66
2008	Kurki, Mallenahalli	GPU-28	10	10	2740	2100	2480	1680	47.00	520	800	17.33
2009	Taraganahalli	GPU-28	10	28	2680	2150	2310	1640	40.85	690	670	23.00
2010	Benakanahalli	MR-6	2.6	7	2540	2400	2530	1650	53.30	1470	880	36.75
2010	Bidarekere	KMR-301	6.4	16	2720	2430	2610	1640	59.10	390	970	13.00
2011	Benakanahalli	KMR-301	5.2	13	2560	2120	2340	1490	57.04	660	850	22.00
2011	Siddanuru	MR-6	4	10	2220	1840	2030	1470	38.00	1970	560	49.25
2011	Bidarekere	GPU-28	8	20	2120	1470	2120	1470	44.20	880	650	29.33
2012	Bommenahalli, Garaga	GPU-28	10	21	2130	1680	1850	1480	25.00	1150	370	38.33
2013	Billahalli	GPU-48	6	15	2350	1890	2250	1630	38.00	250	620	17.20
2014	Garaga, Pandomatti	KMR-301	10	25	2890	2200	2570	1530	67.90	430	1040	14.33
2015	Hunsihalli	GPU-28	4	10	2140	1650	1860	1530	21.56	1140	330	38.00
2015	Kadabagere	ML-365	8	20	2760	2290	2513	2060	21.99	487	453	16.23
<b>Total</b>			<b>102.2</b>	<b>239</b>								
<b>Average</b>					<b>2317.86</b>	<b>2005.00</b>	<b>2268.50</b>	<b>1594.90</b>	<b>42.70</b>	<b>802.90</b>	<b>673.60</b>	<b>25.50</b>

**Potential yield (q/ha): GPU 28-30, KMR 301-30, ML 365-30, GPU 48-25, MR 6-40**

**Table 2: Economic performance of finger millet in different villages of Davangere district of Karnataka**

Year	Village	Variety	Area (ha)	No. of Demo	Cost of Cultivation		Gross Returns		Increase in Gross Returns (%)	Net Returns (Rs./ha)		Increase in Net Returns (%)	Additional Cost (Rs./ha)	Additional Returns (Rs./ha)	B:C ratio	
					Demo	Local	Demo	Local		Demo	Local				Demo	Local
2006	Alur	GPU-48	8	20	4500	4800	16780	13272	26.43	12280	8472	44.95	-300	3508	3.73	2.76
2007	Kuki, Mellakatte and Tholahunase	GPU-28	10	24	7240	6500	14300	9100	57.14	7060	2600	171.53	740	5200	1.98	1.40
2008	Kurki, Mallenahalli	GPU-28	10	10	7000	5100	19840	13440	47.62	12840	8340	53.96	1900	6400	2.83	2.63
2009	Taraganahalli	GPU-28	10	28	6950	5200	19404	13776	40.85	12454	8576	45.22	1750	5628	2.79	2.65
2010	Benakanahalli	MR-6	2.6	7	7350	5200	29095	18975	53.33	21745	13775	57.86	2150	10120	3.95	3.64
2010	Bidarikere	KMR-301	6.4	16	7300	5200	30015	18860	59.12	22715	13660	66.29	2100	11155	4.11	3.62
2011	Benakanahalli	KMR-301	5.2	13	21100	10500	26910	17135	57.05	14810	6635	123.21	10600	9775	2.22	1.63
2011	Siddanuru	MR-6	4	10	21100	10700	23345	16905	38.10	11245	6205	81.22	10400	6440	1.92	1.57
2011	Bidarikere	GPU-28	8	20	21100	10500	24380	16905	44.22	12280	6405	91.73	10600	7475	2.04	1.61
2012	Bommenahalli, Garaga	GPU-28	10	21	15800	15800	33300	26640	25.00	17500	10840	61.44	00	6660	2.10	1.68
2013	Billahalli	GPU-48	6	15	23000	24500	54000	40100	34.66	31000	15600	98.72	-1500	13900	2.34	1.63
2014	Garaga, Pandomatti	KMR-301	10	25	24425	23790	65144	38300	70.09	40719	14509	180.64	635	26844	2.66	1.61
2015	Hunsihalli	GPU-28	4	10	21234	18950	42780	26008	64.45	21546	7058	205.27	2284	16772	2.01	1.37
2015	Kadabagere	ML-365	8	20	23300	22900	62773	51256	22.47	39473	28356	39.21	400	36765	2.69	2.24
<b>Total</b>			<b>102.2</b>	<b>239</b>												
<b>Average</b>					<b>15099.93</b>	<b>12117.14</b>	<b>33004.71</b>	<b>22905.14</b>	<b>45.75</b>	<b>19833.36</b>	<b>10787.93</b>	<b>94.37</b>	<b>2982.79</b>	<b>11903.00</b>		

A close look at the yield levels of finger millet in frontline demonstration reveals that highest yield of 2610 kg/ha. recorded in KMR-301 variety (2010) followed by 2570 kg/ha. in KMR-301 (2014) and 2530 kg/ha. in MR-6 variety (2010). The lowest demonstration yield of 1850 kg/ha. (2012) and 1860 kg/ha. in 2015 (both in GPU-28). The highest average yield in frontline demonstration among different varieties was recorded in ML-365 (2513 kg/ha.) followed by KMR-301 (2506.66 kg/ha.), MR-6 (2280 kg/ha.), GPU-48 (2173 kg/ha.) and GPU-28 (2136.66 kg/ha.). The maximum increase in demonstration yield over local check was 67.9 per cent in KMR-301 (2014) followed by 59.10 per cent in KMR 301 (2010), 57.14 percent in GPU-28 (2007), 57.04 per cent in KMR-301 (2011) and 53.30 per cent in MR-6 variety (2010). The average increase in demonstration yield over local check was found to be 42.70 per cent.

The economics of demonstration in Table-2 indicates that average gross return for demonstration and local check was found to be Rs.33004.71 and Rs. 22905.14 per hectare. An average increase of gross return of demonstration over local check was 45.75 per cent. This might be due to higher yields obtained in demonstrations due to the intervention of scientists, the adoption of high yielding varieties, proper seed rate, use of bio-fertilizers for seed treatments, proper nutrient management practices and need based plant protection measures were also contributed to increase in gross return in demonstration plots. The highest (205.27 %) increase in net return was recorded in GPU-28 variety (2015) followed by 180.64 per cent in KMR-301 (2014), 171.53 per cent in GPU-28 (2007) and 123.21 percent KMR-301 (2011). The average net return was found to be 94.37 per cent increase which implies that frontline demonstrations could increase standard of living among (socio-economic status) the farming community in Davangere district. Considering all the frontline demonstrations the highest BC ratio was found in KMR-301 (4.11) (2010) followed by 3.95 in MR-6 (2010), 3.73 in GPU-48 (2006) and 2.83 in GPU-28 (2008) varieties.

## Conclusion

The above results indicate that frontline demonstration on finger millet crop in Davangere district increase the yield, net returns to farmers substantially. The adoption of recommended practices advocated by scientists helped in getting increased income and better the standard of living of the farm families. In addition, the nutritious fodder from finger millet was added advantage for the farmers. The high yielding varieties demonstrated produce more fodder than the local check varieties. The demonstrations re-assured the fact that finger millet economically viable crop if farmer adopt demonstrated technologies, which otherwise neglected crop.

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