

FRONT LINE DEMONSTRATIONS IN SMALL MILLETS

Front line demonstration is a unique approach to provide direct interface between researcher and farmers as the scientists are directly involved in planning, execution and monitoring of the demonstrations from the technologies developed by them and get direct feedback from farmer's field about the varieties / technologies. During the cropping seasons 2015 FLD's were laid out in the farmers field with the objective of assessing as well as demonstrating the potential available in the improved agro production technologies developed and recommended for small millets. This activity was supported by Department of Agriculture and Co-operation (DAC), Ministry of Agriculture and farmer's welfare, Government of India. Field demonstration is a long term educational activity conducted in a systematic manner in the farmer's field to show the worth of a new practice/ technology. "Seeing is believing" is the basic philosophy of field demonstrations. Only proven technologies are therefore selected for field demonstrations. Field demonstrations educate farmers through results obtained in terms of introduction of recently released varieties, improved management practices and varieties resistant to disease and pest, quality of the grains and overall higher yields. Field demonstrations provide an effective learning situation as farmers "See the crops themselves", "interact with the scientists and extension workers on the fields", and "get doubts clarified then and there itself". Front line demonstrations were assigned to sixteen centres covering all important states of the country.

The details of front line demonstrations planned and executed during 2015 are given in Table 1. All 300 ha assigned were conducted and the results of demonstrations conducted during *Kharif* 2015 are presented in Tables 2 to 7.

Table 1: Details of Front Line Demonstrations conducted on Small Millets during 2015, cropping season

S. No.	State	Centre	Crop	Demonstration Area (ha)		No. of Farmers
				Assigned	Conducted	
			Finger millet	10	10	25
1	Karnataka	P.C.Unit, Bengaluru	Foxtail millet	10	10	25
			Little millet	10	10	25
			Kodo millet	10	10	25
		Mandya	Finger millet	10	10	15
		Hanamanamatti	Foxtail millet	10	10	15

		Hagari	Foxtail millet	10	10	25
2	Andhra Pradesh	Nandyal	Foxtail millet	30	30	48
		Vizianagaram	Finger millet	8	8	34
			Little millet	7	7	10
3	Chhattisgarh	Jagdalpur	Little millet	5	5	5
			Finger millet	10	10	18
			Kodo millet	10	10	25
4	Jharkhand	Kanke	Finger millet	10	10	33
5	Tamil Nadu	Athiyandal	Finger millet	10	10	24
			Little millet	15	15	25
			Kodo millet	10	10	12
			Proso millet	10	10	11
			Barnyard millet	5	5	11
6	Uttarakhand	Ranichauri	Finger millet	5	5	142
			Barnyard millet	5	5	128
		Almora	Finger millet	7	7	113
			Barnyard millet	3	3	82
7	Madhya Pradesh	Dindori	Kodo millet	15	15	28
			Little millet	10	10	22
		Rewa	Kodo millet	10	10	52
			Little millet	5	5	26
8	Maharashtra	Kolhapur	Finger millet	10	10	50
			Little millet	5	5	25

9	Odisha	Berhampur	Finger millet	10	10	25
10	Gujarat	Waghai	Finger millet	10	10	51
			Little millet	5	5	25
Total				300	300	1180

Break up of demonstrations conducted based on area (Table 1.1 and 1.2) for different crops was Finger millet 100 ha, Foxtail millet 60 ha, Kodo millet 55, little millet 62 ha, Barnyard millet 13 ha and proso millet 10 ha. The total number of farmers involved was 1180. Number of front line demonstrations conducted in small millets in different states (Table 1.3) indicated that there were 530 farmers involved in finger millet demonstrations during 2015 across the country followed by barnyard millet (221), little millet (163), Kodo millet (142), foxtail millet (113) and proso millet (11). The main purpose of this activity was to demonstrate the yield potential that could be attained by adopting the improved cultivation practices. Most of the demonstrations were conducted by adopting the whole package with improved varieties versus farmer's practices with local varieties. However, at Nandyal promising intercropping (Foxtail millet + Pigeon pea) and sequences cropping system (Foxtail millet - Mustard / Jowar/ Ground nut/ Paddy / Bengal gram) were demonstrated. These demonstrations might help not only for validation of research findings under real farm situations but also serves as nodal point for bringing together field extension personnel and scientists besides elucidating farmer's reaction to the new agro production technologies recommended.

Table 1.1: Crop wise area (ha) allocated, conducted and no. of farmers involved in front line demonstrations during 2015

S. No.	Crop	Area (ha)		No. of Farmers
		Allocated	Conducted	
1	Finger millet	100	100	530
2	Foxtail millet	60	60	113
3	Kodo millet	55	55	142
4	Little millet	62	62	163
5	Barnyard millet	13	13	221
6	Proso millet	10	10	11
	Total	300	300	1180

Table 1.2: State wise area (ha.) distribution of FLD's in small millets

State	Finger millet	Foxtail millet	Kodo millet	Little millet	Proso millet	Barnyard millet	Total
1. Karnataka	20	30	10	10	-	-	70
2. Andhra Pradesh	8	30	-	7	-	-	45
3. Tamil Nadu	10	-	10	15	10	5	50
4. Odisha	10	-	-	-	-	-	10
5. Gujarat	10	-	-	5	-	-	15
6. Chhattisgarh	10	-	10	5	-	-	25
7. Jharkhand	10	-	-	-	-	-	10
8. Uttarakhand	12	-	-	-	-	8	20
9. Madhya Pradesh	-	-	25	15	-	-	40
10. Maharashtra	10	-	-	5	-	-	15
Total	100	60	55	62	10	13	300

Table 1.3: State wise distribution of FLD's (No. of farmers) in small millets

State	Finger millet	Foxtail millet	Kodo millet	Little millet	Barnyard millet	Proso millet	Total
1. Karnataka	40	65	25	25	-	-	155
2. Andhra Pradesh	34	48	-	10	-	-	92
3. Tamil Nadu	24		12	25	11	11	83
4. Odisha	25	-	-	-	-	-	25

5. Gujarat	51	-	-	25	-	-	76
6. Chhattisgarh	18		25	5	-	-	48
7. Jharkhand	33						33
8. Uttarakhand	255	-	-	-	210	-	465
9. Madhya Pradesh	-	-	80	48	-	-	128
10. Maharashtra	50	-	-	25	-	-	75
Total	530	113	142	163	221	11	1180

Frontline demonstrations in Small Millets: Break up of demonstrations conducted based on area for different crops was Finger millet 100 ha, Foxtail millet 60 ha, Kodo millet 55, little millet 62 ha, Barnyard millet 13 ha and proso millet 10 ha. The total number of farmers involved was 1180. Number of front line demonstrations conducted in small millets in different states indicated that there were 530 farmers involved in finger millet demonstrations during 2015 across the country followed by barnyard millet (221), little millet (163), Kodo millet (142), foxtail millet (113) and proso millet (11). The main purpose of this activity was to demonstrate the yield potential that could be attained by adopting the improved cultivation practices. Most of the demonstrations were conducted by adopting the whole package with improved varieties versus farmer's practices with local varieties. However, at Nandyal promising intercropping (Foxtail millet + Pigeon pea) and sequences cropping system (Foxtail millet - Mustard / Jowar/ Ground nut/ Paddy / Bengal gram) were demonstrated

Productivity of finger millet in front line demonstrations: The increased yield obtained from the improved varieties with whole package demonstrations was compared with farmer's practice in Karnataka, Tamil Nadu, Maharashtra, Jharkhand, Odisha, Andhra Pradesh, Chhattisgarh, Gujarat and Uttarakhand. In general, the grain yield ranged from 770 to 3500 kg / ha in rainfed / irrigated conditions respectively under improved crop management practice as against 530 to 3000 kg per hectare under farmers practice with local varieties.

Productivity of Foxtail millet in front line demonstrations: The front line demonstrations were conducted on foxtail millet in two states namely Andhra Pradesh and Karnataka with the improved varieties such as Suryanandi, Srilakshmi and SiA-3085 were evaluated. In Andhra Pradesh improved variety with recommended package of practice (recommended dose of fertilizer-40:20 kg NP₂O₅ /ha) gave an increase in yield (14) over farmer's practice (local variety) whereas, improved inter cropping and sequence cropping systems gave 27 and 47 per cent higher foxtail millet grain equivalent yield, respectively as compared to farmers practice. In Karnataka due to the introduction of HYV's at Hosadurga, Badami and Shiiggaotaluks with whole package (improved varieties and compost / recommended dose of fertilizer) there was an improvement in foxtail millet grain yield to the tune of 33 - 265 per cent over farmer's practice.

Productivity of Kodo millet in front line demonstrations

The front line demonstrations were conducted in four states viz., Madhya Pradesh, Chhattisgarh, Karnataka and Tamil Nadu. Improved varieties of kodo millet viz. RBK 155, CO 3, JK 439, JK 98 and RK 137 were evaluated along with recommended dose of fertilizer (40:20 kg NP₂O₅ /ha) v/s farmers practice (local variety) which gave an increase in yield of 67 to 101 per cent in Madhya Pradesh, whereas, the increase in improved practice (improved variety and recommended dose of fertilizer / compost) over farmers practice was 87 per cent in Jagdalpur, 26 per cent in Karnataka and 18 per cent in Athiyandal of Tamil Nadu state.

Productivity of Little millet in front line demonstrations: The front line demonstrations of little millet were conducted in Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, Madhya Pradesh, Chhattisgarh and Gujarat states, where in improved varieties viz. JK 8, JK 36, CO (SA) 4, GV 2 with recommended dose of fertilizer (40:20 kg NP₂O₅ /ha) were evaluated against local practices. The results presented in the Table 5 revealed that, the grain yield increase in demonstrations was 16 per cent in Tamil Nadu, 38 per cent in Karnataka, 36 in Andhra Pradesh, 42 per cent in Gujarat, 130 per cent in Chhattisgarh, 42 per cent in Maharashtra and 52-83 per cent in Madhya Pradesh due to introduction of improved varieties with entire package of practices over local practices.

Productivity of Proso millet in front line demonstrations: The front line demonstrations on proso millet were conducted in Tamil Nadu state with improved variety (CO (PV) 5) along with recommended dose of fertilizer (40:20 kg NP₂O₅ / ha) V/s farmer's practice. The improved variety along with improved management practice gave 18 per cent higher grain yield (1308 kg/ha) as compared to farmers practice (1105 kg/ha).

Productivity of Barnyard millet in front line demonstrations: The front line demonstrations on barnyard millet were conducted in Uttarakhand (Almora and Ranichauri) and Tamil Nadu with improved varieties viz. PRJ 1, VL 207, VL 172 and CO 2 and whole package (improved variety and recommended dose of fertilizer- 40:20 kg NP₂O₅ / ha) V/s farmer's practice. In the mid hills of Uttarakhand (Ranichauri and UttaraKashi) the improved / whole package demonstrations gave 1539 kg/ha mean grain yield which was 50 per cent higher than farmer's practice (1026 kg/ha) where as at Almora whole package demonstration gave mean grain yield of 753 kg/ha. In Tamil Nadu the whole package demonstration, the mean yield of 1371 kg / ha was obtained which was 28 per cent higher than farmer's practice (1071 kg / ha). The physical locations of these demonstrations in different states are given in the table 8 to 8.5.

Table 2: Grain yield (kg / ha) of Finger millet in Frontline demonstrations

S. No.	State	Centre / District	Grain Yield (kg ha ⁻¹)				% Increase over farmers practice	Technologies Demonstrated
			Demonstration (IP)		Farmer's practice (FP)			
			Range	Mean	Range	Mean		
1	Karnataka	PC Unit	1788-3300	2569	1513-2338	2002	28	Improved varieties GPU 67 with whole package V/s Farmer's practice.
		Mandya	1200-3500	2593	1000-3000	2173	19	Improved varieties KMR-301 with whole package V/s Farmer's practice.
2	Chhattisgarh	Jagdalpur	1358-2250	1812	530-1150	819	121	Improved package with GPU 28 (line sowing) V/s Local varieties with farmer's practice.
3	Jharkhand	Ranchi	1320-3180	2441	1100-2540	1911	28	Improved varieties (BBM 10, JWM-1 V/s Local varieties with Farmer's practice
4	Uttarakhand	Ranichauri	1300-1980	1621	750-1280	1016	59	Improved varieties (PRM-2) V/s Local varieties with Farmer's practice.
		Almora	770-990	910	750-790	760	20	Improved varieties (VL-135, VL -149 and VL-324) with whole package v/s Farmer's practice.
5	Tamil Nadu	Athiyandal	2678-3200	3023	2200-2900	2645	14	High yielding variety (CO 15) with whole package v/s Farmer's practice
6	Odisha	Berhampur	1825-2400	2100	9000-1390	1215	72	High yielding varieties (Bhairabi) with improved management practices, line transplanting v/s Farmer's practice.
7	Andhra Pradesh	Vizianagaram	2000-3000	2500	1000-2000	1800	38	High yielding varieties (VR 990) with improved management practices v/s Farmer's practice.
8	Maharashtra	Kolhapur	1275-1679	1519	1034-1345	1182	29	Improved varieties PhuleNachani with whole package V/s Farmer's practices
9	Gujarat	Waghai	925-1850	1403	650-1300	1012	38	Improved varieties (GN 4 and GN 5) with whole package

Table 3: Grain yield (kg / ha) of Foxtail millet in frontline demonstrations

S. No.	State	Centre / district	Grain Yield (kg ha ⁻¹)				% Increase over farmer's practice	Technologies Demonstrated
			Demonstration (IP)		Farmer's practice			
			Range	Mean	Range	Mean		

1.	Andhra Pradesh	Nandyal	Sole	2250-3750	3013	1850-3450	2634	14	High yielding varieties(Srilakshmi) with whole package v/s Farmer's practice
			Intercropping	-	2885*	-	2262	27	Improved inter cropping system of foxtail millet + pigeon pea with recommended management practices
			Sequence cropping	-	3541*	-	2404	47	Improved sequence cropping system (foxtail millet- chick pea) with recommended management practices
2.	Karnataka	P.C. Unit Bengaluru		1240-1930	1613	830-1380	1161	38	Whole package with improved practices (SiA 3085, Srilakshmi and Suryanandi) V/s Farmer's practice
		Hanamanamatti		2100-3300	2709	1400-2501	2038	33	Improved varieties along with recommended management practices
		Hagari		1250-2375	1948	312-750	528	265	Whole package with improved variety V/s Farmer's practice.

*Foxtail millet grain equivalent yield

Table 4: Grain yield (kg / ha) of Kodo millet in frontline demonstrations

S. No.	State	Centre / district	Seed/ Grain Yield (kg ha ⁻¹)				% Increase over farmer's practice	Technologies Demonstrated
			Improve practice (IP)		Farmer's practice			
			Range	Mean	Range	Mean		
1.	Madhya Pradesh	Dindori	1209-1922	1559	622-905	773	101	Improved varieties with whole package V/s Farmer's practice
		Rewa	880-1300	1019	497-940	610	67	Improved varieties (RK 390-25, JK 98, JK 155 and RK 137) with whole package V/s Farmer's practice
2.	Chhattisgarh	Jagdalpur	1050-1845	1414	550-850	755	87	Improved package with (JK 439) V/s Local varieties with farmer's practice.
3.	Tamil Nadu	Athiyandal	2772-3073	2914	2395-2605	2461	18	High yielding variety (CO 3) with whole package v/s Farmer's practice
4.	Karnataka	Tumkur	788-1444	1092	656-1050	861	26	Whole package with improved varieties (RBK-155) V/s Farmer's practice.

Table 5: Grain yield (kg/ha) of little millet in frontline demonstrations

S. No.	State	Centre / district	Seed Yield (kg ha ⁻¹)				% Increase over farmer's practice	Technologies Demonstrated
			Demonstration (IP)		Farmer's practice			
			Range	Mean	Range	Mean		
1.	Karnataka	PC Unit, Bengaluru	1238-1650	1452	825-1238	1045	38	Whole package with improved practices V/s Farmer's practice (JK-8)
2.	Madhya Pradesh	Dindori	795-1135	995	433-609	543	83	Improved management practices V/s local practices
		Rewa	438-695	588	265-500	387	52	Improved varieties (JK 8, JK 36) with whole package v/s Farmer's practice
3.	Tamil Nadu	Athiyandal	1110-1567	1406	1000-1342	1208	16	High yielding variety (CO (SA) 4) with whole package v/s Farmer's practice
4.	Gujarat	Waghai	800-1000	942	520-900	665	42	Improved varieties (GV-2) with whole package v/s Farmer's practice.
5.	Chhattisgarh	Jagdapur	580-785	674	280-310	282	139	Improved varieties (JK 8) with whole package v/s Farmer's practice.
6.	Maharashtra	Kolhapur	792-900	838	561-638	591	42	High yielding varieties with whole package v/s Farmer's practice
7.	Andra Pradesh	Vizianagaram	900-1000	950	600-800	700	36	High yielding varieties with whole package v/s Farmer's practice

Table 6: Yield (kg/ha) of Proso millet in Frontline Demonstrations

S. No.	State	Centre / district	Seed Yield (kg ha ⁻¹)				% Increase over farmer's practice	Technologies Demonstrated
			Improved practice		Farmer's practice			
			Range	Mean	Range	Mean		
1.	Tamilnadu	Athiyandal	1100-1432	1308	978-1265	1105	18	Improved practice with improved variety (CO (PV) 5) V/s Farmer's practice.

Table 7: Yield (kg/ha) of Barnyard millet in Frontline Demonstrations

S. No.	State	Centre / district	Seed Yield (kg ha ⁻¹)	% Increase over farmer's practice	Technologies Demonstrated
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			Improved practice		Farmer's practice			
			Range	Mean	Range	Mean		
1.	Uttarakhand	Ranichauri	1350-1880	1539	800-1200	1026	50	Improved practice with improved variety (PRJ 1) V/s Farmer's practice.
		Almora	630-850	753	-	-	-	Improved practice with improved variety (VL 207, VL 172 and PRJ 1)
2.	Tamilnadu	Athiyandal	1200-1564	1371	972-1187	1071	28	Improved practice with improved variety (CO 2) V/s Farmer's practice.