1. Sorghum Genetic Resources Management 2008 – 09

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Contents

Executive summary

- National Research Centre for Sorghum (NRCS) is one of the National Active Germplasm Sites (NAGS) with the responsibility to collect, conserve, evaluate, document, and distribute the sorghum germplasm to the bonafied user within the country. During the reporting period for the year 2008 – 09, the following progress has been made**.**
- A total of 102 accessions were collected from Madhya Pradesh (70), Gujarat (32) during kharif. 211 accessions of voucher samples were submitted to the National Genebank, NBPGR, New Delhi for obtaining IC No.
- A total of 458 accessions are being multiplied for utilization, necessary submission to the National Genebank, NBPGR and sending for trials. 3385 accessions were distributed to the sorghum researchers of the country and 1264 accessions were supplied for trials at NRCS and AICSIP centres. A total of 579 acc. of breeding materials exchanged to NRCS and AICSIP scientists
- Applications for 41 exatant varieties and six new varieties have been submitted to for protection with the Protrction of Plant Varieties and Farmer's Rights Authority. A total of 42 applications for protection of state released sorghum varieties are being submitted to Director – NBPGR for onward submission to the Plant Authority.
- We have received certificate of plant variety protection for three exatant varieties namely CSH 13, CSH 16, and CSH 18 from Protrction of Plant Varieties and Farmer's Rights Authority

1. Sorghum germplasm collection (2008 – 09)

A total of 102 accessions were collected from Madhya Pradesh (70), Gujarat (32) during kharif. The important landraces collected during 2008 – 09 is presented in Table 1.

Table 1: The sorghum landraces collected during the year 2008 – 09

Landraces collected from Madhya Pradesh	Landraces collected from Gujarat
basmati jowar	*Malwan*
deshi jowar	*Gundri*
khandva	*Deshi*
baidara boria	*Solapuri*
hathikunta	*Kamaparva*
doka	*Chachadia*
sabet baidara	
peeli baidara	
zunku	
deshi jondi	
chatkul	
dugdugu	
kathgav deshi	
salegar	
deola	
sabet deshi	

2. Sorghum germplasm characterization/evaluation (2008 – 09)

2.1: Kharif (2008)

2.1.1: Sweet sorghum progeny (F7) evaluation

A total of 25 F7s identified with high brix (Range: 20-21%) and biomass (Range: 3500-6500g/5pl) (Table 1). The total soluble sugar ranges 11.55-18.36%, sucrose ranges 9.74-15.95% and the purity of the juice ranges 73-79% (Table 2). It is observed from the qualitative characters that, very good seedling vigour, yellow green leaf sheath pigmentation, white midrib colour, dark green leave colour, drooping leaf orientation, semi compact ear head, elliptical ear head shape, pearly white and bold seeds, purple glume colour and short glume covering, absence of awns, durra race and non-lustrous seeds. Seven genotypes SSS 13, 33, 42, 49, 60, 62, and 72 have been

observed with brix range 19-21%, biomass 2.7 – 4.7 Kg/5pl, TSS% 17-18 and juice purity 75-78%. Twenty-five high brix entries have been sown for seed multiplication. These entries will be evaluated in the AICSIP trials during kharif 2009.

Table 1: Quantitative traits of sweet sorghum F7s

Entry No	1	2	3	4	5	6	7	8	9	10	11
SSS 1	83	17	2.23	440	25.70	5.33	16	4833	121	38	2.83
SSS 6	69	14	2.37	375	13.73	6.50	16	3617	108	32	3.96
SSS 7	84	19	2.33	405	12.27	4.67	19	3200	127	28	3.07
SSS 8	92	24	2.63	431	15.50	5.47	16	5433	127	22	3.04
SSS 9	88	21	2.57	438	12.37	4.70	18	4700	127	11	1.68
SSS 10	79	19	2.60	396	16.67	5.70	16	3467	122	21	2.94
SSS 11	95	21	2.33	435	13.47	5.40	18	4333	128	13	1.68
SSS 12	92	22	2.53	453	18.17	5.47	18	4617	128	12	2.62
SSS 13	92	22	2.67	463	13.60	5.03	20	4683	127	11	2.12
SSS 14	79	18	2.37	424	15.57	6.73	16	4133	120	27	2.74
SSS 15	89	21	2.57	422	18.07	5.50	19	3467	118	30	2.66
SSS 21	76	18	2.30	375	17.70	9.17	15	5000	115	53	2.91
SSS 22	80	19	2.23	373	16.23	9.03	19	4767	121	50	2.60
SSS 23	85	20	2.30	432	24.40	3.73	18	3417	127	38	3.11
SSS 33	90	20	2.57	418	21.93	5.23	19	3433	126	37	2.72
SSS 35	90	20	2.37	429	26.17	6.20	18	3550	127	40	3.20
SSS 41	89	21	2.43	453	24.43	5.77	17	3750	127	33	2.82
SSS 42	89	20	2.40	463	21.73	5.80	20	3867	127	31	2.75
SSS 44	87	20	2.50	437	21.53	4.73	19	3917	127	39	2.70
SSS 46	88	21	2.50	453	23.07	6.93	19	4033	127	41	3.27
SSS 47	87	20	2.37	434	23.80	6.30	17	3500	127	42	2.53
SSS 49	89	21	2.43	462	24.60	5.53	19	3850	127	37	3.03
SSS 50	90	19	2.33	442	23.70	7.07	19	3600	127	39	2.79
SSS 53	90	20	2.33	474	25.13	5.70	19	4200	127	25	1.77
SSS 54	89	20	2.33	439	23.17	4.70	18	3350	124	46	2.99
SSS 55	89	20	2.30	455	27.47	5.87	18	3967	127	30	2.19
SSS 56	92	21	2.30	424	22.57	5.10	18	4000	127	43	2.31
SSS 57	73	14	2.17	242	18.60	8.27	5	2750	115	54	3.03
SSS 58	90	20	2.23	448	22.87	6.40	19	2733	128	41	2.75
SSS 59	88	21	2.37	470	23.07	5.00	19	3617	128	34	2.33
SSS 60	89	20	2.27	464	23.50	4.00	19	3500	128	28	2.45
SSS 62	89	20	2.07	424	21.87	6.40	20	3417	128	35	2.47
SSS 65	89	21	2.57	447	23.83	5.70	18	3667	127	24	2.59
SSS 66	91	20	2.37	473	20.10	5.23	18	3704	128	28	2.48
SSS 67	90	21	2.37	480	24.40	6.23	19	3483	128	28	2.28
SSS 69	89	20	2.23	441	20.13	5.67	18	3417	128	21	2.25
SSS 71	91	20	2.30	414	23.97	5.40	19	3483	128	26	2.15
SSS 77	91	20	2.70	459	16.43	5.67	17	4417	128	37	2.94
SSS 81	90	20	2.30	438	22.80	5.23	18	3750	128	33	2.60
IS - 14861	89	20	2.70	357	21.83	8.03	14	4917	128	43	3.04
EC -515839	73	16	2.40	179	23.60	6.63	7	2083	115	48	2.98
IS - 11496	80	18	2.27	374	18.33	7.50	19	4500	122	36	2.56
IS - 9705	80	20	2.63	449	13.10	8.20	18	5700	117	22	2.21
SSV - 84	111	21	2.63	465	24.33	7.70	14	4561	140	18	2.30
EC -538167	95	20	2.90	453	15.43	4.50	15	5667	128	12	2.99
IS - 776	94	22	2.50	270	11.93	3.07	7	1617	128	22	2.11
IS - 8218	89	21	2.70	469	23.43	5.13	19	4900	128	38	2.61
IS - 6962	83	21	2.80	286	12.93	7.33	11	3850	115	62	2.92
IS - 15102	89	20	2.27	480	24.67	5.10	18	4533	128	21	2.27
IS - 19626	107	23	2.97	510	22.20	4.33	15	5517	135	15	2.20
IS - 9767	95	22	2.70	477	22.83	5.53	17	5517	128	16	3.01
Mean	**88.04**	**19.99**	**2.44**	**423.76**	**20.37**	**5.88**	**16.94**	**3999.65**	**125.42**	**31.57**	**2.64**
C.V.	3.84	4.27	7.88	7.35	6.98	12.73	10.16	13.64	2.90	36.03	17.24
F ratio	13.52	13.95	3.00	12.02	28.49	8.77	9.95	7.33	6.37	3.33	2.69
F Prob.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S.E.	1.95	0.49	0.11	17.98	0.82	0.43	0.99	314.93	2.10	6.57	0.26
C.D. 5%	5.47	1.38	0.31	50.44	2.30	1.21	2.79	883.61	5.90	18.43	0.74
C.D. 1%	7.24	1.83	0.41	66.76	3.05	1.60	3.69	1169.50	7.81	24.39	0.98

1-Time to 50% flowering (days), 2-Number of leaves, 3-Stem thickness (cm), 4-Plant height (cm), 5-Earhead length (cm), 6-Ear head width (cm), 7-Brix (%), 8-Stem fresh weight (g/5 plants), 9-Time to maturity (days), 10-Grain yield (g/plant), 6-100-seed weight (g)

Table 2: Performance of sweet sorghum for juice analysis

Entry	Brix (%)	Total Soluble Sugar (%)	Sucrose (%)	Reducing Sugars (%)	Purity (%)
SSS 1	16	13.82	11.69	2.13	73.12
SSS 6	18	15.75	13.22	2.53	73.43
SSS 7	18	15.39	13.45	1.94	74.92
SSS 9	18	16.34	14.40	1.93	78.57
SSS 10	14	12.40	10.81	1.59	75.47
SSS 13	20	17.15	15.06	2.09	76.65
SSS 14	18	15.59	13.47	2.11	74.80
SSS 22	17	15.37	12.92	2.45	74.35
SSS 23	18	15.72	13.46	2.26	74.74
SSS 33	19	16.71	14.62	2.09	76.95
SSS 42	19	16.69	14.39	2.30	74.52
SSS 44	16	14.05	11.81	2.24	73.81
SSS 46	18	15.73	13.62	2.11	74.20
SSS 47	21	18.36	15.95	2.41	75.78
SSS 49	19	16.84	14.68	2.16	77.24
SSS 50	20	17.79	15.54	2.25	76.46
SSS 53	19	17.17	14.59	2.58	75.52
SSS 54	20	17.81	15.43	2.37	75.58
SSS 56	19	16.72	14.17	2.55	74.56
SSS 59	18	16.38	13.83	2.55	75.44
SSS 60	20	17.21	15.82	1.39	77.80
SSS 62	19	16.64	14.10	2.54	74.31
SSS 66	18	15.71	13.71	2.00	76.24
SSS 71	19	16.55	14.35	2.20	75.51
SSS 81	18	16.50	13.97	2.53	76.17
SSV - 84	14	12.09	10.66	1.43	76.02
EC - 515839	13	11.55	9.74	1.81	72.92
EC - 538167	19	17.05	14.89	2.15	77.04
IS - 11496	17	14.71	12.42	2.29	74.51
IS - 14861	16	14.50	12.32	2.18	75.37
IS - 15102	16	13.76	11.94	1.83	74.60
IS - 19626	14	12.38	10.62	1.76	73.89
IS - 6962	20	17.43	15.02	2.41	76.38
IS - 776	15	13.10	11.20	1.90	74.42
IS - 8218	16	13.75	11.56	2.19	73.88
IS - 9705	15	13.20	11.47	1.73	74.89
IS - 9767	17	15.05	13.18	1.87	77.39
Mean	**17.70**	**15.49**	**13.35**	**2.13**	**75.34**
C.V.	9.57	9.76	10.85	24.18	2.84
F ratio	4.14	4.20	3.78	1.10	1.18
F Prob.	0.00	0.00	0.00	0.36	0.27
S.E.	0.98	0.87	0.84	0.30	1.24
C.D. 5%	2.76	2.46	2.36	-	-
C.D. 1%	3.66	3.27	3.13	-	-

2.1.2: Sweet sorghum experimental hybrids evaluation

Out of 135 experimental hybrids, 120 hybrids were identified as fertile. Nine hybrids were observed as partial sterile and 9 hybrids flowered late. The time to 50% flowering ranged between 53-104 days and the maturity ranged between 100-130 days. The plant height was between 260-582 cm. The stem fresh weight ranged between 1000-8125 g/5pl and the dry weight was between 500-6200 g/5pl. The brix percentage was ranged 2-20 % and the grain yield was 12-153 g/pl (Table 3). Juices of 19 hybrids with brix range of 11-20% were anlysed in the lab. The total soluble sugar ranges 8.58-17.07%, sucrose ranges 7.99-15.76% and the purity of the juice ranges 71-79%.

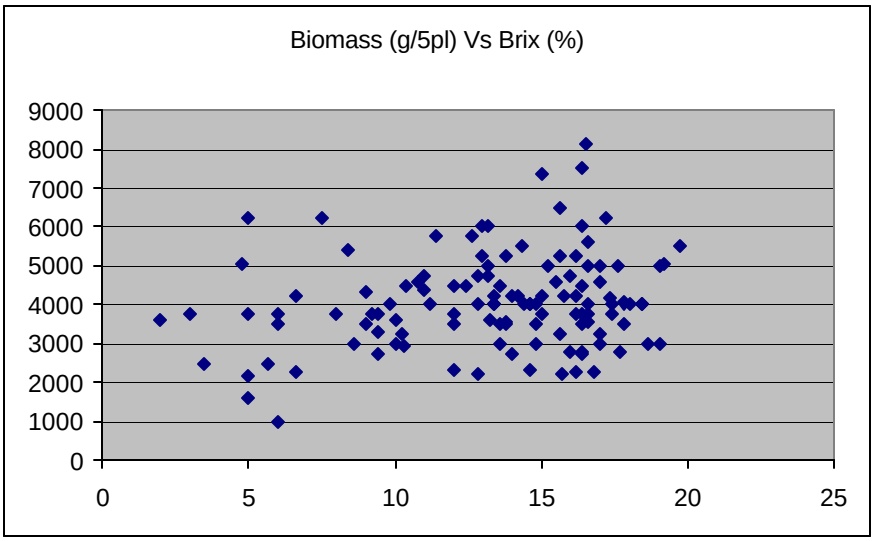
It is observed from the qualitative characters that, very good seedling vigour, yellow green leaf sheath pigmentation, white midrib colour, dark green leave colour, drooping leaf orientation, semi compact ear head, elliptical ear head shape, light red and bold seeds, red glume colour and medium glume covering,

absence of awns, durra race and non-lustrous seeds. Eight hybrids SSH 2, 29, 44, 67, 71, 87, 90 and 126 have been observed with brix range 18-20%, and biomass 3.0 – 5.5 Kg/5pl. Purple rig spots were observed in 23 hybrids. Four non-waxy stem hybrid and fifteen juicy stemmed hybrids were observed. Eight genotypes SSS 15, 22, 42, 53, 58, 59, 60 and 62 were identified as good R-lines with brix ranges 18-20% in the hybrids. In these, SSS 42, 60 and 62 were also identified as good sweet sorghum genotype in the first experiment. Most of the hybrids with 15 and above brix % were with good biomass between 5.0-8.2 kg/pl (Fig. 1). A and R lines were sown to produce twenty high brix sweet sorghum experimental hybrids to test in the AICSIP trails during kharif 2009.

Table 3: Quantitative traits of sweet sorghum experimental hybrids

Characters	Minimum	Maximum	Range	Mean	SE	SD
Time to 50% flowering (days)	53.00	104.00	51.00	77.78	0.67	7.30
Number of leaves	11.00	23.20	12.20	17.71	0.21	2.29
Stem diameter (cm)	1.82	7.48	5.66	2.60	0.05	0.56
Plant height (cm)	260.00	582.00	322.00	431.31	4.37	47.91
Ear head length (cm)	17.00	37.00	20.00	26.96	0.35	3.81
Ear head width (cm)	5.00	11.50	6.50	7.92	0.12	1.29
Brix (%)	2.00	19.75	17.75	13.22	0.37	4.08
Stem fresh weight (g/5pl)	1000.00	8125.00	7125.00	4073.08	110.67	1212.33
Stem dry weight (g/5pl)	500.00	6200.00	5700.00	2712.13	93.74	1026.88
Time to maturity (days)	100.00	130.00	30.00	120.37	0.31	3.39
Grain yield (g/ pl)	12.25	153.40	141.15	57.06	2.35	25.77

Fig. 1: The relation between biomass and brix in 134 sweet sorghum experimental hybrids



2.1.3: High brix sweet sorghum evaluation

The time to 50% flowering ranged between 66-114 days and the maturity ranged between 101-140 days. The plant height was between 174-485 cm. The stem fresh weight ranged between 1000-7550 g/5pl and the dry weight was between 100-6000 g/5pl. The brix percentage was ranged 6-21 % and the grain yield was 2- 77 g/pl (Table 4). A total of 72 F4s with brix ranged between 19-21 % were advanced to F5.

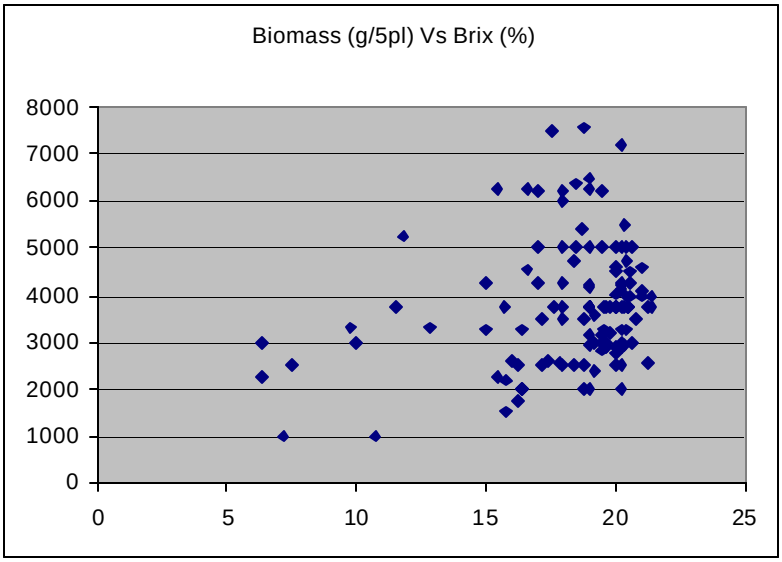
It is observed from the qualitative characters that, very good seedling vigour, yellow green leaf sheath pigmentation, white midrib colour, dark green leave colour, drooping leaf orientation, semi compact ear

head, elliptical ear head shape, pearly white and bold seeds, red glume colour and short glume covering, absence of awns, durra race and non-lustrous seeds. Seven F4s comprising 6 crosses with 21% brix recorded. Most of the hybrids with 15 –21 brix % were with good biomass between 4.0-7.5 kg/pl (Fig. 2). A total of 161 F4s with brix ranged between 19-21% were advanced to F5 during rabi 2008-09.

Table 4: Quantitative traits of high brix sweet sorghum F4s

Characters	Minimum	Maximum	Range	Mean	SE	SD
Time to 50% flowering (days)	66	114	48	88	0.82	9.09
Number of leaves	11	24.4	13.4	18	0.21	2.30
Stem diameter (cm)	1.9	6.86	4.96	3	0.04	0.49
Plant height (cm)	174	485	311	368	5.91	65.27
Ear head length (cm)	11	30	19	20	0.33	3.64
Ear head width (cm)	2.33	8.33	6	5	0.11	1.25
Brix (%)	6.4	21.4	15	18	0.28	3.11
Stem fresh weight (kg/5pl)	1000	7550	6550	3782	117.97	1303.02
Stem dry weight (kg/5pl)	100	6000	5900	2570	97.41	1075.95
Time to maturity (days)	101	140	39	138	0.33	3.66
Grain yield (g/pl)	2.277	77.086	74.809	27	1.59	17.54

Fig. 2: The relation between biomass and brix 114 high brix sweet sorghum F4s



2.1.4: Evaluation of multi-purpose sorghum

The time to 50% flowering ranged between 43-107 days and the maturity ranged between 89-141 days. The plant height was ranged 132-500 cm. The stem fresh weight ranged between 600-7250 g/5pl and the dry weight was between 250-5250 g/5pl. The brix percentage was ranged 3-20% and the grain yield was 10-108 g/pl (Table 5). A total of 80 F4s with brix ranged between 19-21 % were advanced to F5.

It is observed from the qualitative characters that, very good seedling vigour, yellow green leaf sheath pigmentation, white midrib colour, dark green leave colour, drooping leaf orientation, semi compact ear head, elliptical ear head shape, pearly white and bold seeds, purple glume colour and short glume covering, absence of awns, durra race and non-lustrous seeds. Two early flowering F4s with 50-53

days to 50% flowering identified. Eighty-eight F4s with brix ranged between 19-21% were advanced to F5 during rabi 2008-09.

Table 5: Quantitative traits of high brix sweet sorghum F4s

Characters	Minimum	Maximum	Range	Mean	SE	SD
Time to 50% flowering (days)	43.00	107.00	64.00	81.39	1.93	16.58
Number of leaves	8.80	26.20	17.40	17.16	0.45	3.89
Stem diameter (cm)	1.34	3.88	2.54	2.43	0.05	0.42
Plant height (cm)	132.00	500.00	368.00	350.14	8.68	74.66
Ear head length (cm)	11.38	42.10	30.73	22.98	0.59	5.04
Ear head width (cm)	3.30	9.20	5.90	5.97	0.17	1.50
Brix (%)	3.20	20.00	16.80	14.04	0.46	3.96
Stem fresh weight (kg/5pl)	600.00	7250.00	6650.00	3489.76	164.59	1415.85
Stem dry weight (kg/5pl)	250.00	5250.00	5000.00	2366.22	136.98	1178.35
Time to maturity (days)	89.00	141.00	52.00	118.01	2.94	25.27
Grain yield (g/pl)	10.00	108.53	98.53	30.99	2.24	19.28

Expt-5: Characterization of new germplasm

The stem fresh weight, stem dry weight, plant height, grain yield and time to 50% flowering are most variable characters (Table 6). The range of stem fresh weight (500 – 5000 g/5pt), stem dry weight (250 – 3250 g/5pt), grain yield (10 – 108 g/pt), 100-seed weight (1.12 – 3.08 g) and plant height (122 – 481 cm) are most important traits observed. Only 55 accessions were flowered and 29 accessions were like late kharif landraces.

A total of 15 qualitative characters were observed in these new germplasm lines. The very good seedling vigour (62 acc.), yellow green leaf sheath pigmentation (70), dark green leaf (89), drooping leaves (80), white midrib colour (58), semi compact panicle density (24), elliptical ear head shape (31), red glume colour (28), medium glume coverage (33), absence of awns (32), bold seed size (56), white seed (25), non-senescence leaves (50), durra race (33) and non-lustrus seed (50) were found most frequent (Table 7). The promising accessions identified for various agro-morphological traits are presented in Table 8. Thirteen early flowering and promising accessions were used as pollen parent to develop 24 hybrids with 4 A – lines during rabi 2008-09. The 42 accessions identified for promising for various traits will be utilized and evaluated further.

Table 6: Descriptive statistics on characterization and preliminary evaluation of 84 new germplasm lines

Characters	Minimum	Maximum	Range	Mean	SE	SD
Time to 50% flowering (days)	51.00	103.00	52.00	72.62	1.92	15.23
Number of leaves	7.80	21.40	13.60	14.42	0.45	3.56
Leave length (cm)	58.40	94.20	35.80	74.89	0.74	5.89
Leaf width (cm)	2.52	11.00	8.48	8.02	0.16	1.28
Stem diameter (cm)	1.14	2.70	1.56	2.06	0.04	0.30
Plant height (cm)	122.00	481.00	359.00	316.01	11.12	88.28
Ear head length (cm)	9.00	55.00	46.00	21.18	1.37	10.87
Ear head width (cm)	4.90	9.17	4.27	6.48	0.14	1.12
Brix (%)	3.80	17.80	14.00	11.89	0.40	3.20
Stem fresh weight (kg/5pl)	500.00	5000.00	4500.00	2785.19	154.68	1227.76
Stem dry weight (kg/5pl)	250.00	3250.00	3000.00	1578.57	103.15	818.72
Time to maturity (days)	89.00	165.00	76.00	125.17	1.94	15.42
Grain yield (g/pl)	10.08	108.05	97.97	34.06	2.64	20.97
100-seed weight (g)	1.12	3.08	1.96	1.94	0.06	0.48

Table 7: Frequency distribution of qualitative characters on 84 new germplasm characterized and preliminary evaluated during Kharif 2008

Seedling vigour	**Frequency**	**Seedling vigour**	**Frequency**
Poor	7	**Glume colour**	
Good	23	Light red	6
Very good	62	Red	28
Leaf sheath pigmentation		Straw	7
Yellow green	70	Purple	16
Greyed purple	22	**Glume covering**	
Leaf colour		Short	9
Light green	3	Medium	33
Dark green	89	Long	9
Leaf orientation		Very long	7
Drooping	80	**Presence of awns**	
Erect	12	Absent	32
Midrib colour		Present	24
White	58	**Seed size**	
Greyed yellow	33	Small	1
Greyed purple	1	Medium	2
Ear head compactness		Bold	56
Compact	19	**Seed colour**	
Semi compact	24	White	25
Loose	1	Pearly white	21
Semi loose	13	Light red	9
Very loose	1	Red	2
Ear head shape		Brown	1
Elliptical	31	**Stay green**	
Loose	4	Non-senescence	50
Oblong	4	**Race**	
Ovate	16	Bicolor	8
Round	1	Caudatum	3
Semi loose	1	Durra	33
Very loose	1	Durra caudatum	9
		Guinea	2
		Kafir	2
		Lustre	
		Lustrus	7
		Non-lustrus	50

Table 8: Promising sorghum germplasm lines identified for utilization from 85 accessions characterized at NRCS during Kharif 2008

SN	Character	Collector number	No. of acc.
1	Time to flowering (< 55 days)	E 146, E 156, E 157, E 158, E 159, E 172, E 174, **CSV 17**	7
2	More number of leaves (>18)	E 149, E 150, E 152, E 153, E 154, E 167, E 179, E 180, EG 92, EG 93, EG 95, EG 96, EG 100	13
3	Longer leaves (>80cm)	E 147, E 148, E 154, EG 92, EG 95, EG 96, EG 100, **CSV 15**	7
4	Wider leaves (>10cm)	E 163, E 164	2
5	Longer ear head (>35cm)	E 146, E 152, E 153, E 154, E 155, E 159	6
6	Wider ear head (>8cm)	E 145, E 157, E 163, E 170, E 172, EG 103, **CSV 15**	6
7	Short plant (<200cm)	E 156, E 158, E 161, **CSV 17**	3
8	Tall plant (>400 cm)	E 152, E 153, E 154, EG 92, EG 93, EG 95, EG 96, EG 100	8
9	Thicker stem (>2.5 cm)	E 163, E 169, E 181	3
10	High brix (17%)	E 147, E 148, E 151, E 159	4
11	High biomass (>4500g/5plant)	E 148, E 159, E 167, E 176, EG 92, EG 95	6
12	High dry matter (>2750g/5plant)	E 148, E 154, E 165, E 167, EG 92, EG 93, EG 95	7
13	High yield (>70g/plant)	E 145, E 171, **CSV 15**, **CSV 17**	2
14	100-seed weight (>3.0g)	E 145, **CSV 15**	1
15	Time to maturity (<110 days)	E 145, E 146, E 155, E 156, E 157, E 158, E 159,E 160, E 172, E 175, E 176, EG 66,EG 67, EG 68, **CSV 15, CSV 17**	14
		Total	**42**

2.2: Summary of genetic resources experiments during rabi (2008- 09)

Exp. No.	1	2	3	4	5	6	7
Experimental name	Genetic enhancement of rabi sorghum (F2s)	Preliminary evaluation and multiplication and of shoot fly resistant (F1s)	Sorghum hybrid development	Sweet sorghum evaluation (F8)	Sweet sorghum with high brix evaluation (F5)	Dual-purpose and multi-purpose sorghum evaluation (F5)	Multiplication of germplasm and genetic stocks
Objectives in brief	To utilize the landraces for rabi sorghum improvement	To identify shoot fly resistant lines	Seed production of best experimental hybrid for sweet, dual-purpose sorghum and single-cut forage	Evaluation of sweet sorghum	Selection and advancing the progenies	Selection and advancing the progenies	To multiply the 2 kg seed of promising entries
Plot size	3 x 4m x 0.60m	1 x 4m x 0.60m	6 x 4m x 0.60m	3 x 4m x 0.60 m	2 x 4m x 0.60 m	2 x 4m x 0.60 m	1 x 4m x 0.60 m
Replication	1	1	1	1	1	1	1
Checks	Nil	DJ 6514, IS 2205, IS 18551	Nil	SSV 84 and CSV 19SS	SSV 84 and CSV 19SS	CSV 20, CSV 22	Nil
Entries Total area	155 1836m^2	90 + 18 259m^2	42 605m^2	29 + 2 223m^2	161 773m^2	88 + 2 432m^2	314 754m^2
Other information	Locations: Hyderabad and Solapur	Locations: Hyderabad and Solapur	Location: Hyderabad	Location: Hyderabad	Location: Hyderabad	Location: Hyderabad	Location: Hyderabad

3. Sorghum germplasm multiplication (2008– 09)

A total of 314 accessoin of sorghum landraces, fodder germplasm and other genetic stocks are being multiplied during rabi (2008 – 09). Different versions of Maldandi collections (144 acc.) are being multiplied.

4. Status of sorghum genetic resources at NRCS (2008 – 09)

The status of sorghum genetic resources in the medium-term storage at NRCS was updated during 1st January 2009. A total of 22,124 accessions are being conserved which includes 1,280 accessions as duplicate samples. The maximum contribution was from repatriation material (11,113 accessions). The detailed status of sorghum genetic resources in the MTS at NRCS is presented in Table 2.

Table 2: Status of sorghum germplasm in the MTS at NRCS (as on 1st January 2009)

SN	Genetic Stock	No. of accession			Duplicates /Bulk
		31st March 2008	Additions during (2008-09)	Total	
1	A – line	287	0	287	4
2	B – line	317	0	317	7
3	R – line	163	0	163	1
4	Breeders line	996	0	996	5
5	National Released Varieties	13	0	13	6
6	State Released Varieties	106	0	106	49
7	Sorghum Project Varieties (SPV)	386	0	386	75
8	Hybrids	33	0	33	17
9	Sorghum Project Hybrids (SPH)	90	0	90	
10	Exotic collections	466	0	466	264
11	IS lines (germplasm)	3479	0	3479	0
12	Kharif core collection (IS lines)	498	0	498	0
13	Local germplasm	3647	102	3749	1016
14	Repatriation material (IS lines)	11113	0	11113	0
15	Special types	4	0	4	0
16	Others	424	0	424	0
	Total	**22022**	**2101**	**22124**	**1280**

5. APPENDIX

5.1: Germplasm collection

SN	Mission Number	No. of accessions	State	Team Leader	Organisation	Associates
1	22/2008/02	70	Madhya Pradesh	Dr M. Elangovan	NRCS - Hyderabad	DoA – Bhopal
2	23/2008/03	32	Gujarat	Dr M. Elangovan	NRCS - Hyderabad	AICSIP - Deesa
	Total	**102**				

5.2: Germplasm requested

SN	Name of the Scientist	Division	Material requested	Address	Date	No. of acc.	Status
1	M Elangovan	Genetic Resources	Tan plant, large seeded grain sorghum germplasm	USA	28-Jan-08	5	Requested NBPGR to issue IP

5.3: Germplasm characterization & evaluation

Expe. No.	Experimental name	Objectives in brief	Plot size	Replication	Checks	Entries
1	Sweet sorghum progeny (F7) evaluation	Selection and advancing the progenies	2 x 4 x 0.6 m	3	12	39 + 12
2	Sweet sorghum experimental hybrids evaluation	Identification of potential sweet sorghum hybrids and parental lines	3 x 4 x 0.6 m	1	CSH 22SS	134 + 1
3	High brix sweet sorghum evaluation	Selection and advancing sweet sorghum genotypes	2 x 4 x 0.6	1	31	114 + 31
4	Evaluation of multi-purpose sorghum	Selection and advancing multi-purpose sorghum genotypes	2 x 4 x 0.6	1	31	44 + 31
5	Characterization of new germplasm	Identification of potential germplasm	2 x 4m x 0.60 m	1	CSV 15 and CSV 17	84 + 2

5.4: Germplasm multiplication

SN	Material	Source	Season	Location	No. of acc.	Remarks
1	Landraces, genetic stocks and forage germplasm	NRCS	Rabi	Hyderabad	314	In the field
2	Different versions of Maldandi	NRCS	Rabi	Hyderabad	144	In the field
				Total	**458**	

5.5: Germplasm trials

SN	Trial	Source	Season	Location	No. of acc.	Genetic Stock	Purpose	Scientist/status
1	Evaluation of new germplasm	NRCS	Kharif	Coimbatore	84	84	Ident. Prom. Lines	Dr K Ganesamurthy & Dr M Elangovan
2	Evaluation of sweet sorghum germplasm and varieties	NRCS	Kharif	Trichy	156	156	Ident. of promising entries	Dr M Elangovan
3	Screening for shoot pests	NRCS	Kharif	AICSIP centres	274	275	Iden of SF resis lines	Dr VR Bhagwar & M Elangovan
4	Screening for pest & diseases	NRCS	Kharif	AICSIP centres	169	169	Iden of SF & GM resis lines	Dr VR Bhagwat & Dr TGN Rao
5	Evaluation of new germplasm	NRCS	Kharif	Surat	40	40	Ident. Prom. Lines	Dr JD Jadav & Dr M Elangova
6	Screening for stem borer	NRCS	Kharif	Hyderabad	51	39	Iden of SB resis lines	Dr PG Padmaja & Dr M Elangovan
7	Screening for stem borer	NRCS	Kharif	Hyderabad	71	71	Iden of SB resis lines	Dr G Shyam Prasad & Dr M Elangovan
8	Screening for GM & LD	NRCS	Kharif	Hyderabad	151	151	Iden of GM & LD resis lines	Dr TGN Rao & Dr M Elangovan
9	Testing of sweet sorghum experimental hybrids	NRCS	Kharif	Coimbatore & Akola	67	67	Iden of potential hybrids	Dr Elangovan & Dr AV Umakanth
10	Evaluation of rabi landrace F2s	NRCS	Rabi	Solapur, Rahuri, & Hyderabad	132	132	Selection and advancing	Dr Prabhakar, Dr Ambekar and Dr M Elangovan
11	Multiplication of shoot fly resistant F1s	NRCS	Rabi	Solapur & Hyderabad	80	80	Multipliation and advancing	Dr M Elangovan & Dr Prabhakar
					Total	**1264**		

5.6: Germplasm submitted to National Genebank, NBPGR for long-term storage

SN	Date	Acc. code	No. of accessions
1	6-Jan-09	Maharashtra collections	25
2	6-Jan-09	Tamil Nadu collections	40
3	6-Jan-09	Gujarat collections	44
4	6-Jan-09	Madhya Pradesh collections	70
5	6-Jan-09	Gujarat collections	32
		TOTAL	**211**

5.7: Germplasm distributed to researchers

SN	No.of acc.	Division/Institute	Date	Purpose	Received by
1	1	Neeraj Seed Corp. Ahmedabad	3-Mar-08	CSV 15	Sukovia
2	2	AICSIP - Udaipur	3-Mar-08	CSH 14 & CSH 16	Dr Kusam Mathur
3	2	Metahlix, Bangalore	3-Mar-08	SSV 84 & CSV 19SS	Dr Vasudeva Rao
4	161	Alternate Uses - NRCS	6-Mar-08	Proximate analysis	Dr CV Ratnavathi
5	56	Alternate Uses - NRCS	6-Mar-08	Studies on distatic activity	Dr CV Ratnavathi
6	22	Alternate Uses - NRCS	20-Apr-08	Proximate analysis	Dr CV Ratnavathi
7	256	Agri. Entomology - NRCS	24-Apr-08	Screening for Shoot pests	Dr VR Bhagwat
8	18	Agri. Entomology - NRCS	24-Apr-08	Promising SFR germplasm lines	Dr VR Bhagwat
9	169	Agri. Entomology - NRCS	1-May-08	Screening for Shoot pests (SPV)	Dr VR Bhagwat
10	169	Plant Pathology - NRCS	1-May-08	Screening for diseses (SPV)	Dr TGN Rao
11	39	Plant Physiology - NRCS	2-May-08	Screening for salinity tolerant	Dr HS Talwar
12	12	Plant Physiology - NRCS	2-May-08	Acid soil resistant lines	Dr HS Talwar
13	93	Forage breeding - NRCS	6-May-08	Sudan grass lines for DM screening	Dr G Venkatesh Bhat
14	40	AICSIP - Surat	6-May-08	New germplasm collection from Gujarat	Dr BD Jadav
15	44	AICSIP - Coimbatore	6-May-08	New germplasm collection from Tamil Nadu	Dr K Ganesamurthy
16	3	Sweet sorghum PI -NRCS	10-May-08	IVT - AICSIP	Dr Vilas A Tonapi
17	158	AICSIP - Deesa	16-May-08	Forage germplasm	Dr HR Mahla
18	25	AICSIP - Deesa	16-May-08	Dual-purpose germplasm	Dr HR Mahla
19	160	AICSIP - Surat	16-May-08	Germplasm and breeding mat from Gujarat	Dr BD Jadav
20	200	Agharkar Research Institute, Pune	19-May-08	Grain sample analysis (LR, B, R, VAR, RII)	Dr VV Agate
21	51	Agri. Entomology - NRCS	19-May-08	Screening for stem borer (F7s) & 11 parents	Dr PG Padmaja
22	7	AICSIP - Panthagar	19-May-08	Varietal improvement	Dr Shotria
23	71	Agri. Entomology - NRCS	21-May-08	Screening for stem borer (high Brix Germ)	Dr G Shyam Prasad
24	6	IGFRI - Jhansi	4-Jun-08	Varietal improvement	Dr GP Shukla
25	151	Plant Pathology - NRCS	4-Jun-08	Screening for GM and LD	Dr TGN Rao
26	16	Agri. Entomology - NRCS	5-Jun-08	Revalidation of SF resistance	Dr PG Padmaja
27	200	Alternate Uses - NRCS	16-Jun-08	SPV lines for proximate analysis	Dr CV Ratnavathi
28	10	AICSIP - Palem	16-Jun-08	SF resistant lines for breeding	Dr V Swarnalatha
29	500	VRTI, Kutch & Excel, Sec'bad	19-Jun-08	Screening kharif germplasm for B & AB stresses	Dr MV Potdar
30	5	IGFRI - Jhansi	20-Jun-08	Varieites for nutritional acquisition studies	Dr Arvind Kumar Rai
31	21	Alternate Uses - NRCS	20-Jun-08	Proximate analysis	Dr CV Ratnavathi
32	67	AICSIP - Coimbatore & Akola	25-Jun-08	Sweet sorghum experimental hybrids	Dr K Ganesamurthy & Ghorade
33	141	CAZRI - Pali	30-Jun-08	Striga resistant & RAJ germ lines	Dr SS Rao
34	19	Biochemistry - NRCS	8-Jul-08	Proximate analysis	Sri D Gopalakrishna
35	8	Plant Breeding - NRCS	9-Jul-08	Parental lines	Dr R Madhusudhana
36	53	MAS - NRCS	20-Aug-08	SSS, sorghum races	Dr R Madhusudhana
37	15	Plant Physiology - NRCS	4-Sep-08	Drought tolerant germplasm lines	Dr SS Rao
38	5	Biotechnology	1-Oct-08	Chineese material for inter-specific hybridization	Dr SV Rao
39	1	Agri. Entomology - NRCS	3-Oct-08	Pop 52	Dr PG Padmaja
40	134	CRS-Solapur & AICSIP-Rahuri	16-Oct-08	Rabi LR F2s for rabi adaptation	Drs Prabhakar & SS Ambekar
41	30	Plant Physiology - NRCS	20-Oct-08	Drought tolerant germplasm lines	Dr HS Talwar
42	3	Plant Breeding - NRCS	1-Nov-08	Varietal improvement	Dr C Aruna
43	8	MAS - NRCS	12-Nov-08	Basic studies	Dr R Madhusudhana
44	1	Plant Breeding - NRCS	19-Nov-08	Resistant breeding	Dr C Aruna
45	50	Sweet sorghum PI -NRCS	19-Nov-08	M.Sc & crossing programme	Dr AV Umakanth
46	22	Agri. Entomology - NRCS	22-Nov-08	Screening for shootfly	Dr PG Padmaja
47	9	Plant Breeding - NRCS	1-Dec-08	Varietal improvement	Dr S Audilakshmi
48	144	Plant Breeding - NRCS	10-Dec-08	To study variation in Maldandi collections	Dr S Rakshit
49	1	Biochemistry - NRCS	12-Dec-08	IS 3556 for varietal improvement	Dr CV Ratnavathi
50	6	Agri. Entomology - NRCS	18-Dec-08	Screening for shoot fly resistance	Dr PG Padmaja
	3385	**Total (as on 1st Jan 2009)**			

5.8. Breeding material exchanged

SN	No.of accession	Division/Institute	Date	Purpose	Exchanged by	Received by
1	134	CRS - Solapur	16-Oct-08	Rabi landraces F2s	Dr M Elangovan	Dr Prabhakar
2	80	CRS - Solapur	16-Oct-08	Shoot fly resistant hand-crosses (F1s)	Dr M Elangovan	Dr Prabhakar
3	134	AICSIP - Rahuri	18-Oct-08	Rabi landraces F2s	Dr M Elangovan	Dr S Ambekar
4	31	Plant Breeding - NRCS	18-Jun-08	DUS testing	Dr S Audilakshmi	Dr Tonapi
5	21	NCB - NRCS	26-Nov-08	Produce hybrids under NCB	Dr S Audilakshmi	Dr AV Umakanth
6	179	NCB - NRCS	28-Nov-08	Produce hybrids under NCB	Dr M Elangovan	Dr AV Umakanth
	579	**Total**				

6. Sorghum genetic resources evaluated in the AICSIP & Other centres (2008-09)

6.1: Characterization of new sorghum germplasm from Tamil Nadu

Objectives: Idendification of potential germplasm
Location: TNAU, Coimbatore
Design: ABD
No. of entries: 103
No. of rows: 1 row
No. of replications : 1

Materials and Methods: One-hundrad three germplasm lines collected from Tamil Nadu during 2006-08 were characterized for 12 qualitative and 10 quantitative traits along with SPV 432 as check.

Highlight of Results: Plant height, leaf length and time to flowering were most variable characters. The brix percentage ranged 6 – 19%) and the grain yield ranged 12-40 g/plant. The maximum frequency of was observed for good seedling vigour (64 acc.), pale green leaf colour (36 acc.), tan leaf sheath pigmentation (66 acc.), all erect leaf orientation, white midrib colour (80 acc.), stay green (60 acc.), loose panicle compactness (37 acc.), ovate panicle shape (47 acc.), durra race (24 acc.), red glume colour (30 acc.), 25% glume coverage (18 acc.) and absence of awns (47 acc.)

Conclusions: Four accessions EG 12, EG 41, EG 42, EG 51 and EG 66 were observed with 18-19% brix and EG 67 was early flowering genotype which flowered in 55 days. Four accessions (EG 36, EG 44, EG 46, EG 58, and EG 95) were very tall with more than 375 cm in height and fooder germplasm lines.

Looking ahead: The identified fodder and high brix lines will be utilized in the crop improvement programmes.

Table 1: Descriptive statistics of 103 acc. characterized at TNAU – Coimbatore

(Dr K Ganesamurthy)

Characters	Minimum	Maximum	Range	Mean	SE	SD	CV at 5%
Time to flowering (days)	55	96	41	74.1	1.8	14.7	3.7
Number of leaves	6	14	8	9.4	0.2	1.9	0.5
Leaf length (cm)	52	104	52	76.0	1.8	14.3	3.6
Leaf width (cm)	4.5	9.5	5	6.4	0.1	1.1	0.3
Plant height (cm)	139	411	272	257	10.4	82.8	20.8
Ear head length (cm)	7	32	25	19.1	1.0	8.1	2.0
Ear head width (cm)	4	7.3	3.3	5.2	0.1	0.6	0.1
Stem diameter (cm)	1	2.4	1.4	1.4	0.0	0.3	0.1
Brix (%)	6	19	13	12.8	0.5	3.6	0.9
Grain yield (g/plant)	12	40	28	22.2	0.6	4.7	1.2

6.2: Screening local germplasm for biotic and abiotic stresses

A total of 500 germplasm lines are being screened for various biotic and abiotic stresses to identify the most potential sources.

6.3: Evaluation of sweet sorghum germplasm and varities at NRC for Banana, Trichy

1. Observations taken on flowering, plant height, ear head compactness and stem thickness
2. Most of the sweet sorghum germplasm grown like forage lines
3. 40% entries were naturally infected with stem borer
4. Only 25-30% entries flowered and 10% entries matured
5. Sweet sorghum germplasm entries were better adopted than the F7s
6. F7s are late except SSS 6 & SSS 14
7. Madhya Pradesh germplasm series GGUB, Keller, Andhra Pradesh germplasm lines APP 1 and KARS 95 were thick stemmed and high biomass

7. Status of registration of sorghum varieties with the Plant Authority

7.1: Central releases

7.1.1: All the 47 qualifying applications have been submitted

- 6 new varieties + 41 extant
- 11 hybrids, 13 varieties, 9 R-line, 7 A-line, 7 B-line
- Already published in plant variety Journal: 7

7.1.2: Progress in EXTANT variety registration

- Recommended for registration and fee, seed submission in progress: 6
  (CSH 13, CSH 15, CSH 16, CSH 17, CSH 18 and CSV 216R

7.1.3: Progress in NEW variety registration

- DUS fee and seed submitted: 2 (CSV 17 and CSV 20)
- DUS fee paid: 1 (CSH 23)
- 2 new applications (CSH 24 MF and CSH 25) are getting ready

7.2: State releases

7.2.1: Progress in state variety registration

- Total qualifying = 42
- Submitted to the Director, NBPGR = 21
- Directly submitted to the Plant Authority = 1
- 2 new varieties + 20 extant
- 1 hybrid + 21 varieties
- To be submitted to the Director, NBPGR = 20
- 2 hybrids + 18 varieties

7.2.2: Compliance report of the AICSIP centers

- Responded centers and scientists
  - Palem - Dr Nagesh Kumar
  - Rahuri - Dr Datke
  - Parbhani - Dr Dalvi
  - Pantnagar - Dr SK Shotria
  - Coimbatore - Dr K G anesamurthy
  - Hisar - Dr SK Pahuja
  - Indore - Dr Upadhyaya and Dr Usha Saxena
  - Udaipur - Dr Vital Sharma

7.3: Status of central releases applications

SN	Denomination	Type of variety	Classification	Reference No	PVP Journal	DUS Fees	Seed	Registration
1	CSV 14R	Extant variety	Variety	REG/2008/79 dt 3rd Jan 2008				
2	CSV 15	Extant variety	Variety	REG/2008/85 dt 3rd Jan 2008				
3	CSV 216R	Extant variety	Variety	REG/2007/302 dt 12th Nov 2007	Published			Final stage
4	CSV 17	New variety	Variety	REG/2008/17 dt 1st Jan 2008		1st Sep 2008	8th Sep 08	
5	CSV 18	New variety	Variety	REG/2008/18 dt 1st Jan 2008				
6	CSV 19SS	Extant variety	Variety	REG/2008/15 dt 1st Jan 2008				
7	CSV 20	New variety	Variety	REG/2008/20 dt 1st Jan 2008		1st Sep 2008	8th Sep 08	
8	CSV 21F	New variety	Variety	REG/2008/69 dt 3rd Jan 2008				
9	CSV 22	New variety	Variety	REG/2008/86 dt 3rd Jan 2008				
10	CSV 23	New variety	Variety	REG/2008/82 dt 3rd Jan 2008		To be sent		
11	SSV 84	Extant variety	Variety	REG/2008/51 dt 3rd Jan 2008				
12	HC 308	Extant variety	Variety	REG/2008/72 dt 3rd Jan 2008				
13	Pant Chari 5	Extant variety	Variety	REG/2008/84 dt 3rd Jan 2008				
14	CSH 13	Extant variety	Hybrid	REG/2007/303 dt 12th Nov 2007	Published			Final stage
15	CSH 14	Extant variety	Hybrid	REG/2008/77 dt 3rd Jan 2008				
16	CSH 15R	Extant variety	Hybrid	REG/2007/304 dt 12th Nov 2007	Published			Final stage
17	CSH 16	Extant variety	Hybrid	REG/2007/305 dt 12th Nov 2007	Published			Final stage
18	CSH 17	Extant variety	Hybrid	REG/2007/306 dt 12th Nov 2007	Published			Final stage
19	CSH 18	Extant variety	Hybrid	REG/2007/307 dt 12th Nov 2007	Published			Final stage
20	CSH 19R	Extant variety	Hybrid	REG/2008/58 dt 3rd Jan 2008				
21	CSH 20MF	Extant variety	Hybrid	REG/2008/68 dt 3rd Jan 2008				
22	CSH 22SS	Extant variety	Hybrid	REG/2008/78 dt 3rd Jan 2008				
23	CSH 23	Extant variety	Hybrid	REG/2007/308 dt 12th Nov 2007	Published	30th Apr 08	To be sent	
24	PCH106	Extant variety	Hybrid	REG/2008/81 dt 3rd Jan 2008				
25	296A	Extant variety	A - line	REG/2008/59 dt 3rd Jan 2008				
26	2219A	Extant variety	A - line	REG/2008/76 dt 3rd Jan 2008				
27	AKMS 14A	Extant variety	A - line	REG/2008/65 dt 3rd Jan 2008				
28	27A	Extant variety	A - line	REG/2008/62 dt 3rd Jan 2008				
29	IMS 7A	Extant variety	A - line	REG/2008/75 dt 3rd Jan 2008				
30	IMS 9A	Extant variety	A - line	REG/2008/61 dt 3rd Jan 2008				
31	104A	Extant variety	A - line	REG/2008/73 dt 3rd Jan 2008				
32	296B	Extant variety	B - line	REG/2008/83 dt 3rd Jan 2008				
33	2219B	Extant variety	B - line	REG/2008/64 dt 3rd Jan 2008				
34	AKMS 14B	Extant variety	B - line	REG/2008/52 dt 3rd Jan 2008				
35	27B	Extant variety	B - line	REG/2008/66 dt 3rd Jan 2008				
36	IMS 7B	Extant variety	B - line	REG/2008/80 dt 3rd Jan 2008				
37	IMS 9B	Extant variety	B - line	REG/2008/67 dt 3rd Jan 2008				
38	104B	Extant variety	B - line	REG/2008/74 dt 3rd Jan 2008				
39	RS 29	Extant variety	R - line	REG/2008/56 dt 3rd Jan 2008				
40	RS 585	Extant variety	R - line	REG/2008/53 dt 3rd Jan 2008				
41	RS 627	Extant variety	R - line	REG/2008/57 dt 3rd Jan 2008				
42	RS 673	Extant variety	R - line	REG/2008/63 dt 3rd Jan 2008				
43	AKR 150	Extant variety	R - line	REG/2008/71 dt 3rd Jan 2008				
44	AKR 354	Extant variety	R - line	REG/2008/55 dt 3rd Jan 2008				
45	C 43	Extant variety	R - line	REG/2008/70 dt 3rd Jan 2008				
46	Indore 12	Extant variety	R - line	REG/2008/54 dt 3rd Jan 2008				
47	UPMC 503	Extant variety	R - line	REG/2008/60 dt 3rd Jan 2008				

7.4: Status of state releases applications submitted to the Director - NBPGR

SN	Variety name	Year of release	Type of variety	University	State
1	PSV-1	1997	Extant variety	ANGRAU - Hyderabad	Andhra Pradesh
2	Selection 3	1994	Extant variety	MAU - Rahuri	Maharashtra
3	Maulee	1999	Extant variety	MAU - Rahuri	Maharashtra
4	Uttara	2003	Extant variety	MAU - Rahuri	Maharashtra
5	Vasudha	2007	New variety	MAU - Rahuri	Maharashtra
6	Phule Chitra	2007	New variety	MAU - Rahuri	Maharashtra
7	Pant Chari 4	1997	Extant variety	GBPUA&T - Pantnagar	Uttarakhand
8	Parbhani Moti	2004	Extant variety	MPKV - Parbhani	Maharashtra

SN	Variety name	Year of release	Type of variety	University	State
9	Parbhani Swetha	1999	Extant variety	MPKV - Parbhani	Maharashtra
10	PVK 809	2004	Extant variety	MPKV - Parbhani	Maharashtra
11	Paiyur-2	2001	Extant variety	TNAU - Coimbatore	Tamil Nadu
12	APK-1	1996	Extant variety	TNAU - Coimbatore	Tamil Nadu
13	BSR-1	1994	Extant variety	TNAU - Coimbatore	Tamil Nadu
14	CO (FS) 29	2001	Extant variety	TNAU - Coimbatore	Tamil Nadu
15	CO (S)-28	2001	Extant variety	TNAU - Coimbatore	Tamil Nadu
16	K-11	2004	Extant variety	TNAU - Coimbatore	Tamil Nadu
17	HJ 513 *	2006	Extant variety	HAU – Hisar	Punjab
18	Jawahar Jowar 938	1996	Extant variety	RVSKVV - Indore	Madhya Pradesh
19	Jawahar Jowar 1022	2006	Extant variety	RVSKVV - Indore	Madhya Pradesh
20	Jawahar Jowar 1041	1999	Extant variety	RVSKVV - Indore	Madhya Pradesh
21	Pratap Jowar-1430	2004	Extant variety	MPUAT - Udaipur	Rajasthan
22	SPH-837	2002	Extant variety	MPUAT - Udaipur	Rajasthan

* Application directly submitted to the Plant Authority

7.5: Action required by the OICs of AICSIP centers

SN	Variety name	Year of release	Type of variety	University	State
1	PKV Kranti	2004	Extant variety	PDKV - Akola	Maharashtra
2	AKSSV 22		Extant variety	PDKV - Akola	Maharashtra
3	PKV Ashwini		Extant variety	PDKV - Akola	Maharashtra
4	DSH-3	2002	Extant variety	UAS - Dharwad	Karnataka
5	SSV - 74	2000	Extant variety	UAS - Dharwad	Karnataka
6	DSH - 4	2002	Extant variety	UAS - Dharwad	Karnataka
7	DSV - 4	1998	Extant variety	UAS - Dharwad	Karnataka
8	DSV 6		Extant variety	UAS - Dharwad	Karnataka
9	DSV - 5 (GRS 1)	1996	Extant variety	UAS - Dharwad	Karnataka
10	NTJ - 4	2002	Extant variety	ANGRAU - Nandyal	Andhra Pradesh
11	NTJ - 3	1995	Extant variety	ANGRAU - Nandyal	Andhra Pradesh
12	PSH - 1	1999	Extant variety	ANGRAU - Palem	Andhra Pradesh
13	PSV - 2		Extant variety	ANGRAU - Palem	Andhra Pradesh
14	Teepi Jonna (AJ - 140)	1996	Extant variety	ANGRAU - Anantpur	Andhra Pradesh
15	GJ 41 (SPV 1038)	1999	Extant variety	GAU - Surat	Gujarat
16	GJ 40	1997	Extant variety	GAU - Surat	Gujarat
17	GJ 38	1995	Extant variety	GAU - Surat	Gujarat
18	GFS 5 (Fodder)	1999	Extant variety	GAU - Surat	Gujarat
19	Surat 1		Extant variety	GAU - Surat	Gujarat
20	SPV 1388 (Bundela)		Extant variety	CSAUAT - Mauranipur	Uttar Pradesh

8. Sorghum genetic resources registration

8.1: Sorghum germplasm IC 345715 or EC 13 - Potential source for shoot fly resistant and high grain yielding

The sorghum germplasm IC 345715 or EC 13 is potential source for shootfly resistant germplasm and high grain yielding. This germplasm was screened for shootfly resistant during rabi (2003-04) at National Research Centre for Sorghum (NRCS), Hyderabad and kharif 2005 at seven locations in the All India Coordinated Sorghum Improvement Project (AICSIP). At NRCS, the deadheart (%) was on par with the resistant check and better than the Maldandi. It showed high level of tolerance with 10 – 20% deadhearts. This has ranked second in the seventy-five entry shoot pest nursery trial in the all India ranking. It showed 29.3% resistance compared to the resistant check IS 2312 (30.5%). Apart from shootfly resistance, this line has been yielding well with 75g/plant. It is late flowering (82 days), medium height (198 cm), small stem diameter (1.6 cm), and medium grain weight (33 g/1000 grains). The ear head is compact, elliptical in shape, glume colour orange, pearly white and lustrous seed. IC 345715 is locally called *raichur jonna* and collected from Gorlagutta village, Dhone taluk, Kurnool district, and Andhra Pradesh. This germplasm is distinct for shootfly resistance and high grain yield and stable in both kharif and rabi seasons for resistance.

8.2: SPV 1742 - selection from EC 515837 identified as one of the superior genotype for dough and roti qualities

Sorghum grains are very nutritious and traditional food for the millions of farmers living in the semi-arid tropics of the country. It is consumed as unleavened bread (*bhakri*). The roti made from Maldandi (M35-1) is preferred by many for its taste and softness. The dough and roti quality analysis of 15 kharif sorghum genotypes was done at Dharwad during kharif 2007 along with seven checks.

The sorghum variety SPV 1742, a selection from the introduced germplasm from Sri Lanka (EC 515837) has been identified as one of the superior genotype for dough and roti qualities. It is a superior genotype in six out of seven dough quality parameters, superior genotype in eight out of ten roti quality parameters. The evaluation of roti quality was done on a hedonic scale 1 to 9 ranging from like extremely (excellent) 1 to dislike extremely (9).

It is also superior genotype for protein (9.63%) and starch (65.60%) among the samples analyzed for Zone I. The variety SPV 1472 recorded 27 q/ha and 14 t/ha of grain yield and fodder yield respectively with recommended dose of fertilizer. Apart from the roti quality and grain yield, it is also resistant to grain mold and anthracnose in Zone I; resistant to shoot fly in Zone II; resistant to spotted stem borer in Zone I & III; midge resistant in Zone II & III; and resistant to head bug in Zone II. The registration of this genotype is being processed by the NBPGR.

9. Technical Programme (2009 – 10)

9.1: Sorghum germplasm collection

SN	Regions/State	Collaborator	Season/Year
1	Bundelkhand regions of Madhya Pradesh and Uttar Pradesh	DAO - Bhopal & AICSIP - Mauranipur	Kharif – 2009
2	Foothills of Himalayas in Uttar Pradesh	AICSIP – Pantnagar	Kharif – 2009
3	South-eastern Gujarat	AICSIP – Deesa	Late kharif - 2009
4	Southern districts of Tamil Nadu	AICSIP – Coimbatore	Late kharif – 2009

9.2: Sorghum germplasm evaluation

9.2.1: Kharif 2009

SN	Experiment/materials	Centres	Scientists involved
1	Primary evaluation of kharif germplasm (100 acc.)	Deesa, Surat, Indore, Mauranipur and Hyderabad	Elangovan, NB Patel, Usha Saxena, and Sachan
2	Evaluation of sweet sorghum varieties and hybrids	Coimbatore, Akola and Hyderabad	Elangovan, Ganesamurthy and Ghorade
3	Trait specific sorghum evaluation	Indore, Mauranipur, Hyderabad	Elangovan, Usha Saxena and Sachan
4	Characterization of maghi sorghum germplasm (100 acc.)	Coimbatore and Tandur	Elangovan, Ganesamurthy and Nagesh Kumar

9.2.2: Rabi 2009 – 10

SN	Experiment/materials	Centres	Scientists involved
1	Primary evaluation of rabi germplasm	Solapur and Hyderab ad	Elangovan and Prabhakar
2	Selection and advancing rabi genotypes (F3s)	Solapur, Akola, Rahuri, and Hyderabad	Elangovan, Talwar, Prabhakar, Ambekar and Dalvi
3	Screening for shoot fly (F2s)	Solapur, Akola, Rahuri, Parbhani and Hyderabad	Elangovan, Bhagwat, Prabhakar, Ghorade and Ambekar
4	Evaluation of maldhandi genotypes	Solapur, Bijapur and Hyderabad	Elangovan, Rakshit, Prabhakar and Biradar
5	Multiplication of trait specific germplasm	Solapur and Hyderabad	Elangovan and Prabhakar