

REPORT ON THE
WEST AFRICAN SORGHUM ADAPTATION TRIALS - 1986

SAFGRAD/ICRISAT

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International Crops Research Institute for the Semi-Arid Tropics
(ICRISAT)
B.P. 4881
OUAGADOUGOU
BURKINA FASO

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The West African Sorghum Adaptation Trials were organized by the SAFGRAD/ICRISAT West African Sorghum Improvement Program, as per the recommendations of the Advisory Committee for the West African Sorghum Research Network. These regional trials comprised elite breeding lines/hybrids contributed by ICRISAT and the National Sorghum Programs of Burkina Faso and Mali. The entries included in the trials are mostly of recent origin and represent promising lines from various breeding programs. Cooperators in the national programs were expected to select useful entries for further testing and advancement in their countries.

During 1986, three regional trials were organized: West African Sorghum Variety Adaptation Trial - Early Duration, West African Sorghum Variety Adaptation Trial - Medium Duration, and West African Sorghum Hybrid Adaptation Trial. The variety trials comprised of 20 entries each while the hybrid trial comprised of 36 entries, including controls. The variety trials were designed as randomized blocks with three replications while the hybrid trial was designed as a lattice with three replications. Seeds of these trials were dispatched to cooperators in eleven countries.

We are grateful to the cooperators who devoted their time and resources to conduct these trials and communicated us the results. A summary of the results received is enclosed. In the future, we hope to achieve increased cooperation and participation by all the national sorghum programs in the region.

ICRISAT West African Sorghum Improvement Program

WEST AFRICAN SORGHUM VARIETY ADAPTATION
TRIAL (WASVAT) - MEDIUM DURATION

Seeds of WASVAT - Medium Duration trial were supplied to cooperators at twelve locations. (Tables 1 & 2). Results were received from eight locations. However, grain yield data pertaining to the locations Fada and Sotouboua were not subjected to statistical analysis (Table 3). Average grain yield of the trial ranged from 1560 kg ha⁻¹ at Gampela to 2960 kg ha⁻¹ at Kamboinse. Overall, the hybrid control ICSH-1 exhibited the highest yield (2590 kg ha⁻¹) across locations and was the most stable. Among the test entries, ICSV 1063 BF and IS 915 were the highest yielders. IS 915 was the highest yielder at Gampela and Karewa locations. It has brown colored grains. ICSV 126 IN was the highest yielder at Saria followed by PM 11344, a midge resistant variety which gave high yields at Gampela and Nyankpala also. ICSV 1063 BF was the highest yielder at Sapu while ICSV 1074 BF gave the highest yield at Kamboinse.

The mean number of days to 50% flowering of the trial across locations ranged from 64 at Sotouboua to 78 at Gampela (Table 4). On the average, IS 915 was the earliest entry while ICSV 1070 BF was the latest entry. The overall mean days to 50% flower of the hybrid control was 68 and compares well with the observation made in WASVAT - Early Duration trial where it took 66 days. The overall mean plant height (Table 5) of the entries across locations indicated IS 915 and ICSH-1 as the shortest entries while PM 11344 and ICSV 1047 BF were the tallest entries.

Table 1. Cooperators of West African Sorghum Adaptation Trials, 1986.

Country	Location	Trial	Cooperator
Burkina Faso	Di (Sourou)	WASHAT	F. Kambou, S. Da, INERA - B.P. 7192 - Ouagadougou
	Fada	WASHAT	S. Ouedraogo, R. Zangre, S. Da, INERA - B.P. 7192 - Ouagadougou)-S. Ouedraogo, J. Belem, INERA - B.P. 7192 - Ouagadougou
		WASVAT-Early	
		WASVAT-Medium	
	Farako-Bâ	WASHAT	D.S. Murty, ICRISAT - B.P. 4881 - Ouagadougou
	Gampela	WASVAT-Medium	H. Koita, R. Zangre, S. Da, INERA - B.P. 7192
	Kamboinse	WASHAT	D.S. Murty, ICRISAT - B.P. 4881 - Ouagadougou)-K.V. Ramaiah, ICRISAT - B.P. 4881 - Ouagadougou
		WASVAT-Early	
		WASVAT-Medium	
	Niangoloko	WASHAT	S. Da, INERA - B.P. 910 - Fakoba-Bâ
	Saria	WASHAT)-J. Chantereau, CIRAD-INERA, B.P. 596 - Ouagadougou)
		WASVAT-Early	
		WASVAT-Medium	
Cameroon	Guiring	WASHAT)-O.P. Dangi, IRA - B.P. 33 - Maroua
		WASVAT-Early	
	Karewa	WASHAT)
		WASVAT-Medium	
Côte d'Ivoire	Bouaké	WASHAT	K. Attiey, F. Assamoi, IDESSA, B.P. 633, Bouaké
	Ferkéssédougou	WASHAT	F. Assamoi, L. Koné, IDESSA, B.P. 633, Bouaké
Gambia	Sapu	WASVAT-Early WASVAT-Medium)-A.H.A. Cox, Agric. Research Station, Sapu, M.I.D.
Ghana	Nyankpala	WASHAT	
		WASVAT-Early)-M.S. Abdulaï, C.R.I., Nyankpala Experiment Station) P.O. Box 52 - Tamale.
		WASVAT-Medium	
Mali	Sotuba	WASHAT	I.M. Konaté, Bonkana Touré, IER, B.P. 438 - Bamako, Mali
Togo	Atétou	WASHAT)-H. Reneaud, Projet SAFGRAD, B.P. 313, Kara)
	Broukou	WASHAT	
	Sotouboua	WASVAT-Early)-Edah, Schviefert, Ferme Semencièrè Sotouboua,) B.P. 88, Sotouboua.
		WASVAT-Medium	

Table 2. Geographical and climatic features of the locations of the West African Sorghum Adaptation Trials, 1986

Location	Longitude	Latitude	Trial conducted	Date of planting	Effective rainfall (mm) ¹
Kamboinse	01°33'W	12°28'N	WASHAT	15/06/85 (N) ²	690
			WASVAT-Early	15/06/86 (N)	690
			WASVAT-Medium	15/06/86 (N)	690
Saria	02°09'W	12°16'N	WASHAT	26/06/85 (N)	650
			WASVAT-Early	02/07/86 (N)	610
			WASVAT-Medium	26/06/86 (N)	650
Farako-Bâ	04°23'W	11°06'N	WASHAT	12/07/86 (L)	670
Fada	00°21'E	12°04'N	WASHAT	24/07/86 (L)	450
			WASVAT-Early	26/07/86 (L)	450
			WASVAT-Medium	26/07/86 (L)	450
Gampela	-	-	WASVAT-Medium	11/07/86 (L)	540
Di (Sourou)	-	-	WASHAT	13/10/86	Off season/Irrigation
Niangoloko	04°55'W	10°16'N	WASHAT	/07/86	800
Guiring	-	-	WASHAT	17/06/86 (N)	740
			WASVAT-Early	27/06/86 (N)	740
Karewa	-	-	WASHAT	09/07/86 (N)	690
			WASVAT-Medium	07/07/86 (N)	690
Bouaké	05°02'W	07°41'N	WASHAT	22/07/86 (N)	530
Ferkéssédougou	05°11'W	09°36'N	WASHAT	02/08/86 (L)	620
Sapu	14°54'W	13°23'N	WASVAT-Early	23/07/86 (N)	730
			WASVAT-Medium	23/07/86 (N)	730
Nyankpala	00°58'W	09°25'N	WASHAT	24/07/86 (L)	500
			WASVAT-Early	07/07/86 (N)	600
			WASVAT-Medium	25/06/86 (N)	600
Sotuba	07°56'W	12°39'N	WASHAT	22/07/86 (L)	760
Atétou	01°05'E	09°50'N	WASHAT	23/06/86 (N)	910
Broukou	00°55'E	09°45'N	WASHAT	19/07/86 (L)	810
Sotouboua	01°00'E	08°30'N	WASVAT-Early	18/07/86 (N)	850
			WASVAT-Medium	18/07/86 (N)	850

1. Total amount of rainfall from the month the trial was planted to the month it was harvested.

2. N = Normal planting

L = Late planting.

Table 3. Mean grain yields (kg ha^{-1}) of medium duration cultivars in the West African Sorghum Variety Adaptation Trial (WASVAT-86) at six locations (RBD with 3 replications, plot size 7.5 to 8 m^2), 1986.

Cultivar	Burkina Faso			Cameroon	Gambia	Ghana	Overall mean
	Kamboinse	Saria	Gampela	Karewa	Sapu	Nyankpala	
ICSV 23 BF	2360	2310	1650(8) ¹	1340	1710	630	1660
ICSV 1038 BF	2700	2930(10)	1530	2170(5)	1960	1400	2110
ICSV 1044 BF	2650	2550	1700(6)	2460(3)	2130(6)	1460	2160(10)
ICSV 1047 BF	3050	2000	1750(4)	1910	1980(10)	1970(8)	2110
ICSV 1056 BF	3620(2)	3370(4)	1230	1960(9)	2020(8)	1580	2300(6)
ICSV 1057 BF	3490(5)	2670	1490	2040(8)	1670	1870	2200(9)
ICSV 1058 BF	3280(7)	2090	1650(8)	1110	2220(5)	1520	1980
ICSV 1063 BF	3410(6)	3030(9)	1580	2250(4)	2530(1)	2530(2)	2550(2)
ICSV 1067 BF	3240(8)	2470	1700(5)	1650	1870	1980(7)	2150
ICSV 1070 BF	2900	3420(3)	1380	1340	1860	1960(9)	2140
ICSV 1074 BF	3750(1)	3080(8)	1690(7)	2060(6)	1790	1840	2370(4)
ICSV 1077 BF	3220(9)	2240	1530	1940(10)	2380(4)	2170(4)	2250(8)
ICSV 1080 BF	3210(10)	3160(7)	1560	1720	2130(6)	1930(10)	2280(7)
PM 11344	2690	3520(2)	1910(2)	1500	2020(8)	2440(3)	2350(5)
IRAT 277	2840	2410	1620(10)	1010	1540	1400	1800
IS 915	2320	3320(5)	2180(1)	2850(1)	1730	1980(6)	2400(3)
ICSV 126 IN	3610(3)	3590(1)	1380	1680	800	760	1970
ICSV 2 IN	2400	2760	1260	1920	2390(3)	2090(5)	2140
ICSH-1 (Hybrid control)	3580(4)	2460	1760(3)	2550(2)	2510(2)	2700(1)	2590(1)
Local (Control)	850	3230(6)	690	2050(7)	1470	1530	
SE	+379	+324	+213	+393	+208	+261	
\bar{X}	2960	2830	1560	1870	1940	1790	
CV (%)	22	20	24	35	19	25	

1. Numbers in parenthesis indicate the rank.

Table 4. Mean time to 50% flower (d) of medium duration cultivars in the West African Sorghum Variety Adaptation Trial (WASVAT-86) at eight locations in 1986.

Cultivar	Burkina Faso				Cameroon	Gambia	Ghana	Togo	Overall mean
	Kamboinse	Saria	Gampela	Fada	Karewa	Sapu	Nyankpala	Sotouboua	
ICSV 23 BF	78	71	76	75	68	72	67	57	71
ICSV 1038 BF	84	76	81	75	73	77	79	66	76
ICSV 1044 BF	82	73	77	75	66	72	70	57	72
ICSV 1047 BF	72	73	78	76	75	74	73	66	73
ICSV 1056 BF	73	69	82	74	78	76	73	67	74
ICSV 1057 BF	71	69	77	76	74	77	70	66	73
ICSV 1058 BF	79	77	81	76	76	77	78	66	76
ICSV 1063 BF	76	74	79	76	77	73	74	64	74
ICSV 1067 BF	73	73	81	80	78	74	71	71	75
ICSV 1070 BF	74	73	84	83	77	80	75	72	77
ICSV 1074 BF	72	67	77	77	74	75	74	66	73
ICSV 1077 BF	73	74	81	80	76	73	71	67	74
ICSV 1080 BF	82	75	81	76	72	76	75	64	75
PM 11344	80	73	77	74	74	73	73	60	73
IRAT 277	79	73	75	75	70	76	71	67	73
IS 915	78	67	70	70	57	68	68	57	67
ICSV 126 IN	72	71	80	78	75	78	78	72	76
ICSV 2 IN	76	73	83	83	75	73	70	66	75
ICSH-1 (Hybrid control)	65	67	72	72	69	70	65	60	68
Local (Control)	89	76	69	77	71	71	89	57	-
SE	+1.4	+1.1	+1.4	+1.7	+2.5	+1.5	+0.9	+4.9	
\bar{X}	77	72	78	76	73	74	73	64	
CV (%)	3	3	3	4	6	4	2	8	

Table 5. Mean plant height (cm) of medium duration cultivars in the West African Sorghum Variety Adaptation Trial (WASVAT-86) at eight locations in 1986.

Cultivar	Burkina Faso				Cameroon	Gambia	Ghana	Togo	Overall mean
	Kamboinse	Saria	Gampela	Fada	Karewa	Sapu	Nyankpala	Sotouboua	
ICSV 23 BF	257	236	201	136	207	201	239	209	211
ICSV 1038 BF	204	217	179	140	210	175	193	185	188
ICSV 1044 BF	207	196	181	115	199	177	195	171	180
ICSV 1047 BF	224	244	226	170	271	204	228	234	225
ICSV 1056 BF	227	237	208	160	259	198	215	216	215
ICSV 1057 BF	201	206	188	135	213	175	198	210	191
ICSV 1058 BF	245	233	216	132	235	189	222	197	209
ICSV 1063 BF	213	241	202	133	232	187	208	207	203
ICSV 1067 BF	204	238	222	128	230	205	237	211	209
ICSV 1070 BF	214	242	212	137	285	227	227	225	221
ICSV 1074 BF	204	220	175	128	222	181	224	187	193
ICSV 1077 BF	197	221	197	140	241	182	214	203	198
ICSV 1080 BF	211	215	172	113	200	181	200	163	182
PM 11344	305	280	249	173	240	188	223	194	232
IRAT 277	229	232	192	128	215	187	240	204	203
IS 915	192	204	165	127	178	177	200	158	175
ICSV 126 IN	189	224	177	129	235	176	206	217	194
ICSV 2 IN	186	229	192	134	262	192	209	215	202
ICSH-1 (Hybrid control)	168	192	180	129	206	181	183	180	177
Local (Control)	394	239	250	275	208	274	499	192	-
SE	+ 9.6	+ 7.9	+ 6.7	+13.9	+10.7	+ 9.2	+ 7.9	+ 8.4	
\bar{X}	224	227	199	143	228	193	228	199	
CV (%)	8	6	6	17	8	8	6	7	

WEST AFRICAN SORGHUM VARIETY ADAPTATION
TRIAL (WASVAT) - EARLY DURATION

Seeds of WASVAT - Early Duration trial were dispatched to cooperators in nine countries. Results were received from seven locations belonging to five countries. In general, results from five locations were satisfactory and were included in the statistical analysis (Table 6). At the locations Fada and ~~Sotouboua~~ poor field conditions and variable plant stands lead to low yields accompanied by very high coefficients of variation. Therefore, grain yield data from these locations were excluded from statistical analysis. Mean grain yield of the trial ranged from 1815 kg ha⁻¹ at Sapu to 3668 kg ha⁻¹ at Saria and 5310 kg ha⁻¹ at Guiring. The overall means of individual entries were affected to some extent by the very high yields at Guiring location. Across the five locations, ICSV 1078 BF was the highest yielder followed by the entries ICSV 1054 BF, ICSH-1 and ICSV 1055 BF. However, exclusion of the data from Guiring would show up ICSH-1 as the top-most yielder and ICSV 16-5 as another promising entry. The local control varieties yielded low at all the locations except Guiring where the improved control variety S-35 yielded the highest (6840 kg ha⁻¹). Examination of ranks across locations indicated that ICSH-1, ICSV 1078 BF, ICSV 1054 and ICSV 16-5 obtained high ranks consistently.

Overall means of time to 50% flower among test entries ranged from 63 to 72 days (Table 7). Average number of days to 50% flower were the lowest at Guiring while they were the highest at Kamboinse and Sapu. Mali Sor 84-7 was the latest entry. ICSV 16-3 BF and ICSV 16-5 BF were the ~~tallest~~ entries while Mali Sor 84-7 was the shortest entry (Table 8).

Table 6. Mean grain yields (kg ha^{-1}) of early duration cultivars in the West African Sorghum Variety Adaptation Trial (WASVAT-86) at five locations (RBD with 3 replications, plot size 7.5 to 8 m^2) - 1986.

Cultivar	Burkina Faso		Cameroon	Gambia	Ghana	Overall mean
	Kamboinse	Saria	Guiring	Sapu	Nyankpala	
ICSV 2 BF	2450(7) ¹	3600	4460	1640	2480(4)	2930(10)
ICSV 7-1 BF	1750	2760	4710	1070	1330	2330
ICSV 16-3 BF	2130(10)	3710(9)	5120(10)	2090(6)	2310(7)	3070(8)
ICSV 16-5 BF	1970	4350(1)	4780	2120(4)	2550(3)	3150(7)
ICSV 85-2 BF	1480	3620	5710(5)	1910(9)	1530	2850
ICSV 94-1 BF	2050	3690(10)	4670	2000(7)	1380	2760
ICSV 1031 BF	2000	4100(5)	5650(6)	1910(9)	2400(6)	3210(6)
ICSV 1045 BF	2870(2)	4070(6)	4880	2130(3)	690	2930(10)
ICSV 1054 BF	2680(3)	3550	6700(3)	1960(8)	2730(2)	3520(2)
ICSV 1055 BF	3070(1)	3980(7)	5630(7)	2090(5)	2070	3370(4)
ICSV 1060 BF	2670(4)	3870(8)	4510	1860	1790	2940(9)
ICSV 1061 BF	2320(8)	3580	4510	1240	1060	2540
ICSV 1062 BF	2040	3170	5650(6)	1640	2110(10)	2920
ICSV 1064 BF	2500(6)	3040	5650(6)	1790	1420	2780
ICSV 1065 BF	2080	4310(2)	6070(4)	1560	2410(5)	3280(5)
ICSV 1078 BF	2580(5)	4160(4)	6750(2)	2820(1)	2010	3660(1)
IRAT 203	1320	3320	5550(8)	1060	2210(8)	2690
Mali Sor 84-7	1740	2800	4010	1580	2130(9)	2450
ICSH-1 (Hybrid Control)	2290(9)	4230(3)	4830	2620(2)	3400(1)	3480(3)
Local (Control)	920	3520	6840(1)	1210	-	-
SE	+314	+356	+329	+265	+309	
\bar{X}	2140	3670	5310	1810	2000	
CV (%)	25	17	10	26	27	

1. Numbers in parenthesis indicate rank.

Table 7. Mean time to 50% flowering (d) of early duration cultivars in the West African Sorghum Variety Adaptation Trial (WASVAT-86) at seven locations in 1986.

Cultivar	Burkina Faso			Cameroon	Gambia	Ghana	Togo	Overall mean
	Kamboinse	Saria	Fada	Guiring	Sapu	Nyankpala	Sotouboua	
ICSV 2 BF	62	64	76	58	70	62	63	65
ICSV 7-1 BF	72	61	65	62	68	59	53	63
ICSV 16-3 BF	77	70	72	65	73	65	57	68
ICSV 16-5 BF	78	69	69	61	70	60	55	66
ICSV 85-2 BF	73	67	72	59	73	65	57	67
ICSV 94-1 BF	68	63	74	56	72	61	53	64
ICSV 1031 BF	70	63	71	57	51	61	60	65
ICSV 1045 BF	69	66	68	60	76	69	63	67
ICSV 1054 BF	71	63	75	58	74	62	56	66
ICSV 1055 BF	69	65	72	69	80	64	61	67
ICSV 1060 BF	71	62	68	56	71	62	59	64
ICSV 1061 BF	71	66	69	57	75	66	57	66
ICSV 1062 BF	72	72	75	64	73	68	60	69
ICSV 1064 BF	66	63	66	55	69	59	60	63
ICSV 1065 BF	65	64	68	57	68	59	63	63
ICSV 1078 BF	68	63	68	55	76	61	60	64
IRAT 203	77	70	77	65	78	71	57	71
Mali Sor 84-7	73	71	81	59	80	71	69	72
ICSH-1 (Hybrid Control)	69	64	77	57	71	65	61	66
Local (Control)	89	90	69	59	78	59	53	-
SE	+1.5	+1.1	+2.9	+1.1	+1.6	+1.5	+4.0	
\bar{X}	72	67	72	59	73	63	59	
CV (%)	4	3	7	3	4	4	7	

Table 8. Mean plant height (cm) of early duration cultivars in the West African Sorghum Variety Adaptation Trial (WASVAT-86) at seven locations in 1986.

Cultivar	Burkina Faso			Cameroon	Gambia	Ghana	Togo	Overall mean
	Kamboinse	Saria	Fada	Guiring	Sapu	Nyankpala	Sotouboua	
ICSV 2 BF	116	133	90	128	122	125	177	127
ICSV 7-1 BF	194	209	152	246	198	173	184	194
ICSV 16-3 BF	250	283	181	307	213	248	193	239
ICSV 16-5 BF	259	286	158	317	225	247	241	248
ICSV 85-2 BF	178	207	162	189	184	193	197	187
ICSV 94-1 BF	180	196	133	196	180	190	177	179
ICSV 1031 BF	185	207	163	212	181	202	184	191
ICSV 1045 BF	140	160	126	195	146	156	189	159
ICSV 1054 BF	155	189	116	217	162	163	202	172
ICSV 1055 BF	164	182	119	221	164	168	190	173
ICSV 1060 BF	177	175	149	212	166	175	188	177
ICSV 1061 BF	149	185	141	204	152	164	202	171
ICSV 1062 BF	186	243	137	275	185	235	183	206
ICSV 1064 BF	185	230	177	266	198	206	298	209
ICSV 1065 BF	191	200	171	255	199	219	166	200
ICSV 1078 BF	155	184	131	176	170	159	216	170
IRAT 203	176	182	128	196	179	191	192	178
Mali Sor 84-7	120	131	73	134	112	130	162	123
ICSH-1 (Hybrid Control)	158	176	115	192	165	177	185	167
Local (Control)	402	134	274	243	173	181	186	-
SE	+ 8.9	+ 9.6	+10.9	+16.1	+ 5.7	+ 5.6	+17.6	
\bar{X}	186	195	145	219	174	185	191	
CV (%)	8	9	13	12	6	5	16	

WEST AFRICAN SORGHUM HYBRID ADAPTATION TRIAL (WASHAT)

Seeds of WASHAT were distributed to cooperators located in eight countries. The trial was planted at 15 locations. However, the experiments failed at three locations: Niangoloko (Burkina Faso), Sotuba (Mali) and Maradi (Niger), due to extremely late plantings in poor fields.

Grain yield data was received from 12 locations (Table 9), among which Saria, Fada and Atetou exhibited high coefficients of variation ($> 30\%$). Considering the experimental conditions described by the cooperators and the high coefficients of variation, data pertaining to these locations was not considered for the calculation of overall mean yields. At the location Di (Burkina Faso, irrigated off season crop), night temperatures were very low during the anthesis period and resulted in partial sterility of some hybrids. Data pertaining to such entries was deleted from the statistical analysis.

Mean grain yield of the trial ranged from 1060 kg ha^{-1} (Broukou) to 3340 kg ha^{-1} (Nyankpala) - 5530 kg ha^{-1} (Guiring). At the location Guiring, grain yields of individual entries were as high as 6370 kg ha^{-1} and were out of the range. Overall mean grain yields over nine locations showed that ICSH 230 ranked first (3360 kg ha^{-1}) followed by ICSH 229 (3340 kg ha^{-1}), ICSH 208 (3240 kg ha^{-1}), ICSH 134 and ICSH 231. The hybrids ICSH 230, ICSH 229 and ICSH 231 have the common female parent ICSA 11. In general, hybrids of ICSA 11 exhibited relatively higher ranks at many locations and better overall mean performance. Other top yielding hybrids were ICSH 134 and ICSH 208.

ICSH 178 ranked first in grain yield, at the locations Kamboinse and Fada, where head bug incidence was considerably high. ICSH 178 is characterised by very large and lax panicles. At the location Saria, although average yields were in the higher order, plant stands were highly variable and vitiated the results. At Farako-Bâ, ICSH 336 was the highest yielding hybrid followed by ICSH 208 and ICSH 229. Top yielding hybrids at Karewa included ICSH 228, ICSH 231 and ICSH 178 while at Bouaké ICSH 153 was the highest yielding hybrid, followed by ICSH 208 and ICSH 109. At Ferke, ICSH 260 was the highest yielder, followed by ICSH 231, ICSH 290 and ICSH 178. At

Nyankpala ICSH 319, ICSH 109 and ICSH 230 were the top ranking hybrids. ICSH 229 and ICSH 230 were the highest yielders at Broukou.

The early maturing variety control Framida, was relatively low yielding in most of the locations except Guiring where it was the topmost entry. Other early maturing local controls (ex. Nagawhite, ICSV 1002 BF, and Ghana 1) were also relatively low yielders compared to the test entries. In general, late maturing variety controls were the poorest yielders.

Overall mean number of days to 50% flower of test hybrids ranged from 57 to 68 (Table 10). ICSH 287, was the earliest flowering hybrid while CSH-5 was the latest flowering hybrid. On the average, number of days to 50% flower was the lowest at Ferke and highest at Kamboinse. Overall mean plant height of the hybrids ranged from 152 cm (ICSH 336) to 200 cm (ICSH 231, Tables 11 and 12).

Table 9. Mean grain yield (kg ha⁻¹) of test hybrids in the West African Sorghum Hybrid Adaptation Trial (6 x 6 lattice with 3 replications, plot size 5.5 to 16 m²) at 12 locations, 1986.

Entry	Burkina Faso					Cameroon		Cote d'Ivoire		Ghana		Togo		Overall mean ¹
	Karboinse	Saria	Farako-ba	Pada ²	Sourou ²	Gwirig	Karawa	Bouake	Fekke	Nyankpala	Atetou	Brakou		
ICSH-208	3020(5) ³	2730	3610(2)	2330	4750(1)	5100	2360	2460(2)	3070(5)	3990(3)	2240	960	3260(3)	
ICSH-221	2750(9)	2290	1940	1350	3030	5420	2790	1670	2250	3550	1360	1110	2720	
ICSH-228	2840(8)	3620	1810	1460	4060(5)	5750	4170(1)	1860	2160	3990(9)	2540	920	3050(7)	
ICSH-229	3020(5)	2490	3590(3)	2250	4170(3)	5900(3)	2500(11)	1900	2760(9)	4310(4)	2150	1760(1)	3340(2)	
ICSH-230	3090(3)	3650	3260(10)	1980	3890(6)	5730	3470(5)	2140(6)	2610	4320(3)	1330	1700(2)	3360(1)	
ICSH-231	2430	2930	3230(11)	2160	3780(7)	5570	4030(2)	1920	3670(2)	3010	1980	1170(8)	3200(5)	
ICSH-232	2540	2960	3470(5)	1900	1280	5680	1810	2170(5)	2720(12)	2960	1850	1370(5)	2670	
ICSH-241	2560	2590	1930	2130	3720(8)	4130	2500	1650	2870(9)	2500	1780	950	2570	
ICSH-357	1100	1210	2220	1780	3530	4690	2220	1340	1680	2500	1050	910	2240	
ICSH-358	2280	2680	2700	1840	4170(3)	5800(12)	2500	2040(10)	1920	3340	1590	1150(9)	2640	
ICSH-359	3030(4)	3070	3530(4)	1760	2140	6070(5)	2920	2170(5)	2490	2760	2110	1130(11)	2950(11)	
ICSH-259	2580	2460	2310	2070	3690(9)	5910(10)	3750(4)	1620	2910(7)	3010	1730	920	2640(10)	
ICSH-260	2870(7)	3170	2590	2400	3000	4960	3470(5)	1840	3930(1)	3460	1640	1090	3020(9)	
ICSH-263	2060	2330	2440	1130	4190(2)	4980	3750(4)	1770	3040(6)	1840	1550	930	2740	
ICSH-284	2170	3080	3200(12)	1320	-	5250	2780	2070(9)	2240	2610	2060	590	2610	
ICSH-285	2100	3630	2360	1320	-	5230	2920	1650	1820	2190	2220	950	2360	
ICSH-287	1440	3560	2430	1920	4060(5)	5150	2920	1650	2670	2140	1320	1010	2610	
ICSH-290	2070	3980	3420(7)	2340	1310	5450	3060	2090(8)	3300(3)	2550	2320	1130(7)	2720	
ICSH-299	2190	1380	3120	1070	1750	5740	3330(6)	1800	2770	3590	1950	1100	2740	
ICSH-305	2380	3090	1980	1600	3440	5210	3060	1120	2160	4030(7)	1540	1000	2710	
ICSH-311	3170(2)	3020	2580	1470	3220	6360(2)	2920	2280(4)	2080	3980(10)	2310	860	3050(3)	
ICSH-319	2580	2330	2730	2220	2190	6020(6)	3190	2100(7)	2750(10)	4850(1)	2630	1360(6)	3000(6)	
ICSH-331	2600(12)	3180	3430(5)	1700	2670	5210	3190	1740	2730(11)	3220	2370	1110(12)	2800	
ICSH-336	2090(6)	4010	3730(1)	1500	2080	5980(7)	2730	1480	2390	2780	1900	1080	2900	
ICSH-109	2160	3290	2400	640	-	5900(11)	3190	2300(3)	2190	4830(2)	1460	1140(10)	3050(5)	
ICSH-110	2410	3570	3090	1810	-	5270	3330(6)	1880	2080	4160(5)	2080	960	2930	
ICSH-153	2700(11)	3590	2330	1420	-	5760	3330(6)	2480(1)	2060	4110(5)	1590	770	2940(12)	
ICSH-159	2580	3230	3270(9)	1630	-	6130(4)	3190	2040(10)	1600	3730(11)	1870	1020	2950(11)	
ICSH-134	2710(10)	4130	3360(8)	2250	4170(3)	5980(9)	3470(6)	1700	3060	3140	3250	1530(4)	3240(4)	
ICSH-178	3240(1)	3070	2950	2550	2640	5530	3890(3)	1730	3270(4)	3540	2010	960	3090(6)	
CSH-5	2180	2960	1710	690	4140(4)	5230(3)	2780	1900	1610	3620(12)	1500	950	2790	
CSH-6	2400	3300	3060	1450	3640(10)	4230	3690(3)	1380	2030	2930	1720	1500(3)	2450	
Farafra	910	1940	2720	1330	2510	6370(1)	3060	1540	2570	3150	1680	1070	2800	
Local control	2300	1580	1320	1130	2920	5290	3750(4)	950	2530	3380	940	710	-	
Local control	1170	1740	2640	1090	3060	5170	3890(3)	1020	2340	3020	910	410	-	
Local control	710	1770	1600	820	920	4930	2920(9)	1910	2170	3210	1800	970	-	
SE	+343	+643	+276	+317	+327	+616	+450	+236	+313	+352	+403	+164		
X	2380	2930	2730	1680	3150	5530	3140	1820	2490	3340	1900	1060		
CV (%)	24	38	17	33	18	19	24	22	21	18	36	26		
Efficiency (%)	106	103	170	-	-	-	-	105	102	105	117	119		

1. Original data not seen.
2. Analysed as per FBD method.
3. Numbers in parenthesis indicate the rank.
4. Based on nine locations exhibiting <30% CV.

Table 10. Mean time to 50% flower (d) of test hybrids in the West African Sorghum Hybrid Adaptation Trial at 12 locations, 1986.

Entry	Burkina Faso				Cameroon ¹		Côte d'Ivoire		Ghana	Mali	Togo		Overall mean
	Kamboinse	Saria	Karako-Ba	Fada	Guiring	Karewa	Bouaké	Ferké	Nyankpala	Sotuba	Atétou	Broukou	
ICSH-208	63	64	67	64	56	62	57	55	62	65	62	62	62
ICSH-221	67	65	69	66	57	56	59	56	59	68	62	64	62
ICSH-228	67	68	75	69	57	58	60	58	65	67	66	69	65
ICSH-229	65	67	67	66	58	58	58	53	61	66	62	65	62
ICSH-230	67	68	72	68	60	57	57	57	61	67	67	66	64
ICSH-231	67	64	68	62	57	57	58	53	60	65	61	64	61
ICSH-232	70	70	69	68	58	68	58	56	62	67	66	63	65
ICSH-241	63	61	63	62	56	59	51	51	55	61	60	60	59
ICSH-357	61	68	67	62	56	56	55	53	56	63	60	62	60
ICSH-358	72	66	74	71	59	64	60	60	62	69	68	65	66
ICSH-359	65	64	71	64	61	59	58	55	66	67	63	65	63
ICSH-259	70	66	67	66	60	60	59	54	61	66	64	65	63
ICSH-260	64	63	67	62	56	59	58	54	57	65	61	60	61
ICSH-263	61	59	63	63	56	56	51	51	56	61	58	57	58
ICSH-284	69	67	67	66	56	65	58	58	60	66	64	69	64
ICSH-285	71	67	72	65	59	58	59	59	68	71	67	70	66
ICSH-287	59	59	62	59	57	58	52	49	52	60	59	58	57
ICSH-290	64	62	66	64	57	55	57	53	59	67	60	61	60
ICSH-299	67	69	69	68	59	62	57	54	64	69	65	64	64
ICSH-305	68	67	73	68	57	58	57	54	59	69	62	64	63
ICSH-311	69	67	69	71	61	65	58	56	63	67	68	69	65
ICSH-319	66	66	67	63	63	57	57	54	55	68	63	62	62
ICSH-331	71	70	70	69	58	63	62	55	68	72	68	70	66
ICSH-336	69	67	70	70	59	60	59	55	65	73	66	63	65
ICSH-109	70	69	72	70	59	58	59	58	60	73	70	70	66
ICSH-110	72	71	72	70	58	59	59	58	66	70	74	68	66
ICSH-153	69	67	74	69	57	61	57	58	65	70	69	72	66
ICSH-159	71	68	72	70	58	62	58	57	65	68	65	66	65
ICSH-134	70	66	65	66	59	55	57	53	59	66	58	57	61
ICSH-178	74	70	67	66	59	61	56	53	59	69	68	66	64
CSH-5	76	72	74	73	60	64	61	62	63	73	67	70	68
CSH-6	60	62	64	67	55	66	57	53	53	63	56	58	60
Framida	82	77	69	71	59	59	55	54	64	69	73	67	67
Local control	82	81	79	69	58	58	59	55	54	66	(118)	94	-
Local control	76	82	74	73	60	69	55	52	53	68	(110)	74	-
Local control	77	74	79	75	58	62	55	50	55	70	56	85	-
S.E.	+2.6	+1.5	+1.3	+1.4	+2.1	+3.3	+1.2	+0.7	+1.8	+1.4	+4.5	+3.1	
\bar{X}	69	68	70	67	58	60	57	55	60	67	64	66	
CV (%)	6	4	3	4	6	9	4	2	5	4	7	8	

1. Original data not seen.

Table 11. Mean plant height (cm) of test hybrids in the West African Sorghum Hybrid Adaptation Trial at 11 locations, 1986.

Entry	Burkina Faso			Cameroon ¹		Côte d'Ivoire		Ghana	Mali	Togo		Overall mean
	Kamboinse	Farako-Bâ	Fada	Guiring	Karewa	Bouaké	Ferké	Nyankpala	Sotuba	Atétou	Broukou	
ICSH-208	137	167	121	168	168	157	197	172	168	146	158	160
ICSH-221	145	174	129	178	175	175	215	192	195	182	181	176
ICSH-228	183	183	150	208	179	172	222	200	192	166	178	185
ICSH-229	163	180	142	175	174	178	208	199	202	183	187	181
ICSH-230	176	186	143	182	182	180	225	200	203	174	179	185
ICSH-231	179	209	168	193	181	196	242	218	212	198	199	200
ICSH-232	159	180	142	158	172	172	213	191	202	164	181	176
ICSH-241	151	164	129	185	182	163	183	172	177	152	147	164
ICSH-357	135	169	139	201	166	162	200	170	192	163	164	169
ICSH-358	164	177	135	196	167	187	220	189	195	175	175	180
ICSH-359	153	196	168	220	191	192	233	201	208	174	183	193
ICSH-259	146	170	141	185	180	173	197	186	197	167	168	174
ICSH-260	160	187	165	186	183	193	235	200	198	201	186	190
ICSH-263	150	173	121	176	178	170	198	183	178	166	151	168
ICSH-284	153	197	143	154	187	175	225	208	192	186	194	183
ICSH-285	179	184	134	194	188	172	205	177	185	161	178	178
ICSH-287	138	164	131	180	174	170	193	194	193	97	144	162
ICSH-290	152	173	134	177	167	177	215	187	193	182	183	176
ICSH-299	162	176	127	202	182	172	198	186	185	156	176	175
ICSH-305	165	180	145	182	201	177	213	194	195	172	182	182
ICSH-311	153	153	116	187	177	165	188	169	170	145	151	161
ICSH-319	155	177	156	201	173	177	200	202	193	163	179	180
ICSH-331	162	173	128	171	187	168	198	185	183	169	170	172
ICSH-336	147	150	99	190	170	145	162	163	157	153	140	152
ICSH-109	142	190	137	184	186	177	222	199	190	154	180	178
ICSH-110	155	183	133	168	157	163	210	196	200	168	192	175
ICSH-153	170	183	124	179	181	177	220	197	200	168	178	180
ICSH-159	184	203	148	184	184	187	233	200	228	170	184	191
ICSH-134	140	166	118	196	174	158	188	170	172	165	161	164
ICSH-178	171	170	138	183	179	158	198	189	185	163	160	172
CSH-5	154	184	129	206	176	172	210	200	200	160	179	179
CSH-6	130	167	116	170	174	165	187	181	172	167	167	163
Framida	258	193	172	223	187	197	223	223	232	199	219	211
Local control	196	397	170	199	189	173	220	208	217	434	242	-
Local control	392	177	129	186	179	187	168	208	188	395	218	-
Local control	403	397	142	192	177	172	233	203	165	458	245	-
S.E.	+ 4.2	+ 5.5	+ 4.7	+20.3	+10.4	+ 3.6	+ 5.7	+ 4.9	+ 8.6	+10.3	+10.2	
\bar{X}	174	190	138	186	179	174	208	192	192	189	179	
CV (%)	4	5	6	19	10	4	5	4	8	9	10	

1. Original data not seen.

Table 12. Mean performance of test hybrids in the WASHAT - 1986.

Entry	Origin	Grain yield (kg ha ⁻¹) ¹	Time to 50% flower (d) ²	Plant height (cm) ²
ICSH-208	ICSA 3 x MR 860	3260(3) ³	62	160
ICSH-221	ICSA 7 x A 4956	2720	62	176
ICSH-228	ICSA 9 x A 4956	3060(7)	65	185
ICSH-229	ICSA 11 x MR 841	3340(2)	62	181
ICSH-230	ICSA 11 x MR 844	3360(1)	64	185
ICSH-231	ICSA 11 x MR 860	3200(5)	61	200
ICSH-232	ICSA 11 x MR 862	2670	65	176
ICSH-241	ICSA 14 x MR 841	2570	59	164
ICSH-357	ICSA 18 x R 654	2240	60	169
ICSH-358	ICSA 19 x MR 844	2880	66	180
ICSH-359	ICSA 19 x MR 860	2950(11)	63	193
ICSH-259	ICSA 21 x MR 844	2980(10)	63	174
ICSH-260	ICSA 21 x MR 860	3020(9)	61	190
ICSH-263	ICSA 22 x MR 841	2780	58	168
ICSH-284	ICSA 26 x MR 860	2610	64	183
ICSH-285	ICSA 26 x MR 862	2390	66	178
ICSH-287	ICSA 27 x MR 841	2610	57	162
ICSH-290	ICSA 27 x MR 862	2720	60	176
ICSH-299	ICSA 29 x MR 862	2740	64	175
ICSH-305	ICSA 30 x A 4956	2710	63	182
ICSH-311	ICSA 34 x MR 841	3050(8)	65	161
ICSH-319	ICSA 35 x MR 862	3090(6)	62	180
ICSH-331	ICSA 38 x MR 862	2880	66	172
ICSH-336	ICSA 40 x MR 862	2800	65	152
ICSH-109	296 A x MR 844	3050(8)	66	178
ICSH-110	296 A x MR 836	2930	66	175
ICSH-153	296 A x MR 841	2940(12)	66	180
ICSH-159	296 A x SPL 18 R	2950(11)	65	191
ICSH-134	2219 A x SPL 22 R	3240(4)	61	164
ICSH-178	SPL 117Ax SPL 22 R	3090(6)	64	172
CSH-5	2077 A x CS 3541	2790	68	179
CSH-6	2219 A x CS 3541	2860	60	163
Framida	Early maturing control variety	2680	67	211
Local control	Variable	-	-	-
Local control	Variable	-	-	-
Local control	Variable	-	-	-

1. Grain yield observations were averaged over nine locations exhibiting < 30% CV.
2. Time to flower and plant height observations were averaged over twelve and eleven locations respectively.
3. Numbers in parenthesis indicate rank.

WEST AFRICAN SORGHUM ADAPTATION TRIALS - 1986

SUMMARY

Three West African Sorghum Adaptation Trials were organised during the year 1986: West African Sorghum Variety Adaptation Trial (WASVAT) - Early Duration, West African Sorghum Variety Adaptation Trial (WASVAT) - Medium Duration, and West African Sorghum Hybrid Adaptation Trial (WASHAT). The variety trials comprised of 20 entries each while the hybrid trial consisted of 36 entries including controls. Seeds were distributed to cooperators located in eleven countries of the West African region. In the WASVAT - Early Duration, ICSV 1078 BF was the top most yielding entry (3660 kg ha^{-1} , averaged over 5 locations). None of the test varieties exhibited consistent performance in the WASVAT - Medium Duration. In both these trials the hybrid control exhibited stable performance. In the WASHAT, ICSH 230 (3360 kg ha^{-1} , averaged over 9 locations) was the topmost yielding entry. Individual location wise data for grain yield (kg ha^{-1}), time to 50% flower (d) and plant height (cm) were summarised and discussed.

1986-04

REPORT ON THE WEST AFRICAN SORGHUM ADAPTATION TRIALS SAFGRAD-ICRISAT - 1986

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