

## Development Steps for Cane Varieties to Enhance Sugar Yields in Habib Sugar Mills



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## Variety Development History

Next to Fauji Sugar Mills, T.M. Khan, the Habib Sugar Mills, is the pioneer Sugar factory of the Sindh Province, established during 1963-64. From its very beginning it had a clear mandate of cane variety development. The HSM made well planned efforts to propagate and multiply quality varieties.

**Table 1: Sugar recovery trends with relevance to cane variety development in Habib Sugar Mills.**

S. No.	Period	Average	Major cane varieties under cultivation at grower's fields
		Sugar Rec. %	
1	1963-70	7.96	Co.312, CoL.44, CoL.54, CoS.624, Poni
2	1970-75	8.45	Nco.310, CoS.321, CoS.245
3	1975-80	8.81	L.62-96, L.126, L.113,L .116, BL.4
4	1980-85	9.39	L.62-96, L.126, L.113,L .116, BL.4
5	1985-90	9.13	L.62-96, L.126, L.113,L .116, BL.4
6	1990-95	9.15	L.116(72-36%), BL.4(20-29%), Disco(5-10%), CP.67-412(7-13%)
7	1995-00	8.66	L.116(36-7%), BL.4(29-12%), CP.67-412(20-59%),
8	2000-05	8.82	CP.67-412(59-62%), CP.43-33(5-7%), Th.10(11%),
9	2005-10	9.72	CP.67-412(62-15%), Th.10(12-20%), HS.12(12-32%), SPF.234(13-22%),
10	2010-14	10.53	SPF.234(29-50%), HS.12(39-42%)

**Table 2: The cane varieties evolved from the cane fuzz of HSM**

S, No	Variety evolved	year	Approval status	Remarks
1	HSTh 10	2000	Approved for Sindh	The fuzz collected from HSM plantation, was supplied to SZSCRI, Thatta, for screening and selection
2	HSF 240	2002	Approved for Punjab	The fuzz collected from HSM plantation, was supplied to SRI, Faisalabad, for screening and selection
3	HSF 242	2006	Approved for Punjab	The fuzz collected from HSM plantation, was supplied to SCRI, Faisalabad, for screening and selection
4	HS 12		The variety still under observation	The sugarcane variety trials conducted at HSM farm and grower's fields have shown very promising results for its adoptability in the tract
5	HS 20		--Do--	Trials under observation data not yet concluded
6	HS 21		--Do--	Trials under observation data not yet concluded
7	HS 22		--Do--	Trials under observation data not yet concluded
8	HS 24		--Do--	Trials under observation data not yet concluded

**Table 3: The Number of cane varieties in various selection stages During 2009-15 Periods at HSM.**

Year	No. Of Varieties in Varietal Trial				
	Collection	Semifinal	Final	Promising	Out Field
2014-15.	101	12	10	12	5
2013-14.	175	12	14	14	-
2012-13.	150	14	14	12	-
2011-12.	115	18	18	12	-
2010-11.	87	18	18	14	4
2009-10.	148	18	18	12	4

**Table 4: FINAL VARIETAL TRIAL 2012-13 AT HSML.**

S:No.	Cane variety	Mean cane yield in tons per acre	Mean sugar recovery %	Sugar yield in tons per acre
1	SPF.234	38.24 cd	11.43 ab	4.37
2	HS.12	40.41 c	11.62 a	4.69
3	CPF.246	43.80 b	11.08 bcde	4.86
4	CPF.247	32.67 g	11.37ab	3,71
5	NIA.2004	46.22 a	11.30 abc	5.22
6	NIA.2010	33.64 fg	11.27 abc	3.79
7	NIA.2011	33.88 fg	11.47 a	3.89
8	HOTH.300	34.36 fg	10.42 g	3.58
9	CPHS.24	40.41 c	10.73 fg	4.33
10	NSG.59	37.75 cde	10.52 fg	3.97
11	HOTH.2109	33.40 fg	10.79 efg	3.6
12	HOTH.311	35.82 ef	11.51 a	4.12
13	HOTH.326	34.12 fg	10.95 cdef	3.74
14	HOTH.318	36.30 ef	10.88 de	3.95
LSD		2.74	0.43	

**Table 5: FINAL VARIETALS TRIAL (RAT) 2013-14 AT HSML.**

S: No	Name	Average Yield in Tons Per Acre	Average Recovery %	Sugar Yield in Tons per Acre
1	SPF.234	36.60 fg	10.44 h	3.82
2	HS.12	45.24 cd	11.18 bc	5.06
3	CPF.246	53.58 a	11.33 a	6.07
4	CPF.247	33.74 fg	11.28 ab	3.81
5	NIA.2004	46.70 bc	10.46 h	4.88
6	NIA.2010	37.81 fg	10.92 d	4.13
7	NIA.2011	35.97 fg	10.73 e	3.86
8	HOTH.300	33.43 g	10.74 e	3.60
9	CPHS.24	43.98 cde	10.82 de	4.76
10	NSG.59	47.03 bc	11.08 c	5.21
11	HOTH.2109	39.00 def	10.48 gh	4.09
12	HOTH.311	38.40 fg	10.61 f	4.07
13	HOTH.326	40.27 def	10.58 fg	4.26
14	HOTH.318	40.67 def	11.20 b	4.56
LSD		5.91	0.11	

**Table 6: FINAL VARIETAL TRIAL 2013-14 AT HSML.**

S: No.	Name	Average Yield in Tons Per Acre	Average Recovery %	Sugar Yield in Tons per Acre
1	SPF.234	42.81 b	11.30 bc	4.84
2	HS.12	45.28 a	11.82 a	5.35
3	CPSG.2713	39.31 c	10.83 e	4.26
4	CSSG.212	38.94 cd	11.38 bc	4.43
5	HOTH.318	37.85 d	11.28 c	4.27
6	HOTH.326	33.25 g	11.44 b	3.8
7	HOTH.2109	30.61 i	11.26 c	3.45
8	S.2003-US.165	32.91 gh	11.26 c	3.71
9	S.2003-US.824	33.76 fg	11.06 d	3.73
10	S.2006-SP.18	34.79 ef	11.40 bc	3.97
11	S.2006-US.54	34.73 ef	11.00 d	3.82
12	S.2006-US.272	31.96 hi	10.85 e	3.47
13	S.2006-US.658	34.77 ef	11.04 e	3.84
14	S.2006-US.832	35.89e	10.70 e	3.84
LSD		1.303	0.169	

**Table 7: PROMISING VARIETAL TRIAL 2012-13 AT HSML.**

S: No.	Cane variety	Mean yield in Tons Per Acre	Mean sugar recovery %	Sugar yield in tons per acre
1	SPF.234	37.51 cd	11.16 c	4.35
2	HS.12	42.59 a	11.49 ab	4.89
3	S.2099HS.20	37.75 cd	11.54 a	4.36
4	S.2099-HS.21	39.20 bc	11.49 ab	4.5
5	S.2099-HS.22	32.91 ef	11.51 a	3.79
6	CSSG.676	34.36 f	11.34 abc	3.9
7	HOSG.529	41.14 ab	11.47 ab	4.72
8	S.2003-US.133	27.83 g	10.78 d	3.00
9	S.2003-US.778	35.33 de	11.39 abc	4.02
10	S.2006-SP.18	38.72 bc	11.42 abc	4.42
11	S.2006-SP.30	31.22 fg	11.22 bc	3.5
12	S.2006-US.127	31.46 f	10.67d	3.36
LSD		2.767	0.312	

**Table 8: PROMISING VARIETAL TRIAL (RAT) 2013-14 AT HSML.**

S: No.	Name	Average Yield in Tons Per Acre	Average Recovery %	Sugar Yield in Tons per Acre
1	SPF.234	41.81 d	10.65 cd	4.45
2	HS.12	46.34 ab	10.96 b	5.08
3	S.2009 HS.20	44.24 bcd	11.19 a	4.95
4	S.2009-HS.21	43.61 cd	10.35 e	4.51
5	S.2099-HS.22	43.91 bcd	9.73 e	4.27
6	CSSG.676	41.95 d	10.54 d	4.42
7	HOSG.529	45.14 bc	10.85 b	4.9
8	S.2003-US.133	42.90 cd	11.12 a	4.77
9	S.2003-US.778	48.90 a	10.88 b	5.32
10	S.2006-SP.18	44.2 bcd	11.16 a	4.93
11	S.2006-SP.30	44.26 bcd	10.68 c	4.73
12	S.2006-US.127	35.11 e	11.10 a	3.9
LSD		2.67	0.125	

**Table 9: PROMISING VARIETAL TRIAL 2013-14 AT HSML.**

S: No.	Name	Average Yield in Tons Per Acre	Average Recovery %	Sugar Yield in Tons per Acre
1	SPF.234	40.38 f	11.17 cd	4.51
2	HS.12	59.23 a	11.40 b	6.75
3	CPF.246	57.15 ab	11.37 b	6.5
4	CPF.247	48.94 d	11.60 a	5.68
5	HSF.240	43.08 e	11.25 bcd	4.85
6	NIA.2004	57.41 a	11.35 bc	6.16
7	NIA.2011	44.55 e	11.07 d	4.93
8	S.2009-HS.21	44.17 e	10.60 e	4.68
9	S.2009-HS.22	53.29 c	10.77 e	5.74
10	CPHS.24	53.35 c	11.15 d	5.95
11	NSG.59	42.96 e	10.81 e	4.64
12	HOSG.529	43.20 e	11.32 bc	4.89
13	S.2003-US.114	39.57 f	11.13 d	4.4
14	S.2003-US.778	55.76 b	11.21 bcd	6.25
	LSD 0.05	2.397	0.184	

**Table10(a): PERIODICAL ANALYSIS OF PROMISING VARIETAL TRIAL 2013 -2014.**

S: No.	VARIETY	SUGAR RECOVERY %						
		Oct	Nov	Dec	Jan	Feb	March	Ave:
1	SPF.234	8.56	8.76	9.76	10.49	11.23	11.29	10.25
2	HS.12	9.73	9.94	10.72	11.07	11.32	11.65	10.90
3	CPF.246	9.03	9.76	10.18	10.81	11.39	11.65	10.69
4	CPF.247	8.76	10.00	10.56	11.54	11.67	11.78	10.97
5	HSF.240	8.34	8.58	10.16	10.58	11.18	11.48	10.32
6	NIA.2004	8.86	8.96	10.28	10.71	11.33	11.42	10.47
7	NIA.2011	8.14	8.78	9.72	10.44	11.06	11.23	10.15
8	S.2009-HS.21	8.49	8.74	10.28	10.34	10.48	10.96	10.09
9	S.2009-HS.22	7.71	8.87	9.44	10.35	10.73	10.46	9.82
10	CPHS.24	7.92	9.47	10.48	10.93	11.12	11.30	10.48
11	NSG.59	8.58	8.75	10.25	10.85	10.61	11.53	10.34
12	HOSG.529	8.85	9.04	10.36	10.74	11.32	11.77	10.59
13	S.2003-US.114	8.52	8.65	10.07	10.56	10.94	11.23	10.22
14	S.2003-US.778	9.16	9.49	10.03	10.55	11.03	11.21	10.42

**Table 10(b): PERIODICAL ANALYSIS OF FINAL VARIETAL TRIAL 2013-2014.**

S: No.	VARIETY	SUGAR RECOVERY %						
		Oct	Nov	Dec	Jan	Feb	March	Average
1	SPF.234	7.32	8.73	10.18	10.53	11.35	11.58	10.30
2	HS.12	8.92	9.71	10.63	11.01	11.64	11.90	10.88
3	CPSG.2713	7.86	9.22	9.62	9.91	10.69	11.01	9.98
4	CSSG.212	8.04	8.42	9.24	9.87	10.76	11.52	9.93
5	HOTH.318	8.77	8.97	9.63	9.96	10.96	11.12	10.10
6	HOTH.326	8.80	8.91	10.05	10.72	11.18	11.56	10.43
7	HOTH.2109	9.06	9.27	10.28	10.58	10.95	11.39	10.45
8	S.2003-US.165	7.78	8.29	10.01	10.60	11.06	11.40	10.16
9	S.2003-US.824	8.88	9.36	10.11	10.53	10.89	11.31	10.38
10	S.2006-SP.18	7.84	8.35	9.76	10.16	10.41	11.10	9.87
11	S.2006-US.54	8.14	8.83	9.94	10.50	10.79	11.02	10.11
12	S.2006-US.272	7.82	8.57	10.17	10.35	10.61	11.15	10.05
13	S.2006-US.658	8.89	9.50	10.37	10.50	10.80	11.08	10.38
14	S.2006-US.832	8.25	8.92	9.67	9.82	10.11	10.90	9.83

**Table 10(c): PERIODICAL ANALYSIS OF PROMISING VARIETAL TRIAL ( RATOON ) 2013 - 2014.**

S: No.	VARIETY	SUGAR RECOVERY %						
		Oct	Nov	Dec	Jan	Feb	March	Ave:
1	SPF.234	7.87	8.14	9.45	10.47	11.05	11.39	10.02
2	HS.12	8.94	9.22	9.81	10.66	11.17	11.67	10.47
3	S.2009-HS.20	8.51	8.64	9.84	11.17	11.79	12.29	10.69
4	S.2009-HS.21	8.15	8.51	9.48	10.31	11.25	11.62	10.18
5	S.2009-HS.22	7.76	8.30	8.71	9.26	11.51	11.84	9.90
6	CSSG.676	8.43	8.79	9.85	10.40	11.19	11.77	10.35
7	HOSG.529	8.25	8.95	10.20	10.85	11.22	11.48	10.43
8	S.2003-US.133	9.29	9.56	10.11	10.91	11.37	11.75	10.70
9	S.2003-US.778	8.44	8.81	9.65	10.78	11.08	11.62	10.33
10	S.2006-SP.18	9.07	9.23	9.76	10.97	11.67	11.66	10.61
11	S.2006-SP.30	8.22	8.61	10.31	10.62	10.88	11.44	10.28
12	S.2006-US.127	8.89	8.99	9.97	10.72	11.41	11.75	10.53

**Table 10(d): PERIODICAL ANALYSIS OF FINAL VARIETAL TRIAL (RATOON) 2013-2014.**

S: No.	VARIETY	SUGAR RECOVERY %						
		Oct	Nov	Dec	Jan	Feb	March	Average
1	SPF.234	7.43	7.78	9.45	10.39	10.89	11.84	10.00
2	HS.12	8.05	8.40	10.18	11.02	11.57	11.90	10.51
3	CPF.246	9.07	9.36	10.05	11.31	11.72	12.14	10.86
4	CPF.247	8.36	8.60	9.99	10.92	11.48	12.08	10.55
5	NIA.2004	7.62	8.66	10.17	10.35	10.77	11.24	10.10
6	NIA.2010	7.76	7.86	8.96	10.77	11.05	11.63	10.00
7	NIA.2011	8.20	8.39	8.69	9.95	11.08	11.55	9.92
8	HOTH.300	7.58	7.72	8.80	10.32	11.07	11.63	9.86
9	CPHS.24	8.21	8.35	9.23	10.81	11.09	11.61	10.17
10	NSG.59	7.42	7.71	10.14	10.95	11.23	11.82	10.24
11	HOTH.2109	8.23	8.86	10.05	10.51	10.69	11.28	10.19
12	HOTH.311	9.26	9.58	9.99	10.48	11.01	11.86	10.58
13	HOTH.326	8.83	8.99	9.70	10.43	10.71	11.57	10.27
14	HOTH.318	7.37	7.67	9.16	10.75	11.51	11.80	10.08

## Agronomic Experiments.

To assess the performance of a leading variety under different cultural conditions a number of agronomic experiments have been laid out at the HSM farm. List of the experiments is as under.

- Methods of planting trial
- Intercropping various field crops in autumn crop of sugarcane
- Different fertilizer response experiment.
- Different cultural treatments for effective weed control.
- Effect of trash blanket to conserve moisture, control of weeds and overall growth of cane
- Studies on after harvest losses in sugarcane



## **Conclusion.**

**The Habib Sugar Mills is a pioneer sugar factory of upper Sindh region. The organization realized the importance of R & D for promoting quality cane in its tract. The HSM not only introduced new varieties from different research institutes but also initiated its own cane variety selection program based on fuzzi production.**

**The HSM breeding program helped develop cane varieties of repute like HSTh.10 approved for Sindh and HSF.240 and HSF.242 for Punjab, all the three evolved from HSM local fuzzi.**

**In recent past its own bread variety HS.12 has proved to be the popular variety of the region. This variety has excelled in cane and sugar yields over the area prevalent varieties. This variety has found favor of large class of growers due to its wide adoptability and better yield response even in average and marginal lands.**

**A combination of SPF.234 and HS.12 has yielded an average recovery Of 10.53%, replacing SPF234 with CPF.246 may further improve sugar recoveries. Sugar Industry may rely for its economic benefits due to its high sugar contents both in early and late crushing seasons.**

***THANKS.***

