EVALUATION OF PROMISING AND COMMERCIAL SUGARCANE CLONES AT DIFFERENT LOCATIONS IN THAL AND SOUTHERN PUNJAB

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ABSTRACT

Topographical areas better adapted for sugar cane cultivation must be identified and preserved, for this study Indus valley river delta in South Punjab represents promising features for prosperous sugarcane cultivation (lower water pumping costs due to higher water tables, sugarcane being flood resistant crop in Pakistan. Eight sugarcane varieties and eight promising clones were grown on different locations in Punjab at farmer's field using RCBD with three replications. The objective of this study is to evaluate varieties under different ecological zones. These clones were tested for their proficiency at four different locations during 2018-19. The "Thal" and Southern Punjab viz; 142/TDA Lalazar Layyah, Indus Sugar mills Rajanpur, Ashraf Sugar Mills Bahawalpur and Adam Sugar Mills Chishtian. The data on germination %, tillers / plants, Number of mill able canes, canes yield tones/ ha and commercial cane sugar (CCS) were recorded during the course of study. It is obvious from pooled mean of four locations that cane yield of clone S2002-US-133 gave 84.13 % higher cane yield as compared the check variety CPF 248 as far as CCS% is concerned, sugarcane clones S200-US-633 and S200-US-133 gave the higher sugar recovery that is 15.31 % & 15.23 % respectively more than check variety. Whereas S200-US-658 and HSF-240 have the lowest CCS% 1.22 & 1.14 % less than check.

INTRODUCTION

The trial consists on sixteen sugarcane promising and commercial clones that provide necessary information required to make informed varietv recommendation to growers. Trial specific sites are strategically selected based on the need for information regarding variety performance in particular areas and on the similarities of the sites to the general production conditions within a region (Redshaw, 1999). Southern Punjab and "Thal"

are the areas characterized with low rainfall, less humidity hiah temperatures. and Sugarcane produced in these areas where sugar mills are installed especially in river Indus old basins. These basins are much fertile as are flooded with river water every year. The crop produces high cane and sugar yields in south Punjab because it is declared as Red Rot disease free zone. Variety plays a fundamental key role both increasing and decreasing per unit area sugarcane yield. The average sugarcane yield of Punjab is 62 t/ha, which is higher than the national level average cane yield. i.e. 59.87 t/ha during the year 2017-18. The sugar recovery of Pakistan was around 9.97 % i.e. just below the world average (FAOSTAT, 2017).

MATERIALS AND METHODS

The study was under taken on sixteen (16) sugarcane promising and commercial clones: S2002-US-133. S2003-US-127, S2003-US-633, S2003-US-778, S2005US-54. S2006-US-658, S2008-AUS-133, CP 77- 400, CPF 237, SPF 213, HSF 240, CPF 246, CPF 247, CPF 248, CPF 249 and S2006-SP-93 at four different locations during Sep, Feb-March, 2017 and 2018 in "Thal" and South

Punjab. The detail of locations with sugarcane clones / varieties are as under

Sr. No.	Locations		Sugarcane Clones			
1	Adam Sugar Mill, Chistian		S2002-US-133, S2003-US-127, S2003-US-633, S2003-			
			US-778, S2005-US-54,	S2006-US-658, S2008-AUS-		
			133, CP 77-400, CPF-23	7, SPF 213, HSF 240, CPF		
			246, CPF 247, CPF 248, CPF 249, S2006-SP-93			
2	Ashraf sugar mill,			-do-		
Ashraf	Bahawalpur					
3	142/TDA Lalazar, Layyał	า		-do-		
4	Indus Sugar mill, Rajanp	ur		-do-		
The exp	eriments were laid v	ariety	y S2003-US-633 gave	able canes/ ha. The		
out in	RCBD with three the	าย	statically significant	sugarcane clones maximum		
replications on an area of half germin		nation %, age i.e. 73.14	S2002-US-133 & S2008-			
acre. Date on germination %, which		was followed by	AUS-133 exhibited higher			
tiller / plant, no. of mill able S2006		6-US-658 with 67.13%	cane yield which was followed			
canes / ha, cane yield t/ha, but t		he sugarcane variety	by CP 77-400 while the clone			
and CCS% were recorded by CPF2		37 gave the lowest	S2006-SP-93 gave the lowest			
using the standard procedure. germi		ermi	nation %, i.e. 33.05. As canes yield (52.36 t/ha). The			
The date was analyzed by well		as tillers / plants	CCS % of S2003-US-633 is			
employing the fisher's conce		rned CPF 246	the maximum (14.17) among			
analysis of variance produc		ced significantly more the clones which				
technique (steal et. al. 1997) tillers		(1.69) the varieties CPF followed by S2002-US-				
compare the difference 237 a		nd SPF 213 statistically	CPF 237 and SPF 213 with			
among treatments means at par		r with the variety CPF	14.02, 13.93 and 13.87			
with LS	SD test at 0.05 2	46.	The sugarcane clone	respectively. Moreover, these		
probability level. S2003			3-US-778 gave the	clones statistically at par with		

RESULTS AND DISCUSSION

Adam Sugar Mill, Chistian Ashraf

The perusal of the data in table-I revealed that the Ashraf

lowest no. of tillers / plants i.e. 0.52. The sugarcane clone S2002-US-133, S2008-AUS-133 and S2003-US-633 produced statically signifying mill able cane / ha while the variety CPF 248 gave the lowest mill clones statistically at par with S2003-US-633 while the sugarcane clone HSF 240 gave the lowest (12.07). The findings of (Sarwar, 2019) are agreement with these in findings.

Variety	Germination	Tillers/	No. of "000"	Cane yield	CCS %
	%	plant	mill able	tonnes/ha	
			canes/ha		
S2002-US-133	36.85	0.78 de	106.47 a	103.87 a	14.02 ab
S2003-US-127	46.85	1.03 cd	80.67 e	76.41 def	13.66 bc
S2003-US-633	73.15 a	0.82 cde	103.92 a	83.99 bc	14.17 a
S2003-US-778	47.69 e	0.52 f	91.63 cd	57.40 gh	13.25 cde
S2005-US-54	55.65 cd	0.61 ef	94.69 bc	78.83 cde	13.07 e
S2006-US-658	67.13 b	0.37 f	72.82 f	73.01 ef	12.01 f
S2008-AUS-133	47.41 e	0.80 cde	104.88 a	99.78 a	12.47 f
CP77-400	36.57 fg	1.05 c	95.74 bc	86.75 b	13.58 bcd
CPF-237	33.05 g	1.54 ab	97.53 b	82.56 bcd	13.93 ab
SPF-213	36.76 fg	1.48 ab	86.88 d	76.75 def	13.87 ab
HSF-240	53.70 d	0.82 cde	94.17 bc	70.64 f	12.07 f
CPF-246	38.80 f	1.69 a	97.58 b	63.50 g	13.17 de
CPF-247	59.07 c	1.31 b	77.59 ef	54.29 h	12.99 e
CPF-248	48.05 e	0.96 cd	63.60 g	42.29 i	12.98 cde
CPF-249	39.35 f	1.36 b	88.17 d	59.19 gh	13.33 cde
S2006-SP-93 36.57 fg 1.43 b		1.43 b	63.92 g	52.36 h	13.24 cde
LSD Ashraf	2.07	0.12	2.76	3.35	0.23

Ashraf Sugar Mill, Bahawalpur

A glance at the data given in table-2 depicted that variety HSF 240 gave statistically significant germination % whereas varieties CP 77-400 and CPF 246 are statistically at par with variety HSF 240 while the variety CPF 249 showed the lowest %.

The variety S2003-US-778 produced the statistically maximum tillers / plant (3.22) but the varieties / clones S2003-US-127 and CPF 249 followed and statistically at par with that of S2003-US-778. The clone S2006-US-658 gave the statistically lowest tillers / plant. The sugarcane clone S2003-US-633 produced statistically significant mill able canes / ha which was followed by clone S2008-AUS-133 while the maximum variety CPF 248 gave the lowest no of mill able canes/ha. The sugarcane clone S2002-US-133 exhibited higher cane yield which was followed / statistically at par by / with

S2003-US-633 and S2006-US-658 while the variety CPF-248 gave the lowest yield (101-07 t/ha). The CCS % of S2002-US-133. S2003-US-633, S2003-US-127 and S2008-AUS-133 is the maximum (14.09, 14.09. 13.99 and 13.94) respectively among the rest clones. These are statistically at par with CPF 237 i.e. CCS% (13.72) but the variety CPF 248 gave lowest (11.93). the The findings of (Sarwar et. al. 2016) are agreement with these findings.

Variety	Germination	Tillers/nlant	No. of "000"	Cane vield	CCS %
variety	%	riner 5/piune	mill able	tonnes/ha	
	70		canes/ha	tonnes/na	
			canes/na		
S2002-US-133	51.58 efg	2.23 cd	118.92 fg	143.76 a	14.09 a
S2003-US-127	46.20 g	2.91 ab	108.95 h	129.68 cde	13.99 a
S2003-US-633	60.19 bcd	1.69 efg	166.72 a	135.16 abc	14.09 a
S2003-US-778	55.00 def	3.22 a	128.92 cde	108.02 ghi	13.33 bc
S2005-US-54	45.37 g	2.64 bc	121.67 def	116.59 fg	13.20 bc
S2006-US-658	60.37 bcd	1.23 h	131.41 cd	141.82 ab	12.12 ef
S2008-AUS-133	57.04 cde	1.90 def	150.41 b	124.64 ef	13.94 a
CP77-400	66.30 ab	2.04 de	104.49 h	103.50 hi	12.54 e
CPF-237	49.07 fg	2.05 de	131.94 c	126.64 cde	13.72 ab
SPF-213	55.19 def	1.50 fgh	120.50 ef	133.94 bcd	13.19 bc
HSF-240	72.50 a	1.52 fgh	134.81 c	125.26 def	12.13 ef
CPF-246	66.21 ab	1.98 de	132.78 с	115.26 g	12.48 e
CPF-247	63.98 bc	2.05 de	110.20 gh	111.22 gh	12.59 de
CPF-248	62.04 bcd	1.30 gh	102.85 h	101.07 i	11.93 f
CPF-249	35.37 h	2.91 ab	112.34 fgh	112.31 gh	13.33 bc
S2006-SP-93	57.69 cde	1.82 def	106.16 h	104.25 hi	13.11 cd
LSD	3.46	0.20	4.82	4.49	0.26

142/Tda Lalazar Layyah.

It is obvious from the data in table-3 that the sugarcane S2003-US-633 clone produced the higher germination% (73.15)statistically significant while the clone CPF 246 gave the lowest germination % (35.18). As for as the tiller / plant are concerned the clone CPF 246 gave the more tillers/ plant which was followed by CPF 237, CPF 247, CPF 248 and S2006-SP-93 but the clone S2008-AUS-133 gave the lowest no of tillers / plant. The

Sugarcane clone S2002-US-133 and S2003-US-633 have significant no of mill able canes / ha but the clone CP77-400 produced the less no. of mill able canes / ha. The prior two mentioned clones have produced the significantly higher cane yield among the other clones but variety the **CPF-248** produced the lowest cane yield t/ha (89.36). This gives the message that the maximum no. of mill able canes / ha has direct effect on cane yield. Sarwar et. al., (2016) and Afghan et. al.

(2013) have reported that no. of mill able canes positively correlated with cane yield. As for as CCS% is concerned the sugarcane clones S2002-US-133 and S2003-US-633 have produced statistically significant (14.31, 14.31) which followed were bv S2003-US-127 and SPF 213 13.58) (13.75)& with respectively but the sugarcane clone S2006-US-658 produced the lowest sugar contents. The findings of Sarwar et. al. 2017 agrees with these findings.

Variety	Germination	Tillers/plant	No. of "000"	Cane yield	CCS %
	%		mill able	tonnes/ha	
			canes/ha		
S2002-US-133	40.00 fgh	0.69 efg	171.94 ab	168.61 a	14.31 a
S2003-US-127	48.43 de	0.93 cdef	127.28 fgh	112.03 cd	13.75 b
S2003-US-633	73.15 a	0.81 defg	177.97 a	137.50 b	14.31 a
S2003-US-778	48.42 de	0.53 fg	156.82 bc	108.92 cde	13.38 bc
S2005-US-54	55.74 c	0.87 cdefg	152.50 bcd	107.74 def	12.74 ef
S2006-US-658	57.22 c	0.63 efg	147.17 cdef	140.83 b	12.09 g
S2008-AUS-133	52.04 cd	0.50 g	107.03 hi	113.25 cd	12.99 cde
CP77-400	37.78 gh	0.95 bcde	100.25 i	109.42 cde	13.33 bcd
CPF-237	35.19 h	1.41 a	106.36 i	96.94 fg	13.40 bc
SPF-213	45.74 ef	0.84 defg	149.28 cde	141.69 b	13.58 b
HSF-240	37.78 gh	0.90 cdefg	141.47 cdef	119.39 c	12.15 g
CPF-246	35.18 h	1.56 a	145.06 cdef	95.81 g	12.93 cde
CPF-247	55.28 c	0.74 efg	117.39 ghi	98.47 efg	12.82 de
CPF-248	42.59 efg	1.19 abcd	133.06 defg	89.36 g	12.25 fg
CPF-249	40.83 fgh	1.26 abc	155.94 bc	133.53 b	12.69 ef
S2006-SP-93	37.69 gh	1.35 ab	131.03 efg	118.06 cd	12.93 cde
LSD	2.90	0.19	10.07	5.53	0.26

Indus Sugar Mill Rajanpur

All the sugarcane clones / varieties showed better germination % with S2003-US-633 at the top in table-4. The sugarcane clone/variety CPF 247 produced significantly more tillers/plant i.e. (3.44) which was followed by S2003-US-778 and CPF 248 having the (3.06 & 30.07) tillers / plant respectively. The maximum no. of mill able canes / ha has direct effect on cane yield, hence the sugarcane clone S2002-US-133 has produced maximum cane yield tons / ha and lowest by CPF 248. M. Sarwar (2018) & Aslam et. al. (2014) reveals the results similar to the present findings. In case of CCS% the sugarcane clones S2002-US-133, S2003-US-127 and S2003-US-633 have shown / produced significantly higher than other clones however, the sugarcane clone CPF 248 produced less CCS%.

Variety	Germination %	Tillers/plant	No. of "000" mill able	Cane yield tonnes/ha	CCS %
C2002 LIC 122	61.02.0	1 40 ;	104.01 o	100 1 4 0	14170
52002-05-133	61.02 a	1.48 J	194.81 a	180.14 a	14.17 a
S2003-US-127	54.72 bc	2.13 ef	116.47 hi	102.97 g	13.93 a
S2003-US-633	61.85 a	1.63 ij	139.69 def	118.83 ef	14.09 a
S2003-US-778	61.85 cd	3.06 b	181.75 a	167.97 b	13.05 bc
S2005-US-54	55.65 b	2.19 de	147.14 cde	124.06 ef	12.73 cde
S2006-US-658	61.21 a	1.09 k	109.19 i	136.42 d	12.31 fg
S2008-AUS-133	53.88 bcd	1.91 fgh	165.64 b	158.50 bc	12.42 efg
CP77-400	60.74 a	1.84 ghi	105.50 i	98.14 gh	13.14 b
CPF-237	51.85 cd	1.83 ghi	152.97 bcd	168.28 b	13.15 b
SPF-213	38.89 f	2.39 d	157.39 bc	152.69 c	13.04 bc
HSF-240	59.52 a	2.66 c	153.61 bcd	126.97 de	12.23 gh
CPF-246	50.83 d	2.83 bc	121.25 ghi	151.42 c	12.46 defg
CPF-247	45.28 e	3.44 a	110.89 hi	115.47 f	12.43 efg
CPF-248	38.43 f	3.07 b	106.47 i	89.78 h	11.96 h
CPF-249	55.18 b	1.69 hij	126.75 fgh	135.72 d	12.63 def
S2006-SP-93	60.55 a	2.00 efg	135.86 efg	129.03 de	12.77 cd
LSD	1.57	0.12	7.76	5.62	0.16

Summary table (4 locations pool data)

Sr. No.	Sugarcane Clones	Yield (t/ha)	% increase	CCS%	% increase
1	S2002-US-133	149.09	84.93	14.15	15.23
2	S2003-US-127	105.27	30.57	13.83	12.62
3	S2003-US-633	118.87	47.44	14.16	15.31
4	S2003-US-778	110.58	37.17	13.25	7.90
5	S2005-US-54	106.80	32.47	12.93	5.29
6	S2006-US-658	123.02	52.59	12.13	-1.22
7	S2008-AUS-133	130.94	62.42	12.95	5.45
8	CP77-400	115.50	43.27	13.15	7.08
9	CPF-237	104.19	29.24	13.55	10.34
10	SPF-213	118.90	47.58	13.42	9.28
11	HSF-240	110.56	37.14	12.14	-1.14
12	CPF-246	106.50	32.10	12.76	3.91
13	CPF-247	94.86	17.66	12.71	3.50
14	CPF-248	80.62	0.00	12.28	0.00
15	CPF-249	110.19	36.68	12.99	5.78
16	S2006-SP-93	100.92	25.18	13.01	5.94

CONCLUSION

Average data presented in summery table revealed that sugarcane clone S2002-US-133 gave the highest cane yield and produced 84.93% more yield than check variety CPF 248. Similarly, the sugarcane clones S2008-AUS-133, S2006-US-658 and S2003-US-633 produced the 62.42% 52.59% and 47.44% increased cane yield tonnes /ha over the check.

As far as, the CCS% is concerned the sugarcane clone S2003-US-633, S2002-US-133 and S2003-US-127 gave the 15.31% 15.23% and 12.62% respectively more CCS% over the check variety.

The sugarcane clones S2006-US-658 and HSF 240 gave 1.22% and 1.14% less CCS% over the check variety.

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