

A Comparative Study of Varietal Performance in Eight Ecological Zones

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ABSTRACT

A comparative study with six varieties were conducted in the eight ecological sugarcane growing zones of the country in 1980-81 season.

The results revealed that, the varietal potential were identical and ecological zones had significant effect on the yield of the varieties as evident from significant interaction between locations and varieties. The mean yield of L. Jaba-C irrespective of locations was higher followed by Isd.2/54 and Isd.16. The newly released Isd.16 variety was found significantly superior in the soils of Ganges river flood plain and Barind tract in all production parameters and its sucrose content was significantly superior in six ecological zones. The gradation list of varieties based on higher cane and sugar yield and recovery (%) may provide a tentative guide to the sugarcane variety to be cultivated in the selected zone.

INTRODUCTION

Variety of crops plays the most important part as regards the yield and the quality and sugarcane is no exception (Anon., 1978). Improved technologies of cultural practices cannot have much effect on the quality of a crop. Although most of the varieties now grown in the sugar mills zones of Bangladesh are recommended but a promising variety may not give good performance in all ecological zones due to variations of agro-climatic factors (Anon., 1979). The yield potentials of the varieties in specific zones have not yet been tested thoroughly. Moreover, a variety may not perform well for indefinite period. Barnes (1954) and Humbert (1959) reported that varieties of sugarcane after a considerable period of cultivation had a tendency to decline in yield and vigour and newly released latter varieties replaces the old ones (Rao, 1947; King, 1953). Li & Chu (1956), reported that, in Taiwan, a newly released variety suffered severe wind breakage loss and its cultivation was stopped immediately. So, it is necessary to ensure the performance of a variety in a particular area before recommendation. Barnes (1954), suggested that, yield, juice quality, disease reaction and ratooning power of new promising varieties need to be compared with those of standard varieties in commercial cultivation. Therefore, an experiment was conducted in the eight ecological zones of the country to identify most appropriate growing area of SRTI bred or introduced commercial varieties in Bangladesh.

MATERIALS AND METHODS

The trial was conducted at the eight ecological cane growing zones in addition to Sngarcane Research and Training Institute (SRTI). The SRTI was included to compare the results of the ecological zones with that of Research Station. The ecological zones and the mills farms involved in the zone are as follows :

Ecological zone based on soil type	Mills farm where the experiments were conducted (location)
1. Black terai soils	Panchagar Sugar Mills (PSM)
2. Non calcareous dark grey flood plain soils	Thakurgaon Sugar Mills (TSM)
3. Teesta flood plain	Rangpur Sugar Mills (RSM)
4. Barind tract	Rajshahi Sugar Mills (RJSM)
5. Old Brahmaputra flood plain	Zeal-Bangla Sugar Mills (ZBSM)
6. Ganges flood plain (calcareous brown flood plain)	Carew & Co.
7. Ganges flood plain (calcareous dark grey flood plain)	Kushtia Sugar Mills (KSM)
8. Brahmaputra flood plain	Kaliachapra Sugar Mills (KCSM)

The experiment was conducted in the 1980-81 season following RCB design with five replications. One highly promising strain (later on released as Isd.16 two SRTI bred variety (Isd.1/53 and Isd.2/54) and three major introduced variety were included for each ecological zones. The introduced commercial varieties included in the experiment were Co.1158, Latarijaba-C, Co.975, Nagarbari and B.O.71. Five varieties were common in all locations (Isd.16, Isd.2/54, Isd.1/53, Co.1158 and L. Jaba-C) and the rest one was selected among the locally grown other popular varieties of the specific location.

The plot size was 9.45m x 8.31m maintaining 1.05m inter row distance. The crop was planted within November '82 in mechanically made trenches following end to end method of setts. The doses of fertilizers applied were as per recommendation for the specific zone. All normal cultural practices were done in time to provide optimum conditions for the crop growth. The crop was harvested between 15th December '81 to 15th January '82.

Data on yield of cane, yield of sugar and sucrose content (%) were recorded at the time of harvesting the crop using appropriate methods.

RESULTS AND DISCUSSION

The yield of cane varieties in different locations are shown in Table 1. Since B.O.71 and Nagarbari variety were grown each in one location only hence they could not be compared with locations except comparing them with the varieties

Table 1. Yield of cane varieties at different ecological zones (TCH)

Variety Name of location	Isd. 16	Isd.2/54	Isd.1/53	Co. 1158	L. Jaba-C	Mean**	Co. 975	BO. 71	Nagarbari	Mean
TSM	74.17bc	70.81ab	87.39d	62.52a	84.15cd	75.81bc	—	85.49d	—	77.42
PSM	76.22a	81.31a	88.99a	90.40a	82.45a	83.87c	—	—	—	83.87
RSM	63.43a	85.14b	67.55ab	78.13ab	106.11c	80.07bc	—	—	104.75c	84.19
RJSM	103.81a	99.47a	95.24a	98.60a	99.86a	99.40d	87.83a	—	—	97.47
KSM	127.60a	109.52a	111.37a	113.27a	118.39a	116.03e	107.32a	—	—	114.58
CAREW & CO.	68.94d	58.32cd	31.17a	39.87a	50.64bc	49.79a	44.83b	—	—	48.96
ZBSM	82.84b	92.53b	87.07b	89.07b	93.02b	88.91cd	43.03a	—	—	81.26
KCSM	68.37bc	68.27bc	57.06ab	74.20bc	75.83c	68.76b	46.39a	—	—	65.02
SRTI	72.99ab	74.69ab	79.95b	79.77b	74.67ab	76.41bc	67.41a	—	—	71.91
MEAN	82.04a	82.23a	78.42a	80.65a	87.24a		73.91	85.49	104.75	86.97

* Figures in the rows bearing same letters do not differ significantly at 5% level of probability.

** The mean yield in column bearing similar letters do not differ significantly.

Table 2. Recoverable sucrose (%) as influenced by different varieties at different locations.

Variety Location	Isd. 16	Isd. 2/54	Isd. 1/53	Co.1158	L. Jaba-C	Co.975	B.O.71	Nagarbari	Mean
PSM	9.30a	8.77a	8.48a	8.30a	9.21a	—	—	—	8.82
TSM	11.41	10.65	9.71	9.78	7.96	—	8.77	—	9.72
RSM	9.80a	9.85a	9.92a	10.11a	9.74a	—	—	10.65a	10.02
RJSM	10.81c	10.10ab	9.30abc	8.93a	9.53bc	9.61bc	—	—	9.72
KSM	9.06b	7.62ab	7.28a	7.47b	7.89ab	8.71ab	—	—	8.01
CAREW & CO.	9.51a	10.45a	10.30a	10.18a	10.38a	9.59a	—	—	10.07
ZBSM	10.31c	9.94bc	9.46ab	9.15a	10.07bc	9.26a	—	—	9.70
KCSM	9.01a	9.14a	9.30a	8.53a	9.36a	9.29a	—	—	9.11
SRTI	12.62b	11.99b	11.06a	11.33a	12.43b	12.21b	—	—	11.94
MEAN	10.02	9.60	9.32	9.10	9.63	9.51	8.77	10.65	9.49

*The extraction factor of juice was considered as 0.65.

*Figures in rows bearing same letters do not differ significantly at 5% level of probability.

Table 3. Gradation of varieties based on cane, sugar yield and recovery (%) in the Ecological Zones.

Ecological Zone/ Location	Highest Yielder			2nd Highest Yielder			3rd Highest Yielder		
	Variety & Cane Yield (TCH)	Variety & Sugar Yield (TSH)	Variety & Recovery (%)	Variety & Cane Yield (TCH)	Variety & Sugar Yield (TSH)	Variety & Recovery (%)	Variety & Cane Yield (TCH)	Variety & Sugar Yield (TSH)	Variety & Recovery (%)
PSM	Co. 1158 90.40	L. Jaba-C 7.58	Isd. 16 9.30	Isd. 1/53 88.99	Co. 1158 7.51	L. Jaba-C 9.21	L. Jaba-C 82.45	Isd. 1/53 7.48	Isd. 2/54 8.77
TSM	Isd. 1/53 87.39	Isd. 1/53 8.48	Isd. 16 11.41	B.O. 71 85.49	Isd. 16 8.47	Isd. 2/54 10.65	L. Jaba-C 84.15	Isd. 2/54 7.54	Co. 1158 9.78
RSM	L. Jaba-C 106.11	N. Bari 11.13	N. Bari 10.65	N. Bari 104.75	L. Jaba-C 10.34	Co. 1158 10.11	Co. 1158 78.13	Isd. 2/54 8.39	Isd. 1/53 9.92
RJSM	Isd. 16 103.81	Isd. 16 11.22	Isd. 16 10.81	L. Jaba-C 99.86	Isd. 2/54 10.05	Isd. 2/54 10.10	Isd. 2/54 99.47	L. Jaba-C 9.55	Co. 975 9.61
KSM	Isd. 16 127.60	Isd. 16 11.51	Isd. 16 9.09	L. Jaba-C 118.39	L. Jaba-C 9.39	Co. 975 8.71	Co. 1158 107.32	Co. 975 9.26	L. Jaba-C 7.89
Carew & Co.	Isd. 16 68.94	Isd. 16 6.56	Isd. 2/54 10.45	L. Jaba-C 50.64	Isd. 2/54 6.09	L. Jaba-C 10.38	Isd. 2/54 58.32	L. Jaba-C 5.26	Isd. 1/53 10.30
ZBSM	L. Jaba-C 93.02	L. Jaba-C 9.37	Isd. 16 10.31	Isd. 2/54 92.53	Isd. 2/54 9.20	L. Jaba-C 10.07	Co. 1158 89.07	Isd. 16 8.54	Isd. 2/54 9.94
KCSM	L. Jaba-C 75.83	L. Jaba-C 7.10	L. Jaba-C 9.36	Co. 1158 74.20	Co. 1158 6.33	Isd. 1/53 9.30	Isd. 16 78.37	Isd. 2/54 6.24	Co. 975 9.29
SRTI	Isd. 1/53 79.95	L. Jaba-C 9.31	Isd. 16 12.62	Co. 1158 79.77	Isd. 16 9.17	L. Jaba-C 12.43	L. Jaba-C 74.67	Co. 1158 9.02	Co. 975 12.21

of the same location. The five varieties common in all locations were compared for yield potential of varieties and locations. Although the mean yield of cane varieties were identical to each other, the yield of L. Jaba-C was the highest (87.23 TCH) followed by Isd.2/54 (82.24 TCH) and Isd.16 (82.05 TCH) irrespective of location. Again, highest yield of cane among all varieties and locations were produced by Isd-16 at KSM (127.60 TCH) followed by L. Jaba-C and Co.1158 of the same location. Different varieties performed differently when varieties of individual ecological zones were concerned.

In PSM Co.1158 variety gave highest yield and in TSM Isd.1/53 produced significantly highest yield of cane. Nagarbari and Latarijaba-C appeared significantly superior variety than others in RSM. In RJSM, Isd.16 out yielded the rest of the varieties. Similar results were obtained from KSM. These findings agree with these found elsewhere (Anon., 1981). All varieties grown in KSM produced highest yield compared to other locations and were identical to each other. These findings indicate that varieties under this study have similar yield potential. Yield performance of all varieties were poor in Carew & Co. Yet significantly highest yield was obtained from Isd.16 followed by Isd.2/54. All varieties except Co.975 in ZBSM and SRTI produced identical yield (Table 1). L. Jaba-C produced the highest yield in KCSM followed by Co.1158. The mean yield of the varieties of one location varied significantly with other locations.

The mean recoverable sucrose of varieties show that Isd.16 contains highest sucrose irrespective of locations (Table 2) and the mean sucrose in all varieties was the highest at SRTI followed by Carew & Co. Although, highest mean cane yield irrespective of varieties were obtained from KSM but highest mean sugar yield was obtained from RJSM.

On the basis of findings of the above experiment, comparison was made in respect of cane yield, sugar yield and sucrose (%). Choices in respect of the above production parameters were shown against individual ecological zone (Table 3).

The newly released Isd-16 was found to produce significantly highest sucrose (%) in six out of nine locations studied (Table 2). The findings show that the varietal yield potential was identical to each other. The cane yields were dependent on the growing condition (agro-climate) of the individual ecological zones. Highest cane, sugar yield and recovery (%) were obtained from Isd.16 grown in the Ganges river flood plain and Barind tract (Tables 1 & 2). The work of is still in progress. However, the gradation list (Table 3) based on the performance of the varieties may provide a tentative guide to the sugarcane to be cultivated in the selected zone.

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