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Selection of Sugarcane Clone as Chewing Cane

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ABSTRACT

An experiment was conducted with five sugarcane chewing clones namely Amrita, Co 208, Q 69, Misridana, Co 527 and Isd 24 in three locations at RSRS farm, Kapasia and Kaligonj farmer's field, Gazipur, Bangladesh during cropping season 2008-09 to find out the suitable sugarcane clones for chewing cane. The chewing canes are softer, juicy and easily remove bark from cane. The highest average cane yield was obtained from Amrita with 140.20 tha^{-1} and in the context of benefit cost ratio (BCR) Amrita gave the second highest value with 1.93. The clones Co 208 also gave highest BCR with 1.98. Considering the yield and benefit cost ratio (BCR) Amrita was comparatively a good chewing clones.

Key words: Chewing clones, *Saccharum officinarum*, benefit cost ratio

INTRODUCTION

Sugarcane *(Saccharum officinarum)* is a cash crop and main source of white sugar in Bangladesh. It is also an important food crop of the tropics and subtropics (Sivanesan and Waller, 1986). It has been known for at least 2200 years. Alexander's army saw sugarcane during its conquest of India in 326 BC (Purseglove, 1979). Sugarcane was originally grown for the sole purpose of chewing in South Eastern Asia and the Pacific. The rind was removed and the internal tissues sucked or chewed. Noble canes are the best for chewing due to softness, high sugar and juice contents. Naidu (1987) reported that sugarcane was primarily grown for chewing and livestock feed. Four sugar estates (Bacita, Numan, Sunti and Lafiagi) in Nigeria grow sugarcane on a relatively large scale, while the majority of smallholder farmers grow soft sugarcane (chewing cane) on land holdings of 0.2-0.5 ha (Anon.,1997). Wayagari *et al.* (2003) reported that chewing sugarcane is a indicator as moneymaking enterprise in the central zone of Nigeria. Cane juice gives energy directly and it has medicinal value for treating jaundice affecting people. Sugarcane juice is widely consumed by people of the tropics and subtropics. Lu Nai *et al.* (2004) reported that the aqueous extracts of three varieties of sugarcane showed good antioxidant properties and were also able to protect against radiation induced DNA damage in pBR322 plasmid DNA and *Escherishia coli* cultures. They also observed that sugarcane juice have the ability to scavenge free radicals, reduce iron complex and inhibit lipid peroxidation, may explain possible mechanisms by which sugarcane juice exhibits its beneficial effects in relation to its reported health benefits. Cultivation of chewing sugarcane uses a plastic shed to create a microclimate in favour of chewing sugarcane growth and encouraging early maturity. There is little scope for increasing the area under sugarcane due to limitations of irrigation and very high land. In our country sugar producing varieties are cultivated in large scale but chewing varieties are cultivated in very limited area. The demand of chewing cane is increasing day by day and there is a scope to expand the area under chewing cane cultivation particularly in the non mill zone areas. Some promising clones having chewing characters are being cultivated in different locations of the country. Therefore, the present work was considered to determine the suitable chewing sugarcane cultivated in the red soil environment of Madhupur Tract. The research findings will be popular, choose able and beneficial to human being.

MATERIALS AND METHODS

The experiment was set up in RSRS farm, Kapasia and Kaligonj farmer's field at Gazipur district during the cropping season 2008-09. Chewing sugarcane clones viz; Amrita, Co 208, Q 69, Misridana, Co 527 and Isd 24 were transplanted in three locations following RCB design with replicated three times. Two eyed pre germinated settlings were transplanted and recommended fertilizers, chemical insecticides were applied with appropriate intercultural operations. After cutting the setts, these were dipped in 0.1% Bavistin 50 WP solution for 30 minutes. Then the setts were placed in soil bed and covered with straw for germination. All the varieties were transplanted in 8m x 6m size plot with 102 settlings in every plot. Settlings to settlings distance was 0.5 meter and line to line 1 meter. The cane was harvested at December 2009. Data on mortality, number of tiller, millable cane, yield of cane and Brix % were taken and analyzed with DNMRT.

RESULTS AND DISCUSSION

At RSRS farm, Gazipur:

The performance of the tested clones regarding mortality after transplanting, tillering, millable cane, individual cane weight, Brix% and yield of cane were presented in Table 1. In case of mortality, the lowest (1.97%) was found in Amrita that indicated the survival capability was higher than other clones. In tiller production, there was a significant difference among the clones where Amrita produced the highest number of tillers ($128.10x10^3ha^{-1}$) that was identical with Co 527 and Co 208 but significantly differ with Q 69, Isd 24 and Misridana. On the contrary, Co 527 produced the highest ($88.33x10^3na^{-1}$) number of millable cane which significantly differed with Co 208 and Misridana. This result copes with the Anonymous (BSRI Annual Report, 1999 & 2000) where Co 527 produced the highest number of millable cane compare to other local varieties. Higher individual cane weight was found with Misridana (2.35 kgs) and Amrita (2.15 kgs) which was significantly superior to rest of the varieties/clones. On the other hand, in case of cane yield, among the clones Amrita produced the highest (180.40 tha^{-1}) that was statistically significant. Considering the cane yield it was found that Amrita produced the highest yield among the tested clones/varieties under study the differences was statistically significant. The percent Brix of the tested clones where Q 69 was significantly gained the highest (20.81) percentage but statistically similar with Amrita (20.34). Statistically identical reading was found with Q 69 and Amrita which significantly differed with other tested clones/varieties.

Farmers' field, Kaligonj, Gazipur:

The results on mortality of settlings after transplanting, tillering, millable cane and yield of cane were presented in Table 2. The mortality of settlings was zero in Amrita that indicated the survival capability cent percent. It also significantly differed from Co 208 but insignificant to rest of other clones. In tiller production, Co 527 produced the highest ($187x10^3ha^{-1}$) number of tillers that was identical with Amrita Q 69 and Isd 24 but significantly differed with Co 208 and Misridana. Similarly, Co 527 produced the highest ($122.91x10^3ha^{-1}$) number of millable cane which significantly differed with Amrita, Co 208 and Misridana. This result copes with the Anonymous, 1999 & 2000 where Co 527 gave the highest number of millable cane compared with other local varieties. The individual cane weight was the highest in Misridana with 1.74 kgs but Amrita gave highest cane yield ($138.93tha^{-1}$) that was statistically significant followed by Misridana. Considering the Brix% among the tested clones Q 69 was produced the highest (20.49) that statistically identical to Isd 24 (19.72) but differed with rest clones/varieties.

Farmers' field, Kapasia, Gazipur:

The analyzed data on settlings mortality after transplanting, tillering, millable cane and yield of cane were presented in Table 3. The lowest (14.50%) mortality was found in Amrita that significantly differed from Co 208 and Misridana but insignificant with Q 69, Co 527 and lsd 24. In tiller production, there was a significant difference among the clones where Co 527 produced the highest number of tillers ($130.83x10^3 ha^{-1}$). Similar trend was found in millable cane production. This result coincides with the Anonymous, 1999 & 2000 where Co 527 gave the highest number of millable cane compared with other local varieties. Amrita gave the highest (1.81kgs) individual cane weight which was insignificant with Misridana but significantly differing with Q 69, Co 208, C0 527 and lsd 24. Considering yield production Co 527 out yielded all other varieties/clones under the experiment which was statistically significant to the other varieties but identical with Amrita. On the other hand, Co 527 produced the highest ($110.66 tha^{-1}$) cane yield that was insignificant with Amrita but significantly differed with Q 69, Co 208, Misridana and lsd 24. The percent Brix of the tested clones were not significant.

The average results of three locations were presented in Table 4. The data revealed that mortality of transplanted settlings was the lowest (5.27%) in Amrita. The highest number of tiller was found in Co 527 clones which significantly differed from all the clones/varieties. Similar trend was found in millable cane production. Individual cane weight was highest in Misridana (1.89 kgs) followed by Amrita (1.78 kgs) and both the clones were significantly superior to others. However in cane yield Amrita produced higher yield ($140.20 tha^{-1}$) compare to other clones. than the other clones. This result copes with Sohel *et al.*(2009) where it was reported that Amrita produced the highest yield than other clones. But in case of average Brix% there was significant deference among the clones of three locations.

The economics of the chewing clones in three locations was calculated and presented in Table 5. Among the six clones, Co 208 gave the highest profit of Tk. 269.27 thousand per hectare and highest BCR 1.98 was also found with the same variety. Meanwhile, Amrita also gave almost equal return, profit and BCR which valued 262.30 thousand per hectare and 1.93. Considering the results of the experiment Co 208 and Amrita were found superior in respect of BCR (Benefit Cost Ratio) in red soil of Madhupur tract. But Amrita has some demerits like comparatively harder internode, blackish and less attractive color compare to Co 208. Rashid *et al.* (2009) conducted an experiment with twelve chewing sugarcane varieties under Modhupur Tract and reported that among the evaluated varieties Amrita produced the highest BCR (Benefit Cost Ratio) and found comparatively better chewing quality. However, some agronomic features like chewing quality, stalk color, market price and over all choice of neighbouring farmers were recorded and superiority of Co 208 and Amrita was found in the tested locations.

Table 1. Performance of Chewing clones on yield and yield parameters at RSRS farm, Gazipur during cropping season 2008-09

Treatments	Mortality (%)	Tiller ($10^3 ha^{-1}$)	Millable cane ($10^3 ha^{-1}$)	Wt. of individual cane (Kg)	Yield (tha^{-1})	Brix (%)
Amrita	1.97 c	128.10 a	83.60 a	2.15 a	180.4 a	20.34 ab
Co 208	6.86 bc	111.40 abc	51.45 c	1.16 b	59.03 c	16.77 c
Q 69	4.24 bc	105.00 c	75.69 abc	1.31 b	107.1 b	20.81 a
Co 527	5.56 bc	126.40 ab	88.33 a	1.21 b	107.9 b	17.55 c
lsd 24	7.52 b	110.00 bc	78.75 ab	1.35 b	106.7bc	17.65 c
Misridana	16.33 a	105.60 c	56.94 bc	2.35 a	133.6 ab	17.61 bc
CV	38.63	8.05	18.44	14.62	22.79	8.23
Lsd at 5% level	5.46	16.76	24.31	0.42	48.01	2.76

Table 2. Performance of Chewing clones on yield and yield parameters at Kaligonj farmers field, Gazipur during cropping season 2008-09

Treatments	Mortality (%)	Tiller (10^3 ha^{-1})	Millable cane (10^3 ha^{-1})	Wt. of individual cane (Kg)	Yield (tha^{-1})	Brix (%)
Amrita	0.00 b	157.00 ab	98.95 b	1.38 b	136.93 a	16.77 b
Co 208	2.94 a	128.60 bc	64.57 c	1.00 c	65.70 b	16.77 b
Q 69	1.30 ab	160.41 a	110.40 ab	1.15 c	127.26 b	20.49 a
Co 527	0.65 b	187.00 a	122.91 a	1.02 c	127.18 b	16.83 b
Isd 24	0.65 b	156.38 ab	100.96 ab	1.13 c	115.30 b	19.72 a
Misridana	1.30 ab	107.42 c	60.34 c	1.74 a	105.28 ab	16.94 b
CV	92.58	11.61	13.32	8.35	20.29	5.81
Lsd at 5% level	1.92	31.57	22.55	0.19	41.70	1.89

Table 3. Performance of Chewing clones on yield and yield parameters at Kapasia farmers field, Gazipur during cropping season 2008-09

Treatments	Mortality (%)	Tiller (10^3 ha^{-1})	Millable cane (10^3 ha^{-1})	Wt. of individual cane (Kg)	Yield (tha^{-1})	Brix (%)
Amrita	14.50 c	72.53 bc	56.14 bc	1.81 a	103.33 a	17.88
Co 208	50.92 a	56.60 c	45.89 c	1.55 ab	52.33 b	17.27
Q 69	21.90 bc	79.77 b	66.31 b	1.13 c	74.33 b	17.00
Co 527	18.20 bc	130.83 a	102.42 a	1.07 c	110.66 a	19.21
Isd 24	25.61 bc	76.51 bc	59.37 bc	1.27 bc	69.66 b	18.27
Misridana	32.70 b	58.72 c	42.56 c	1.59 a	66.66 b	17.38
CV	30.44	14.05	17.00	12.09	17.75	NS
Lsd at 5% level	15.12	20.24	19.21	0.30	25.67	

Table 4. Performance of Chewing clones on yield and yield parameters of three locations (RSRS farm, Kaligonj, Kapasia) during cropping season 2008-09

Treatments	Mortality (%)	Tiller (10^3 ha^{-1})	Millable cane (10^3 ha^{-1})	Wt. of individual cane (Kg)	Yield (tha^{-1})	Brix (%)
Amrita	5.27 b	119.21 bc	79.56 b	1.78 a	140.20 a	18.33
Co 208	19.47 a	98.86 bc	53.97 c	1.27 b	59.01 c	16.93
Q 69	9.15 ab	115.05 bc	84.13 b	1.22 b	102.88 b	19.43
Co 527	8.78 ab	148.07 a	104.55 a	1.10 b	115.25 ab	17.86
Isd 24	11.15 ab	114.29 bc	79.69 b	1.25 b	97.20 b	18.51
Misridana	16.77 ab	90.58 c	53.28 c	1.89 a	101.84 b	17.25
CV	64.29 ab	12.71	12.39	16.33	17.59	NS
Lsd at 5% level	13.76 ab	26.44	17.10	0.42	32.87	

*NS= Not Significant

Table 5. Economics of chewing sugarcane clones of three locations (RSRS farm, Kaligonj. Kapasia) during cropping season 2008-09

Treatments	Millable Cane (MC) ($x10^3$ ha^{-1})	Price/MC (Tk)	Income $x10^3ha^{-1}$ (Tk)	Cost of cultivation ($x10^3ha^{-1}$)(Tk)	Profit $x10^3ha^{-1}$ (Tk)	BCR (Benefit Cost Ratio)
Amrita	79.56 b	5.00	397.80	135.5	262.30	1.93
Co 208	53.97 c	8.00	404.77	135.5	269.27	1.98
Q 69	84.13 b	3.50	294.45	135.5	158.95	1.17
Co 527	104.55 a	2.80	292.74	135.5	157.24	1.16
Isd 24	79.69 b	2.80	223.13	135.5	87.63	0.64
Misridana	53.28 c	4.50	239.76	135.5	104.26	07.6

Inputs Cost: Seed cane: Tk.1850.0/ton Urea: Tk. 12.00/Kg, TSP (Tripple Super Phosphate): Tk. 22.00/Kg, MoP (Muriate of Potash): Tk. 25.00/Kg, Gypsum: Tk. 12.00/Kg, Zinc Sulphate: Tk. 120.00/Kg, Bavistin: Tk. 1800.00/Kg, Furadan 5G: Tk. 120.00/Kg, Labour wage: Tk. 150.00/Man day

REFERENCES

Anonymous. 1997. Sugarcane Varietal Development and Research in Nigeria. Paper prepared by NCRI for FMNAR, Abuja. 10 pp.

BSRI Annual report, 1999-2000. Bangladesh Sugarcane Research Institute, Ishurdi, Pabna, Annual report, 1999-2000. pp. 128-129.

BSRI Annual report, 2000-2001. Bangladesh Sugarcane Research Institute, Ishurdi, Pabna, Annual report, 2000-2001. pp. 125-126.

Lu Nai C.; WeiMin Z.; JianZhong, C.; WenFeng, W. and JianHong J. 2004. Mechanical cultivation technique for chewing sugarcane. *Sugarcane*, **11** (2): 22-24.

Naidu, K.M. 1987. Potential yield in sugarcane and its realisation through variety improvement. Pp.1-17 *in* Sugarcane Varietal Improvement (M.K. Naidu, J.V. Screenivasan and M.N. Premachandran, eds.). Sugarcane Breeding Institute, Coimbatore, India.

Purseglove, J.W. 1979. Tropical crops: monocotyledons. Longman Group Ltd., London. 607 pp.

Rashid, M.A.; Alam, M.N.; Sohel, M.A.T.; Rahman, M.S. and Kuasha Mahmud. 2009. Performance of chewing varieties at Sreepur, Gazipur under Modhupur AEZ. *Bangladesh J. Sugarcane*, **31**:69-73.

Sivanesan, A. and Waller, J.M. 1986. Sugarcane.

Sohel, M.A.T.; Rashid, M.A.; Alam, M.N.; Karim, K.M.R. and B.P. Podder. 2009. Performance of chewing type sugarcane genotypes under AEZ 28. *Bangladesh J. Sugarcane*, **31**:65-68.

Wayagari, J.W.; Ayoola, G.B.; Imolehin, E.D. and S.M. Misari. 2003. Economic Evaluation of Chewing Sugarcane Production in the Central Zone of Nigeria. *Sugar Tech.*, **5** (1&2); 81-84.