

Potential of Maize Stalk for Gur Manufacture

M.A. Jabber, M.A. Matin, M.A. Hossain and M.A.S. Miah

Sugarcane Research & Training Institute,
Ishurdi, Pabna, Bangladesh.

Information on use of maize stalk for sugar and gur production is lacking. However, recently some claims on manufacture of gur using maize stalks have been published in daily news paper "The Dainik Millat" on 20th September 1989. Therefore, a trial was conducted at sugarcane Research and Training Institute farm with three maize varieties such as Barnali, Shuvra and Swan-2 to study the potentiality of gur manufacturing using maize stalks. Barnali and Shuvra are developed by Bangladesh Agricultural Research Institute and Swan-2 is introduced to Bangladesh from Thailand. Seeds were sown in December 1989 in furrows with 0.75 m row spacing and 0.5 m interplant spacing. Three seeds were placed at 2.5 cm depth of soil to maintain uniform plant population. The rate of fertilizer application in kg/ha were 100N, 50 P₂O₅ and 34 K₂O. One-third nitrogen and all other fertilizers were applied during final land preparation and rest of nitrogen was applied in two equal splits as top dressing at 30 and 60 d after planting. Weeding and other cultural operations were done following each irrigation at 35, 65 and 90 d after planting. Maize were harvested in April 1990 and data on stalk length, diameter and stalk yield were taken at harvest. Chemical analyses of maize stalks for brix, pol, purity, recovery, Reducing sugars and fibre content were done (Meade, 1963). Gur was prepared soon after harvesting maize stalks by open pan boiling method and it was analysed after two days of its preparations for some important physical and chemical properties such as recovery, texture, crystalline nature, colour in solid state, sucrose, reducing sugars, moisture, foreign matter and pH. The sucrose percentage was determined by Saccharimeter and reducing sugars by Lane and Eynon Method (Anon., 1979). The results of the experiment are presented in the Tables 1, 2 and 3. From the Table 1, it is seen that Barnali produced significantly higher stalk yield (21.7 t/ha) compared to Swan-2 (20.2 t/ha), while stalk yield of shuvra was statistically comparable to that of Barnali as well as Swan-2. Significantly higher stalk length was recorded in Barnali compared to Shuvra, while no significant differences were observed between Barnali and Swan-2 as well as Shuvra and Swan-2 (Table 1). No significant difference in stalk diameter was found among the varieties. It can be seen further from the Table 1 that higher yield of Barnali was found associated with higher stalk length and diameter. Results on chemical analyses of maize stalks presented in the Table 2 shows the highest sucrose (6.9) and purity percentage (56.5) in the juice of Shuvra. Table also shows that percentage reducing sugars are quite high (2.6-3.7) in all the maize varieties which is a poor characteristic for manufacture good quality gur.

Recovery, physical and chemical properties of gur have been shown in the Table 3. It is seen from the Table that gur manufactured from maize stalk is very poor having higher reducing sugars, poor crystalline nature, higher moisture percentage, soft texture etc. Chemical composition of gur and its quality are dependent on

Table 1. Yield and yield contributing characteristics of maize stalks.

Variety	Stalk yield/ha(MT)	Length (cm)	Diameter (cm)
Swan-2	20.2 b	156 ab	1.37 a
Barnali	21.7 a	165 a	1.72 a
Shuvra	21.2 ab	145 b	1.52 a
	s.e.m= 0.15	4.34	0.13
	c.v. = 3.06	4.86	14.49

Similar letter indicates no Significant difference as per DNMT at 5% level.

Table 2. Chemical analysis of maize stalk.

Variety	Juice extrac- tion (%)	Brix (%)	Sucrose in juice (%)	Purity (%)	Recovery (%)	Reducing sugars (%)	Fibre (%)
Swan-2	42.8	11.5	6.0	52.2	1.95	2.7	19.2
Barnali	41.6	13.1	6.2	47.3	1.65	3.7	20.5
Shuvra	42.9	12.2	6.9	56.5	2.55	2.6	18.0

Table 3. Recovery, physical and chemical properties of gur.

Variety	Recovery (%)	Texture	Crysta- line nature	Colour in solid state	Sucrose (%)	Reducing sugars (%)	Moisture (%)	Foreign matter (%)	pH
Swan-2	3.6	Soft	Poor	Dark	30.0	31.0	17.8	3.0	5.3
Barnali	4.0	Soft	Poor	Dark brown	47.0	18.0	15.9	1.5	5.2
Shuvra	4.0	Soft	Poor	Dark brown	51.0	15.7	16.7	1.8	5.2

composition of juice from which gur is manufactured. It is highly hygroscopic in nature and quickly absorbs moisture, and becomes soft in texture and sticky and often liquify completely. It was reported that some microorganisms are responsible for fermentation in gur which brings about various changes resulting heavy losses both in weight and quality (Farooque, 1960). The quality of gur is considered by its taste, reducing sugars and colour intensity although quality can be further modified by using appropriate clarificants and method of boiling for gur preparation. Moisture and reducing sugars content of gur play an important role for keeping quality. The standard gur should contain 65 to 80% sucrose. Gaur *et al.*, (1979) reported that a good quality gur should have high sucrose and low reducing sugars content (5-10%). But gur manufactured from maize stalk of all the varieties investigated contains higher level of reducing sugars and moisture. Besides, due to lower pH level the taste of gur was found to be acidic which is not preferred by the consumers, and yield of maize stalks and extraction percentage of all varieties were found to be very low. Chemical analyses on gur prepared from different maize stalks were also showed inferior quality.

Considering the results obtained in the present investigation, it can be concluded that maize stalk is much less potential to be utilized for manufacturing gur for human consumption. However, maize stalk can be utilized to prepare some of syrup for using as a cattle feed and alcohol production.

REFERENCES

- Anonymous, 1979. Official methods of chemical control for Philippine Cane Sugar Factories, Refineries and Distilleries, Revised Edition. Philippine Sugar Commission, Bacold City, Philippine, 437 p.
- Farooque, M. 1960. Role of micro-organism in deterioration of Gur in storage. *Indian Journal of Sugarcane Research and Development*, **1** : 69-71.
- Gaur, S.L. ; Ranadive, S.J. and Jawalekar, D.V., 1979. Effect of sugarcane varieties on the keeping quality of Gur. *The Indian Sugarcane Crop Journal*, January-March, pp. 18-20.
- Meade, G.P. 1963. Polarimetry in Sugar Analysis. Cane Sugar Hand Book. 9th Edition. John Wiley Sons Inc. New York. pp. 401-441.