

Gur from Sweet Sorghum

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ABSTRACT

Gur was prepared from four sweet sorghum varieties, viz. Mer 71/1, Wray-4, Ramada and Rio by ordinary pan boiling method at the Sugarcane Research & Training Institute in August, 1984. Highest ton gur/ha was obtained from the variety Mer 71/1. The percent moisture and reducing sugar content of sorghum gur was found to be quite high. Further investigation for keeping quality of gur in storage is needed.

INTRODUCTION

Sweet sorghum, *Sorghum bicolor* (L) Moench, has long been used as a source of syrup. It was introduced in U.S.A. for more than one hundred years ago and was intensively studied during the late 1800's by Wiley, Neal and others (Cowley and Smith, 1971). Although Sweet sorghum was recognised as a potential source of sugar, rather it was grown for commercial production of syrup. The United States Department of Agriculture reactivated the research in sweet sorghum for granular sugar when World War-II disrupted much of the World's supply of sugar (Broadhead, 1981). Production research in sweet sorghum was initiated by the Texas Agricultural Experiment Station in 1961 to evaluate sorghum, sugarcane and sugar beet as sugar source crop. Similar efforts were also initiated by the Texas Agricultural Experiment Station in 1961 to evaluate sorghum, sugarcane and sugar beet as sugar source crop. Similar efforts were also initiated in Louisiana with the primary purpose to determine whether sweet sorghum could be grown profitably on a commercial scale in idle sugarcane land using sugarcane equipment and milled in existing sugar mills for the production of higher invert molasses. Very recently, Breaux Bridge Sugar Co-operative in Louisiana emerged as possibly the world's only commercial supply of sorghum-sugar, milled from the crop produced by its farmers on fallow land.

Sweet sorghum has long been of interest to sugar farmers and sugar processors. It has the potential of extending its cultivation because of short season. It can be grown successfully under wide range of agricultural and climatic conditions. It grows quickly and matures in 110-120 days and can be planted in late April and harvested in mid. August before the regular cane crushing season starts. Rahman *et.al* (1984) reported yield potentiality of sweet sorghum in Bangladesh. Because of the warm weather and softness of stalks, it is subject to more deterioration than sugarcane although this should be of a less problem when producing alcohol rather than sugar (Polack and Day, 1980). Hence, with a view to see the prospect of sweet sorghum cultivation in respect of gur preparation an experiment was carried out at the SRTI Experimental Farm in 1984.

MATERIALS AND METHODS

In order to study the prospect of sweet sorghum cultivation for gur preparation four Sweet Sorghum varieties viz. Rio, Mer 71/1, Wray-4 and Ramada were sown in the sugarcane Research and Training Institute Farm in April, 1984. The experiment was laid

out following the randomized complete block design. Plot size for each variety was 6m x 8m. Seeds were sown in lines. Row to row and plant to plant distance was 30 and 15 cm respectively. Rate of fertilizer was 70 : 138 : 70 kg/ha (N : P₂O₅ : K₂O). Phosphorus and potassium were applied in full to the field at the time of sowing and nitrogen was applied in two splits (at 21 and 35 days after sowing). Intercultural operations were done as and when necessary. The crop was harvested in August, 1984. Yield of crop was determined and chemical analysis was done for Brix, Pol, Purity, % Available Sugar (Meade, G.P., 1963), reducing sugar, ash, PH and % fibre. Gur was prepared from the juice of sorghum immediately after harvest by open pan boiling method, using ordinary lime as clarifying agent. Physical and chemical properties, such as quantity, quality, texture, crystalline nature, colour in solid state, pol, reducing sugar, moisture, ash and PH were analysed. It was then stored in a glass container to study the keeping quality.

Sucrose percent : 130 gms of sorghum-gur was dissolved in 1000 ml of distilled water. From this solution 100 ml was taken and 1 gm of Basic Lead Sub-Acetate was added as clarifying agent and then filtered. Filtered solution was studied in a Saccharimeter and the percent sucrose was found out from Schmitz's table.

Reducing sugar : Reducing sugar was estimated by Lane and Eynon method, using Fehling solution. The solution of gur tested was prepared by dissolving 65 gm of gur in 500 ml distilled water.

Colour : The solution for colour determination was prepared by dissolving 6.5 gm of gur in 100 ml distilled water. The solution was read on photo Electric Colorimeter using 660µm filter.

RESULTS AND DISCUSSION

The yield and quality of sweet sorghum have been shown in Table 1. From the table it was observed that variety Wray-4 gave highest ton stalk yield/ha (78.54), followed by Ramada (70.79). This result is in conformity with that of Rahman *et. al.* (1984). But the percent available sugar was found to be less than the rest two varieties, Mer 71/1 and Rio. Similar result was obtained by Angelle (1982) in variety Rio. From the table it was also revealed that percent reducing sugar was quite high in all the varieties. All the varieties were acidic in nature, lowest PH being in Rio. Ramada produced highest fibre, followed by Mer 71/1. Highest percent ash was in Ramada, lowest being in Rio.

Table 1. Yield and sucrose content of Sweet Sorghum

Variety	Stalk Yield MTH	Brix (%)	Pol (%)	Purity %	Available sugar (%)	Reducing sugar (%)	Fibre (%)	Ash (%)	pH
Rio	43.51	19.24	14.77	76.77	6.79	9.87	13.55	1.22	5.20
Mer 71/1	66.65	20.15	16.41	79.80	7.61	9.73	12.36	0.52	5.08
Wray-4	78.54	13.55	8.85	66.26	3.63	2.25	16.77	0.58	5.12
Ramada	70.79	16.80	11.34	67.18	4.73	1.15	17.00	2.06	5.00

The gur yield/ha of sweet sorghum is presented in Figure 1. From the figure it was observed that variety Mer 71/1 yielded highest ton gur/ha (2.92), followed by Ramada (12.46). Lowest yield of gur was obtained from Rio (1.56).

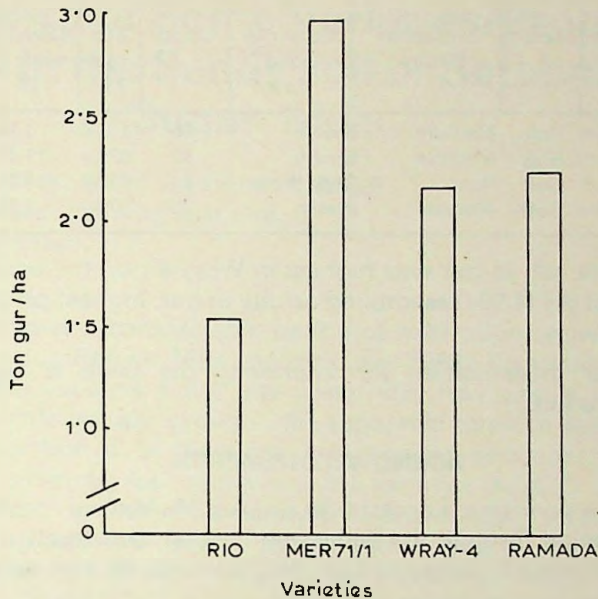


Figure 1. Ton gur/ha from different sweet sorghum varieties.

The percent recovery and the physical and chemical properties of sorghum-gur have been demonstrated in table-2. Chemical composition of gur and its quality are dependent on the composition of juice from which gur was made. It depends on a number of factors namely soils, climate, variety, nature of cultivatin, stage of maturity at harvest and method of preparation of gur. Gur preparation is a difficult task, as there is a wide variation in quality, its complex chemical composition and marked deterioration it undergoes during storage. The gur is highly hygroscopic and quickly absorb moisture ; as a result it becomes soft and sticky and often liquify completely. Some micro organisms are responsible for fermentation which brings about various changes resulting heavy losses both in weight and quality (Farooque, 1957). Since gur is a hteterogenous chemical product, its standardization is rather a complicated one (Kale *et. al.* 1964). The quality of gur is considered by its taste, reducing sugar and colour intensity (Anon., 1973), though the quality may be further modified by method of boiling and clarificants used for preparation of gur. From the analysis of gur from sweet sorghum it was observed that Mer 71/1 gave highest recovery (4.39), followed by rio (3.59). The standard gur should not contain more than 70-75 % sucrose. Sucrose percent gur from Mer 71/1 and Rio were found to be 62.52 and 70.66 respectively. Colour of gur from Mer 71/1 and Rio were light. Texture was soft in all the varieties.

Moisture and reducing sugar content of gur play an important role for it keeping quality. From the table its is evedent that reduing surgar was high in all the varieties, highest being in Wray-4. Percent moisture was highest in Mer 71/1. Percent ash and pH also play an important role in the taste, quality and preservation of gur. Table 2

Table 2. Percent recovery, physical and chemical properties of 'gur' from Sweet Sorghum.

Variety	Recovery (%)	Quality	Texture	Crystalline nature	Colour in solid state	Colour	Sucrose (%)	Reducing sugar (%)	Moisture (%)	Ash (%)	pH
Rio	3.59	Medium	Soft	Medium	Brown	65	70.66	9.26	15.63	4.78	5.18
Mer 71/1	4.39	Medium	Soft	Medium	Brown	62	62.52	11.46	16.98	4.52	4.99
Wray-4	2.95	Poor	Soft	Poor	Dark Brown	61	55.10	18.56	15.63	6.07	5.12
Ramada	3.48	Medium	Soft	Medium	Brown	70	77.44	9.26	14.47	4.05	5.08

revealed that percent ash in gur was highest in Wray-4 ; on the contrary variety Mer 71/1 recorded lowest pH (4.99) resembling acidity in gur, highest pH being only 5.18 in Rio.

Therefore, further investigation for improving the taste & keeping quality of sorghum-gur is needed.

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