

Study on the effect of flowering of cane on the quality of juice

M. A. A. Sarkar
and
M. A. S. Miah
Sugarcane Research Institute
Ishurdi, Pabna, Bangladesh.

ABSTRACT

Comparative studies between flowered and nonflowered cane of ISD-9/57 were conducted at two stages of flowering in respect of fibre % cane, sugar recovery % cane, sucrose (true) % cane, juice extraction % cane, purity (apparent) % cane. Differences between flowered and nonflowered canes were observed in juice quality upto 60 days from the date of initiation of inflorescence where flowering canes show superiority. The difference was found more at the inflorescence emergence stage which decreased with the increase of flower age.

INTRODUCTION

Most of the sugarcane varieties flower freely under natural conditions in Bangladesh. Arvier (1968) reported that natural flowering occurs in only 13% of stalks. According to Parthasarathy (1972), fertility of soil, irrigation, drainage, application of nitrogenous fertilizers and time and dose of the same etc. affect flowering of sugarcane. Hernandez (1965) reported that several important factors caused flowering. But according to him, the most important factors for flowering were optimum temperature and light condition at appropriate time in the cane growing cycle. The sugarmen believe flowering reduces the quality of juice and yield of sugar.

The farmers are most interested to crush their canes before flowering starts resulting in heavy pressure to the Mill Management. Several workers reported that flowering had a beneficial effect on yield, particularly early in the season (Anon, 1973) and no adverse effects even late in the season (Anon. 1973; Arvier, 1968; Hernandez, 1965). In Bangladesh, a thorough comparative study between flowered and nonflowered cane in respect of quality of juice has not yet been done. Thus, the present study was undertaken to investigate the effect of flowering of cane on the quality of juice.

MATERIALS AND METHODS

The commercial variety ISD-9/57 was used for the present investigation. The plant samples were collected from the Farm, Sugarcane Research Institute, Ishurdi, Pabna, where about 75% plants flowered and the rest remained vegetative till harvesting. The

plants were grown under normal field condition with recommended doses of manures and fertilizers. A good number of plants of approximately same aged from the same field were tagged before flowering. In each case, ten healthy stalks of flowered and nonflowered canes were taken from the tagged plants and their fresh weights were recorded. Then both the flowered and nonflowered canes were cut at each internode from top to bottom for chemical analysis. In this study, the flowered canes were compared with nonflowered ones at two different stages of flower development.

The stages were (a) at the time of inflorescence emergence and (b) 60 days after emergence of inflorescence. To fully explore the effect of flowering, fibre % cane, juice extraction % cane, purity (apparent) % cane, sugar recovery % cane, sucrose (true) % cane and weight of stalks were determined. The chemical analysis was done following Horne's Dry Lead Method (Horne, 1903).

RESULTS AND DISCUSSION

Differences were observed between flowered and nonflowered canes in respect of all the factors investigated. Results of the experiment shown in the table. The fibre content in flowered cane was 3.39% over nonflowered ones at the time of flower emergence and 4.66% after 60 days of flowering. The upper internodes of flowered canes contained higher percentage of fibre in comparison with the lower internodes. A similar result was found by Hernandez (1965), where total percentage of fibre in flowered canes was 4.03% higher than in the nonflowered canes. The present finding, however, differs with the report of Hernandez (1965) who reported that there was no difference in the total fibre content at the time of flowering. In flowering cane, the juice extraction was 1.64% higher at the emergence of inflorescence and 1.62% lower after 60 days of flowering. This was possibly due to the increase of fibre content in flowered canes. It was found that fibre content increased with increase of flower age. There was a positive correlation between flower age and fibre content.

Hernandez (1965) found 17% less juice in flowered canes at the later stage of flower development. Since, the juice extraction reduced with the increase of flower age, the same would be reduced with the further gradual increase of flower age. The apparent purity of flowered canes at inflorescence emergence stage found to be 2.02% higher than that of the juice of nonflowered canes, whereas the same was 0.75% less in flowered cane after 60 days of flowering. This indicated that the purity decreased with the increase of flower age. A similar result was found by Hernandez (1965) who reported that purity of juice was 2.09% less from the upper internodes and 5.23% less in lower internodes of flowered canes.

In flowered canes true sucrose was 2.85% higher than in the nonflowered canes at the emergence of inflorescence, while the same was 2.64% higher after 60 days of flowering. The present finding agrees with the report of Hernandez (1965). He found average true sucrose to be 2.89% higher in the flowered canes than in the nonflowered canes. In one report it was stated that the sucrose yield was higher in flowering canes than in the vegetative stalks at flower emergence and anthesis and no significant difference was observed in later stage (Anon, 1973) and also the difference was maintained throughout the experimental period. Sugar recovery in flowered canes was higher than in the nonflowered canes at both the stages and the

difference was greater at the inflorescence emergence stage. It was found to be 5.99% higher at the inflorescence emergence stage, while 0.95% after 60 days of flowering. This indicated that the sugar recovery gradually decreased with the increase of flower age.

The fall off in sugar content was reported to be due to the appearance of side-shoots when harvesting was delayed till November or December (Arvier, 1968). The fresh weight of the stalks of flowered cane was 12.63% and 25% higher over nonflowered canes at inflorescence emergence stage and after 60 days of flowering respectively. This increase in weight was mainly due to 2 to 4 additional internodes. The extracted sucrose from these additional internodes results in the higher yield in flowered canes.

Table. Comparative analysis of flowered and nonflowered canes in respect of wt. of stalk, extraction of juice % cane, purity (apparent) % cane, sugar recovery % cane, true sucrose % cane and fibre % cane.

Factors for Analysis	At the time of emergence of inflorescence.			After 60 days of emergence of inflorescence		
	Non-flowered cane	Flowered cane	% increase over non-flowered cane	Non-flowered cane	Flowered cane	% increase/decrease over nonflowered cane
No. of stalks	10	10	—	10	10	—
Wt. of stalks (lb)	20.20	22.75	+ 12.63	20.00	25.00	+ 25.00
Extraction of juice % cane	0.61	0.62	+ 1.64	0.62	0.61	—1.62
Purity (apparent) % cane	79.30	80.90	+ 2.02	80.80	80.20	—0.75
Sugar recovery % cane	10.02	10.62	+ 5.99	10.61	10.71	+ 0.95
Sucrose (true) % cane	12.47	12.95	+ 3.85	12.92	13.26	+ 2.64
Fibre % cane.	14.47	14.96	+ 3.39	15.26	15.97	+ 4.66

Since, true sucrose, sugar recovery, stalks weight etc. in flowered canes were higher than in the nonflowered canes upto 60 days of flowering. The quality of juice and yield of sugar were also higher. Apparent purity and juice extraction etc. were higher at the stage of emergence of inflorescence and less after 60 days of flowering. The fibre percentage was higher at both the stages which partially reduced the juice extraction % cane. From the above experimental results, it was found that differences appeared between flowered and nonflowered canes in juice quality at both the stages of flower development upto 60 days from the date of initiation of inflorescence where flowering canes show superiority. It was also found that the difference was greater at the inflorescence emergence stage than at the later stage and the difference gradually decreased with the increase of flower age. The result was confirmed with the report of Hernandez (1965) who stated that the differences appeared at various stages of flower development and intensified in specimens with old flowers. Arvier (1968) found no apparent adverse effect on yield within a month of appearance of inflorescence.

The flowering had a beneficial effect on yield, particularly early in the season and had no adverse effect even late in season (Anon, 1973). It is, thus suggested that the flowering had no adverse effect on the quality of juice upto 60 days of flowering and it is better to harvest canes as early as possible after the emergence of inflorescence. Further investigation is necessary to determine the quality of juice beyond 60 days of flowering.

REFERENCES

- Anonymous, 1973. Annual Report, Mauritius Sugar Industry Research Institute, Reduit, Mauritius. p. 34.
- Arvier, A.C., 1968. Investigation into chemical control of arrowing. Proc. Qusld So. Sug. Cane Tech. p. 125-130.
- Hernandez, J. A. L., 1965. The quality of flowering cane. Sugar-Y-Azucar, p. 41-42.
- Horne, W. D., 1903. Horne's Dry Lead Method. J. Am. Chem. Soc. 26 : 186.
- Parthasarathy, S. V., 1972. Sugarcane in India. Published by the K.C R. Ltd., Madras-6, India. p. 186-187.