



## **Juice Quality Comparison between Flowered and Non-Flowering Cane for Ten Commercial Sugarcane Varieties at Ten or Eleven Months under Beles Sugar Development Project**

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### **Abstract**

Comparisons of flowered and non flowered cane in juice quality parameters for ten commercial varieties were conducted in 2014 at Tana Beles Sugar Development Project. Samples of flowered and non-flowering cane were taken for 10 commercial varieties at 10 or 11 months after planting. Measurements and analyses on these samples gave the following results: Brix % juice, pol, purity and sugar percentage was much higher in the stalk of flowered cane than non-flowering cane for all varieties at 10 or 11 months in juice quality for ten commercial varieties under Beles Sugar Development Project agro-climatic conditions. Therefore as the flowering is a basic problem in sugarcane cultivation by reducing sugar content especially after two or three months of flowering; a full wise proposal considering season of planting, time of data collection, variety and etc... should be developed.

**Keywords:** Sugarcane, Variety, Flowering and Age

### **1. Introduction**

Sugarcane (*Saccharum officinarum* L.) is one of the six to thirty seven species (depending on taxonomic system) of the genus *Saccharum*, family poaceae and tribe Andropogoneae (Daniels and Roach, 1987). The present day sugar cane varieties (*S. officinarum*) have been the subject of many improvements. The original *S. spontaneum* and *S. robustum* were replaced by *S. barberi* and *S. sinense*, but were themselves ousted later by *S. officinarum* or noble cane (Richard, 2005). Generally, sugarcane is a tall perennial crop that tillers at the base, grows three to four meters tall and about five cm in diameter (Singh, 2003). Sugarcane is grown in countries within latitudes 37<sup>0</sup> N and 32<sup>0</sup> S of the equator. It is an important cash crop as it is widely adapted to a wide range of tropical and

semi tropical climate, soils and cultural conditions and to a long, warm growing season.

Flowering, with accompanying losses in cane yield and increases in fibre content and pith, is a major problem in cane cultivation in many cane growing areas, especially in the tropics. Few comparisons of this nature are to be found in the literature, but Lalitha *et al* 1968 found that flowered cane had higher cane weights, sucrose % cane, purity, fibre % cane and lower reducing sugars than non-flowering cane up to 90 days after flowering. Thereafter, cane quality was better in the non-flowering cane. Davies, 1971 also noted the superior quality of flowered cane. So that as flowering is occasionally prolific in the Tana Beles Sugar Project of Ethiopia and existence of collected

data of flowering at 11 or 10 months after planting, this study was done to compare flowered and non-flowering canes for 10 commercial varieties.

## 2. Materials and Methods

### 2.1 Description of the Study Area

The experiment was conducted at Tana Beles Sugar Development Project. It is located near Fandica Town, capital of Jawi Woreda, found in the western periphery of Amhara National Regional State of 145km from Bahir Dar and 650 km North of Addis Ababa, Ethiopia with 11007’N and 36020’E latitude. The study area has low to medium relief differences with an altitude range of 806 to 1242 meters above sea level. Tana Beles receives about 1490 mm annual average rainfall with mean maximum and mean minimum temperature of 32.5°C and 16.4°C, respectively (Amhara Design & Supervision Works Enterprise (ADSWE), 2013).

### Materials

Ten Cuban and commercial sugarcane varieties namely; C86/56, C86/12, Mex-54/245, C86/165, CO-740, CO-449, C90-501, B80/250, CO-678 and D42/58 were planted for to study the effect of flowering.

### 2.2 Data Collection

Brix, Pol, purity and sugar % cane was analyzed at the age of 10 or 11 months after planting for flowered and non-flowered cane for ten varieties.

**Table 1** ANOVA for comparisons of Flowering & variety for juice quality in sugarcane at Tana Beles Sugar Development Project

Sources of Variation	Brix % MS	Pol % MS	Purity % MS	Sucrose % MS
Variety	1.50984500	1.85033389	12.0860556	1.26816056
Flowering	48.143045***	57.426605***	85.2845**	33.722045***
CV	6.162374	8.166459	2.919787	9.965446
R-Square	0.863065	0.852976	0.798288	0.844611
Mean	18.59350	15.81150	84.79500	10.38550
LSD	1.1816	1.3316	2.5533	1.0673

The reaction of the varieties for flowering is significant – highly significant differences between the

**Table 2** Mean Performances of flowered cane and non-flowered cane for juice quality in 10 Sugarcane varieties at 10 and 11 months

Flowering	Brix % Juice	Pol % Juice	Purity % Juice	Recoverable sucrose %
Flowered cane	20.1450 <sup>a</sup>	17.5060 <sup>a</sup>	86.860 <sup>a</sup>	11.6840 <sup>a</sup>
Non-flowered cane	17.0420 <sup>b</sup>	14.1170 <sup>b</sup>	82.730 <sup>b</sup>	9.0870 <sup>b</sup>

The recoverable sugar refers to the total recoverable sugar percent in cane; this was calculated as described by Berge (1972); **Sugar % = [pol % - (brix – pol %) \* 0.61] \* 0.75**; Where 0.61 is non sugar factor, representing the amount of sucrose lost in final process and 0.75 is cane factor representing the correlation factor between theoretical yield of molasses mixed juice for the same genotype and the same cut of cane determined by milling test.

Pol is the apparent sucrose content of a sugar product determined by direct or single polarization. Pol was read on the scale of polarimeter, indicating the apparent sucrose content of the sample to be analyzed. Brix is the percent by mass of soluble solid meter (sucrose and soluble non sucrose in a solution as indicated by a sugar refractrometer).

### 2.3. Data Analysis

The quantitative data recorded in this study was subjected to analysis of variance using statistical procedures described by Gomez and Gomez (1984) with the help of statistical analysis software (SAS, 2002).

## 3. Results and Discussion

Analysis of variance for all juice quality parameters collected (brix, pol, purity and recoverable sugar percent) revealed significant differences between the flowered and non flowered cane but not among the varieties and ages (Table 1).

flowered and the non-flowered cane for brix, pol, purity and sugar percentage.

The mean performances of the flowered cane was significantly higher than the non flowered cane for brix, pol, purity and sugar percent at 10 and 11 months (Table 2). Lalitha, *et al* 1968 also reported that flowered cane had higher cane weights, sucrose % cane, purity, fibre % cane, lower reducing sugars than non-flowering cane up to 90 days of flowering.

#### 4. Conclusions and Recommendations

The performances of flowered cane are significantly higher than the non-flowered cane at 10 or 11 months in juice quality for ten commercial varieties under Beles Sugar Development Project agro-climatic conditions. Therefore as the flowering is a basic problem in sugarcane cultivation by reducing sugar content especially after two or three months of flowering; a full wise proposal considering season of planting, time of data collection, variety and etc... should be developed.

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