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**SOME FACTORS INFLUENCING ON YIELD AND QUALITY OF
SORGO (Sorghum bicolor (L.) Moench) IN EGYPT**

By

Laila Muhammed Ahmed Saif
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APPROVED BY :

Prof. Dr. Nemat Kour Eldin

Prof. Dr. Abdel-Fattah M.A. Wahab

Prof. Dr. Alfa El Bagaw

DATE :

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COMMITTEE IN CHARGE

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INTRODUCTION

The gap between production and consumption of sugar is increasing year after year, as a result of that the government imports large quantity of sugar annually. The above mentioned gap increased from 1200 tons in 1960 to 579000 tons in 1982. At the same time the production increased from 34,000 tons 1960 to 680,000 tons 1982. If the gap between production and consumption of sugar is translated to money, we find that the import of sugar raised from 7,000,000 Dollars in 1960 to 180,000,000 Dollars in 1982. This figure is considered by the Economists as a heavy burden to Egyptian Economy.

It is known that the total Egyptian gap of food amounted by \$1870,000,000 in 1982, 9.6 percentage of them for sugar importation, this percent from the total Egyptian gap considered so high.

It is expected that the consumption of sugar will increase annually as a result of many factors, among them the population and improvement of the living standard of Egyptians are considered to be the most important ones.

During the three last decades, it is observed that the farmer's tendency to not supply their canes to sugar factories

and prefer to supply the canes to syrup factories instead, because of the high price they got.

As we know, the syrup (treacle) is basic energetic food for the popular sector of our society and it is supposed to be cheaper than any other food, whatever may be the price such syrup became nowadays very costly as a result of its high price in addition to that we know that the cultivated sugar cane area is not sufficient for even half of our actual need of sugar and small cultivated area is used for syrup and 20 percentage of this production in Minia and Kena governorates.

To solve such problem many countries like USA, Brazil and others used sweet sorghum for syrup (treacle) production which proved to be highly efficient in that field.

Sweet sorghum is superior to sugar cane and corn in terms of the production of food energy calories produced per unit of cultural energy invested. (I)

Sorghum has a lower water requirement, is drought resistant and can be grown in low rainfall areas unsuitable for sugar cane and corn. Sorghum has lower nitrogen requirement than either sugar cane or corn and may be grown on

(I): (C.F. the introduction of 35 th Ann. Corn & Sorghum Res. Conference, 1982)

a wider range of soil types than either of these crops.

Planting, fertilizing and other cultural costs for sorghum are lower than those for sugar cane or maize. Residues from sweet sorghum crop provide more than enough fuel to convert the crop's carbohydrates to alcohol.

The principal object of this study is to increase sweet sorghum production and save 20 percentage of the cultivated area for sugar production. Also sweet sorghum can be utilized as sugar and fodder crop.

The present studies were conducted to study some factors influencing on yield and quality of sorgho.

REVIEW OF LITERATURE

Sweet sorghum is adapted to a wide range of soil and climatic conditions. Consequently, a wide range of varieties is needed for adaptation to each area and for each object. Sweet sorghum is cultivated for sugar and syrup production, and in addition to that it is cultivated successfully for alcohol production. It is a high nutritious fodder summer crop.

The desirable characters of sweet sorghum varieties for sugar production are similar to those used for syrup with respect to yield of stalks. Sweet sorghum varieties for sugar production must have extracted juice with high purity (at least 75 percentage) and low rate of sucrose inversion. These conditions, depending on varieties, harvesting date and harvesting stage (Cowley and Smith, 1982).

I- Effect of harvesting stage on sugars contents:

Collier (1878- 1882) reported that in sorgo stalks, the total sugar and sucrose percentage increased to a maximum and then decreased as the growing season progressed.

Ventre and Byall (1937) stated that in the analysis of four varieties of sorgo at different stages of maturity, an increase in sucrose in juice as maturity was approached.

The composition of the stalk varies considerably at different stages of maturity. The dough to ripe stage was considered the best for syrup making (Walton et al, 1940). The results obtained from the analysis of several varieties indicate that sucrose concentration in juice increased gradually as the season progressed (Webister, et al, 1945).

Ventre et al (1948) showed that data of eight varieties having nearly equal growing seasons indicated that the rate of increasing in total soluble solids and total sugars of the plant between the second and third stages of maturing were nearly double the increasing between the first and second stages.

Webister et al (1954) reported that the concentration of sucrose in the expressed juice increased to a maximum at hard dough stage, and then changed very little as season progressed. He noticed also that reducing sugars percentage decreased as the harvest season progressed.

Nour (1963) showed that the Brix in the stalk seemed to increase progressively from the milk stage to a maximum in the dough to ripe stage and then decreased slightly in dead ripe stage. He added that the reducing sugars were found to be greatly in excess in the milk stage, then they rapidly decreased while sucrose rapidly increased till the dough to ripe

stage was reached.

II- Effect of varietal differences

a - On the yield:

Varieties differ greatly in their ability to produce high stalks yield , a high percentage of extractable juice, a high total soluble solids(Brix) content, mostly sugar and their adaptation to soil and climatic condition (Nour,1966). He advised the growers to consider all these qualities in his choice of variety.

Mc Clelland,(1929) indicated that yields of stripped sorgo stalks ranged from 3-24 tons/acre, varying with varieties and seasons. The same observation was found by Cowgil(1929) who cleared that sorgo Tonnages vary greatly, not only on account of differences in fertility of field and different seasons, but also with the varieties.

Mathews and Barnes(1940) showed that the yield of sorgo was affected by time of sowing and variety. Walton et al, (1940) noticed that the yield of stalks depends largely on the different varieties of sweet sorghum.

Fergus et al, (1958) showed that varieties of sorghum differ in yield, strength of stalk, commercial qualities and other respects. They added that variety yield of each

location differ greatly and the best variety not only produce high yield of syrup, but also is resistant to leaf and stem diseases.

Thurman et al (1960) indicated that the yield of stalks /acre was greatly affected with varieties, locations and years. The difference in yield of two varieties of sorgho in firm dough stage of maturity appeared to be primarily in stalk weight.

Average of data for "Rio" variety for the 5 years period (1965-1969) indicated that the stalk yield of 11 tons/acre can be expected from March planting; yield increase to 15-16 tons from April planting and peak at levels in the 16 to 20 tons range from May planting dates. They added that yield were obviously affected by day length and solar radiation. The same authors stated that, according to data reported about 75 percentage of the differences in yield could be attributed to the variability in solar radiation recieved by the plants between boot stage and that of early seed set. Maximum solar radiation occurs in south Texas during June, July and August. Maximum yield are correspondingly obtained in planting made in April, May and June.

Miller and Creelman (1982) found that the yield of sorghum varieties studied ranged between 22.5 tons /ha. for "Rio" variety to 40.2 tons/ha. for "Wary" variety. On the other hand, "Tracy" variety gave 31.13 tons/ ha.

b- Morphological characters

I- Stem characters:

Nour(1963) reported that varieties studied differed significantly in stalk diameter per plant. On the contrary, Miller and Creelman(1982) found that there was slight difference between varieties of sorghum in stem diameter, the average of stem diameter ranged between 1.60 Cm. to 1.80 Cm. for "Tracy" and "Wary" varieties respectively.

The analysis of variance showed that varieties of sorghum differed significantly in stalk length per plant in the two seasons (Nour, 1963). The average of stem height ranged from 2.54 m. for " Tracy " to 2.71 m. for " Sugar drip " varieties (Miller and Creelman, 1982).

The variety "Sart" possessed the maximum internodes while variety " Grain hull cane" and "Leoti" were the least in internodes number in both first and second seasons, respectively (Nour, 1963). He added that the varieties studied differed significantly in stalk weight.

2- Leaf characters:

Lo, (1970) showed that the monthly increase in leaf area of sugar cane was greater in early maturing than in the late maturing variety. Talkhawy(1983) reported that the varieties showed almost highly significant difference for leaf

area per plant at all stages of sugar cane growth in the two seasons. On contrary, Tawfik, (1983) found that the differences between varieties in mean green leaf area per plant were not significant at most of studies stages of growth. EL Geddawy (1984) showed that leaf area of Co.9II variety surpassed those of N.Co.3IO and Co.997 varieties during different periods of reproductive stages but the differences were not great enough to reach the 5 % level of significance at development and flag stages.

C- Chemical compositions:

Brix degrees increased progressively with maturing in all the studied varieties, then it decreased in the dead rip stage. The persistence of high Brix degrees varied according to variety and planting seasons (Venter and Byall, 1937 Venter et al, 1948 and Webister et al, 1954) .

Reducing sugars percentages varied with the varieties and planting season. In most of varieties, the reducing sugars were greatly in excess at the milk stage and decreased rapidly during dead rip stage (Willasman, 1920 and Webister, 1954). Fort Mc Kaig (1939) showed that eight varieties grown in Louisiana showed quite variable amounts of non-sucrose substances in the crushed juice.