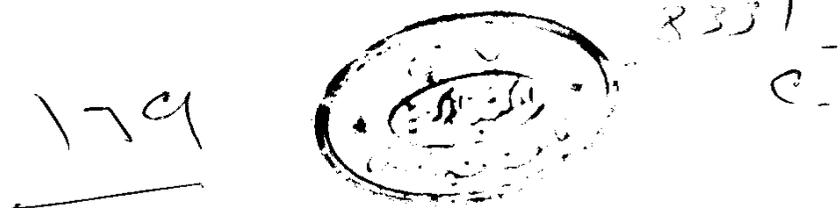


CARBOHYDRATE FRACTIONS IN SUGAR CANE WITH SPECIAL
REFERENCE TO INVERSION OF SUCROSE IN THE
DIFFERENT PARTS OF THE STALK



By

Ahmed Fouad Mohamed Aly
(B.Sc., Agric.)



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Faculty of Agriculture
Ain Shams University

1964

This thesis for the M.Sc. degree
has been approved by :

.....

.....

.....

Date :



V. C. R. A.

Name : Ahmed Fouad Mohamed Ali.

Degree

& Date : B.Sc. (Agric.) 1955, Cairo University.

Date of

Birth : 9/2/1933.

Place

of Birth: Mansoura, Dakahliya, U.A.R.

Position: Sugar Cane Specialist, Ministry of Agriculture,
Giza, Egypt, U.A.R.

Title of

Thesis : Carbohydrate Fractions in Sugar Cane, with
special reference to sucrose inversion in
the different parts of the Sugar Cane Stalk.

Supervi-

sed by : Professor Dr. Mohamed Abdel Moneim Kamal, of
Agricultural Biochemistry, Faculty of Agric-
ulture, Ain Shams University, Cairo, Egypt,
U. A. R.

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P R E F A C E

The work embodied in this dissertation was done in the Experimental Farms, Ministry of Agriculture, the Laboratory of the Agriculture Biochemistry Faculty of Agriculture, Ain Shams University, Cairo, and the laboratory of Sugar Crops,, Ministry of Agriculture, U.A.R. starting from August 1958 till May, 1961.

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INTRODUCTION.

Sugar cane (*saccharum officinarum*) is a perennial tropical crop, the cultivation of which is restricted to within about 35 degrees, north and south of the Equator. This crop grows also as well in some sub-tropical countries. Generally, sugar cane could only be grown in areas lying between latitudes 25°N. and 25°S. U.A.R. is on the northern edge of this area, as it lies in between latitudes 22° and 31° north latitude, and between 25° and 35° east longitude.

Statistical data from 1945-1961, shows that 3/5 of sucrose industry in the world depends mainly upon its production from cane (cf. Table 1). In Egypt, cane is the only source for this industry.

As it is known, the average yield of sugar cane per feddan in U.A.R. is comparatively higher than that of any other sub-tropical areas with the exception of that produced from Hawaii (cf. Table 2). This may be due to the soil fertility, and other agronomical conditions.

Table (1)

Yield and Concumption of Sugar in the World
from the year 1944/1945 till 60/61

Year	Sugar Production from cane	from beet	Total production	Total consumption
44/45	15.241.685	6.496.453	21.738.138	21.652.213
45/46	12.941.129	6.220.577	19.161.706	20.555.461
46/47	15.556.549	7.389.115	22.945.664	22.429.483
47/48	17.018.841	7.545.830	24.554.671	25.595.407
48/49	17.953.995	10.076.187	28.030.082	28.134.320
49/50	18.306.701	10.694.974	29.001.675	29.812.693
50/51	19.474.670	14.101.719	33.576.389	23.289.968
51/52	21.836.372	14.164.391	36.000.763	33.139.898
52/53	21.169.352	12.421.016	33.590.368	35.199.718
53/54	21.976.798	16.606.628	38.583.426	36.892.170
54/55	23.215.927	15.189.163	38.405.090	35.253.564
55/56	23.785.272	16.096.773	39.882.045	40.443.299
56/57	25.654.221	16.631.904	42.286.125	42.227.743
57/58	26.750.667	19.123.036	45.873.703	44.750.070
58/59	29.276.358	21.616.198	50.892.556	47.212.808
59/60	29.766.126	20.313.251	50.079.377	43.640.633
60/61	31.335.795	25.702.953	57.038.748	51.067.500

It should be mentioned that the best location for growing cane for sugar production in U.A.R. has been found to be the rural districts at Kena and Aswan (Upper Egypt). It is also grown for the same purpose in some northern localities of Upper Egypt from Dairiut (Assiut) to Fashn (Minia); the first locality was found to be predominate. In this connection, it should be mentioned here that sugar cane is also grown for chewing and syrup industry in small areas distributed all over the country either in Delta or in northern parts of Upper Egypt.

It is important to state here that since the Sugar Company was prelonged to the government at the year 1956, the area under cane increased about 10.000 feddan in the average, this is accompanied by an increase in the sugar production about 23%, and in sugar yield per feddan about 15 % (cf. Table 3).

In the year 1952, the total sugar production in U.A.R. was 188477 tons, the consumption was 287,000 tons (cf. Table 3), so the government used to import sugar to compensate this shortage (cf. Table 4). Now, the total sugar

Table (3)

The acreage, average, cane yield, and average sugar yield in U.A.R. together with sugar production and consumption.

Year	Acreage per feddan	Cane yield tons per feddan	Sugar yield tons per feddans	Sugar produced per ton	Sugar consumed per ton
51/52	64248	32,3	2,94	183477	287000
52/53	65727	38,3	3,48	228856	296764
53/54	80347	33,1	3,07	270881	292651
54/55	83177	38,3	3,83	318505	293643
55/56	81455	39,1	3,83	312018	309979
Mean	74991	36,3	3,40	263747	296007
56/57	80162	37,9	3,73	299131	306500
57/58	81789	38,6	3,74	306074	314233
58/59	84602	38,4	3,88	323374	318946
59/60	85149	38,8	3,95	335624	337510
60/61	85140	41,3	4,25	363028	355554
Mean	83614	39,0	3,90	326746	326559

Table (4)

Imports and Exports of Sugar, in U.A.R.
from the Year 1952 till 1960

Year	Imported sugar per ton	sugar per pound	Exported sugar per ton	sugar per pound
1952	126573,160	6515900	292,406	19518
1953	53126,478	2302074	7,979	767
1954	22426,039	797149	1,199	118
1955	1360,414	56057	30395,673	1187828
1956	427,588	19636	17018,216	667000
1957	38913,839	1522712	17359,890	860308
1958	19032,135	807077	27610,261	1226964
1956	26787,553	1080098	6460,840	224195
1960	21855,661	593495	47762,584	1647551

production covers our local consumption (cf. Table 3).

Recovery of sugar (99,3 pol.) from cane is about 100. kgm. per ton of cane, plus 45 kgm. of final molasses.

All the sugar produced in U.A.R. is manufactured in four factories belonging to the "Egyptian Society of Sugar Manufactory". The capacity of each factory is as follows :-

<u>Factory</u>	<u>Capacity</u>
Abou-Kourkas	4.000 tons per day
Nag-Hamadi	8.000 tons per day
Arment	6.000 tons per day
Kom-Ombo	6.000 tons per day

These four factories produce a high grade sugar of 99.3 pol. which is refined at Hawamdieh Refinery. The refinery has a capacity production of 800 tons of refined sugar per day. There is also a factory in Edfo belonging to "Nasr Society of Sugar Production".

About 100.000 tons of molasses are also produced per annum, a part of this is usually exported.

About 50.000 tons dry cane bagasse are by-produced per annum. At the present time, it is used almost exclusively

as a fuel in the mills, with the installation of new equipment, already began, the mills expect to cut down their use of fuel, consequently a part of it will be available for industrial use.

In the U.A.R. by-products of sugar industry are utilized in producing ethyl alcohol, vinegar, glacial acetic acid, perfumes, and cosmetics. New industries arising are dry yeast, and pressed wood manufactures.

The problems encountered in the manufacture of sugar in the U.A.R. are the following :-

- a) Improving the present species or finding other known to have a high sucrose content and a low fibre content.
- b) Increasing the tonnage per feddan by improving agricultural treatment of the land, especially by the use of fertilizers.
- c) Increasing the sugar yield per feddan. This can be achieved by not leaving the cane to overmature in the soil, and by harvesting it at the proper time in order to avoid the inversion of sucrose into non-crys-