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DEVELOPMENT OF SUGARS IN MALTING GUINEA CORN (SORGHUM SPECIES)

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SUMMARY

In this article the levels of reducing sugars and total sugars for four samples of malting guinea corn (Sorghum spp.) were determined daily over four days of germination. Considered on wet and dry weight basis significant increases were observed in the levels of the reducing sugars and total sugars during this period.

INTRODUCTION

Guinea corn (Sorghum spp.) is one of the staple cereal food in Ghana. It is used for stiff porridge known as 'tuo zaafi' (Hausa). The flour can be cooked to make gruel or pap called 'koko' (Hausa) (Whitby 1968). Guinea corn is malted for use in the preparation of alcoholic drink known as 'pito'.

It is the objective of this article to study the daily development of reducing and total sugars in four samples of guinea corn (Sorghum spp.) over four days' period of malting or germination.

EXPERIMENTAL

Materials

Four samples of guinea corn (Sorghum spp.) were purchased from the market at Accra. About 500g of each sample was steeped in water overnight. The guinea corn samples were then sieved and spread on a muslin cloth placed in a container. The samples were left in the room at ambient temperature to germinate for a period of four days. Water was sprinkled over the samples every day to keep them moist.

Methods

The moisture, reducing sugars and total sugars were determined daily over a period of four days as follows:

Moisture

About 5g of the mashed malting guinea corn sample was dried in nickel dish in an air oven at 105°C to a constant weight. The difference between the weights of the wet and dry samples gave the moisture content (A.O.A.C., 1970).

Sugar determination

About 25g portion of the mashed malting guinea corn sample was accurately weighed. It was carefully transferred into 250ml. volumetric flask and was shaken. The mixture was then cleared with

5ml. each of zinc acetate and potassium ferrocyanide solutions and made up to the mark. The mixture was then filtered.

Reducing Sugars

The reducing sugars (as invert sugar) were determined by the Lane and Eynon's Method (Pearson, 1970). The filtrate was transferred into a burette and titrated against 10ml mixed Fehling's solutions. The percentage reducing sugars (as invert sugar) was calculated from the titre by reference to the Invert Sugar Table.

Total Sugar

The total sugars (as invert sugar) was carried out according to the Lane and Eynon's Method (Pearson, 1970). The filtrate was first inverted by adding 1ml 50% HCl to a measured volume of the filtrate in 100ml flask. It was warmed between 68°C and 70°C in a water bath for 10 minutes. After cooling the solution was neutralised with NaOH solution using phenolphthalein as indicator. It was made up to the 100ml mark. The inverted solution was transferred into the burette and titrated against 10ml mixed Fehling's solutions. The percentage total sugars (as invert sugar) was calculated from the titre by reference to the Invert Sugar Table.

Table 1: **Daily levels of reducing and total sugars of four samples of guinea corn malted for four days.**

Name of Sample	Days of Malting	Moisture (%)	Reducing Sugars (%)		Total Sugars (%)	
			Wet basis	Dry basis	Wet basis	Dry basis
Sorghum	Start	34.8 (4) 33.6-36.2	0.6 (4) 0.5-0.7	ND	ND	ND
Sorghum	First	36.5 (4) 35.2-37.8	2.1 (4) 1.7-2.4	3.3 (4) 2.6-3.9	2.4 (4) 1.9-2.6	3.8 (4) 2.9-4.2
Sorghum	Second	44.5 (4) 42.7-47.2	3.6 (4) 3.1-4.0	6.5 (4) 5.4-7.6	3.5 (4) 3.4-3.6	6.3 (4) 5.9-6.8
Sorghum	Third	50.8 (4) 47.3-54.8	4.2 (4) 3.8-5.0	8.5 (4) 7.2-11.1	4.4 (4) 3.8-4.8	8.9 (4) 7.2-10.6
Sorghum	Fourth	55.5 (4) 53.2-57.0	4.4 (4) 4.1-4.6	9.9 (4) 8.7-10.7	4.6 (4) 4.2-4.8	10.3 (4) 9.0-11.2

The figures represent mean and range values.

Figures in parenthesis denote the number of samples analysed.

ND means Not Determined because titration end point was not clear.

The raw guinea corn contained 10.8% moisture with range value 10.2% to 11.4%.

FIGURE 1 Graph of daily levels of percentage reducing sugars on wet and dry basis against days of malting of guinea corn samples.

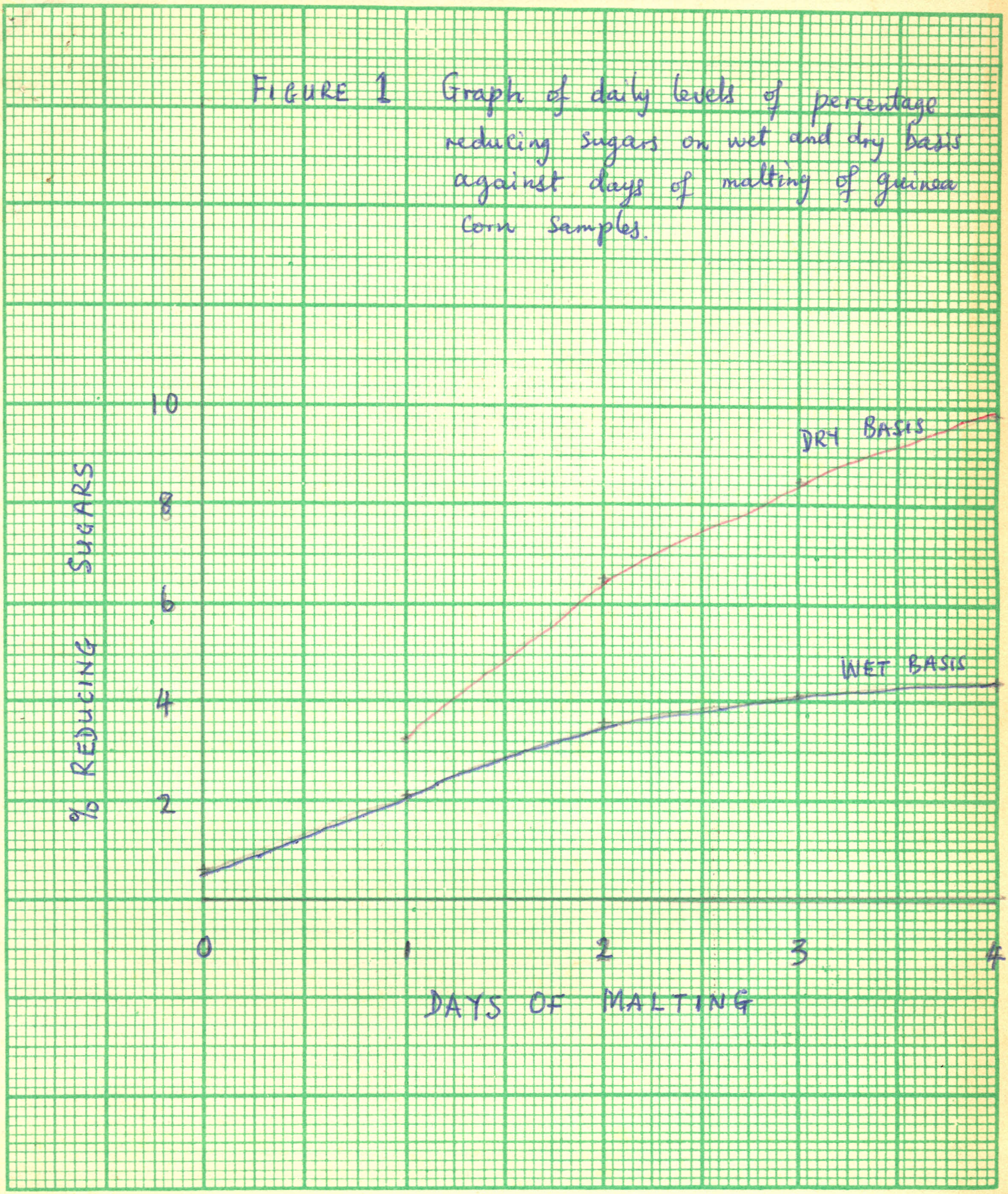
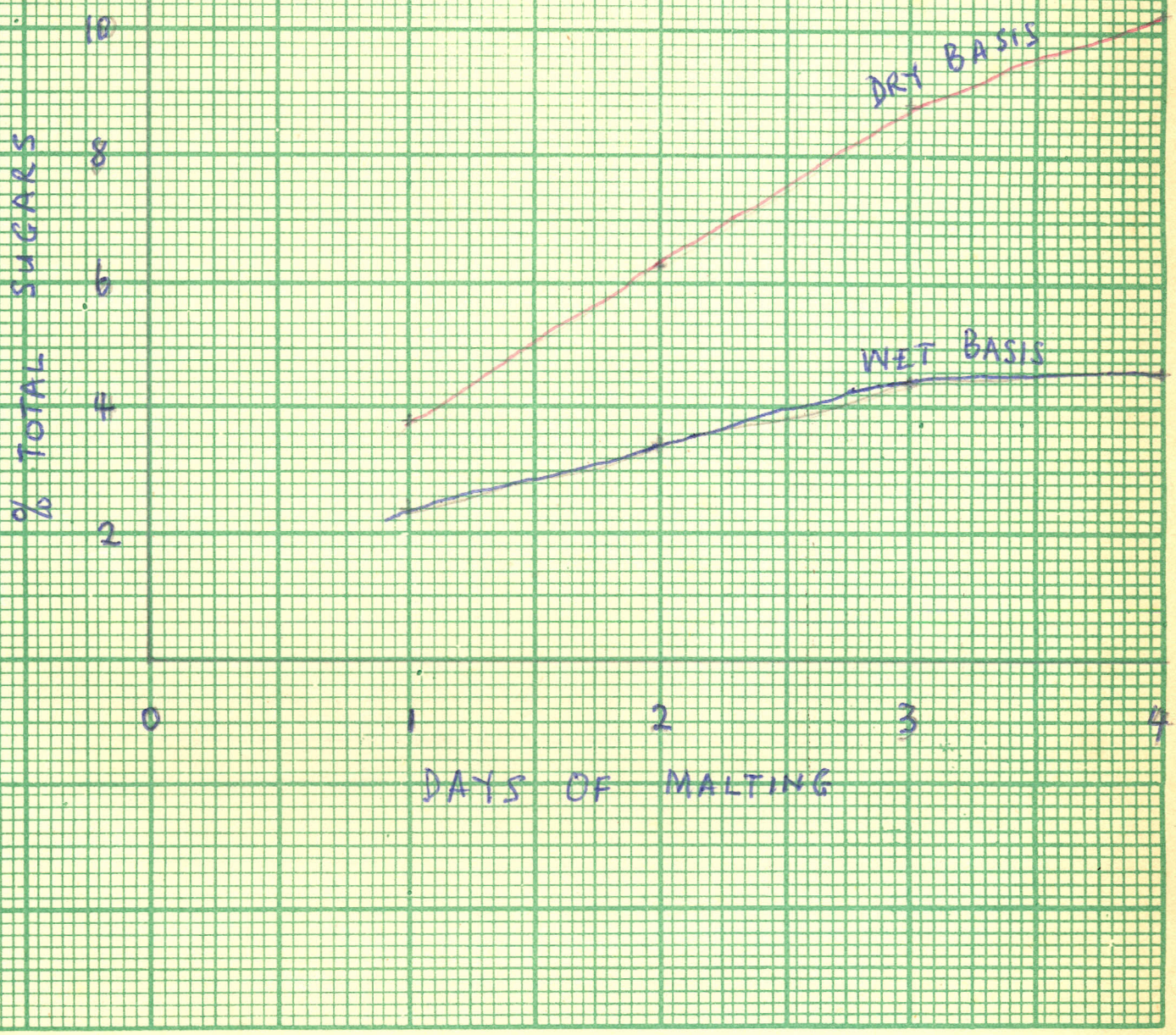


FIGURE 2. Graph of daily levels of total sugars on wet and dry basis against days of malting of guinea corn samples



RESULTS AND DISCUSSION

The results for the daily development of reducing sugars and total sugars in four samples of malting guinea corn over a period of four days are presented in Table 1. The results are also graphically presented in Figures 1 and 2.

It was found that on wet weight basis, the reducing sugars increased from 2.1% to 4.4% from the first to the fourth day of malting representing an increase of 110% whilst on dry weight basis the reducing sugars rose from 3.3% to 9.9% being an increase of 200% for the same period.

Considered on wet weight basis, the total sugars rose from 2.4% to 4.6% being an increase of 91.7% from the first to the fourth day of malting whilst on dry weight basis the total sugars also rose from 3.8% to 10.3% representing an increase of 171%.

It is recommended that for brewing purposes the fourth day old malted guinea corn should be preferred as the brewer can then make maximum utilization of the natural or endogenous fermentable sugars for alcohol production.

ACKNOWLEDGEMENT

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