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DEVELOPMENT OF CARAMEL POWDER FROM ROTTEN PLANTAIN (*MUSA PARADISIACA*)

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SUMMARY

In this article caramel powder was developed from roasted rotten plantain (*Musa paradisiaca*). The physical and chemical properties of the powder and its mixture were investigated.

INTRODUCTION

In Ghana some food and drink preparations appear brown in colour. For example, the brown colour of stew, wine, lollies, edible ices, confectionery, alcoholic and non alcoholic drinks can be cited.

In this work a brown caramel powder was developed from roasted rotten plantain (*Musa paradisiaca*).

It is hoped that if the developed caramel powder proves to be a suitable substitute, it can be used in the brown colouration of some food and drink items including confectionery, lollies, edible ices, alcoholic and non alcoholic products such as wine, 'Nmedaa" and 'pito'.

EXPERIMENTAL

Preparation of Caramel Powder

The rotten plantain *(Musa paradisiaca)* was peeled and cut into pieces before drying in oven at 105°C. After cooling the dried rotten plantain was ground into powder and tightly sealed up in a polythene satchet. It was kept in the laboratory at ambient temperature.

Preparation of 5% Caramel Mixture

5g portion of the caramel powder already prepared was mixed in water in a beaker and transferred into 100ml flask making up to the mark. The mixture was then filtered. The filtrate represented the 5% caramel powder mixture in water.

METHODS

Determination on the Caramel Powder

The following physical and chemical determinations were made on the caramel powder. The solubility in water and ethanol was tested by placing small quantity of the powder in test tube.

The moisture, fat, ash and mineral contents were determined as follows:

Moisture

About 5g sample of the caramel powder was dried in nickel dish in air oven at 105°C to a constant weight. The difference between the weight of the wet and dry samples gave the moisture content.

Fat

Fat was measured by Soxhlet extraction method according to Pearson (1970).

Ash

Ash was determined by igniting about 5g sample in a muffle furnance at 550°C.

Sugar Determination

The percentage reducing sugars and total sugars of the caramel were determined according to Lane and Eynon's method described by Pearson (1970). 5g portion of the powder was mixed with water and made up to 100ml. The amount of reducing sugars was determined on the filtrate after suitable dilutions by titrating against 10ml mixed Fehling's Solution.

The total sugars were determined after inversion of the filtrate. The per cent sucrose was then calculated.

Mineral Determination

The ash was dissolved in 10ml 5N HCl and made up to 50ml with water. A slightly modified method fo the A.O.A.C (1970) was used for the determination of calcium and iron

Calcium was determined by titration against 0.02N $KMnO_4$ solution.

Iron was determined colorimetrically in a Coleman Model 8 Colorimeter.

Phosporus was determined according to the method described by Fogg and Wilkinson (1958).

Determinations on 5% Caramel Powder Mixture

The colour, pH, total solids, acidity, reducing sugars and total sugars were determined on the 5% caramel powder mixture as follows:

The colour was measured in the Lovibond Tintometer using one inch cell. The pH was read on the PHM 92 Lab pH Meter. The total solids content was determined by drying about 5g of the mixture on sand in air oven at 105°C.

The acidity was determined by titrating with 0.1N NaOH using phenolphthalein indicator. The reducing sugars and total sugars were calculated from the figures obtained for the caramel powder.

Table 1: Physical and Chemical Properties of the Caramel Powder from Roasted Rotten Plantain

Caramel Powder was brown in appearance.
Caramel Powder was highly soluble in water producing brown liquid mixture.
Caramel Powder was sparingly soluble in ethanol producing light yellow colour.
Caramel Powder became hygroscopic after about three months' storage.

Moisture	:	3.4%
Fat	:	1.2%
Ash	:	3.8%
Reducing sugars (as invert sugar)	:	18.3%
Total sugars (as invert sugar)	:	23.0%
Sucrose	:	4.3%
Calcium	:	7mg/100g
Phosphorus	:	62mg/100g
Iron	:	2.3mg/100g

Table 2: Physical and Chemical Characteristics of Filtered 5% Mixture of Caramel Powder in Water

Small quantity in water produced yellow colour
Great quantity in water produced brown colour
Lovibond Tintometer Reading for the brown colour using one inch cell :
R = 38, Y = 25.5, B = 27

pH	:	4.4
Acidity	:	equivalent to 17ml 0.1N NaOH per 100ml 5% mixture
Total Solids	:	1.9% W./W
Reducing sugars (as invert sugar)	:	0.9g/ml
Total sugars (as invert sugar)	:	1.2g/ml

RESULTS AND DISCUSSION

In this work brown caramel powder was developed from dehydrated or roasted rotten plantain (*Musa paradisiaca*). The physical and chemical properties of the caramel powder are given in Table 1. The caramel powder mixed with water to form a stable brown caramel liquid. In the presence of small quantities light yellow colour was formed. The powder was found to be highly soluble in water but sparingly soluble in ethanol giving light yellow colour. It was also found to be hygroscopic solidifying after about three months' storage but can be dehydrated again by heating at 105°C.

The caramel powder contained 3.4% water, 1.2% fat, 3.8% ash. It also contained 18.5% reducing sugars (as invert sugar) 23.0% total sugars (as invert sugar) and 4.3% sucrose. The caramel powder contained 7mg/100g calcium, 62mg/100g phosphorus and 2.3mg/100g iron.

The chemical reasons for browning are not fully understood but are likely to be:

i) the reaction of free amino groups of proteins with aldoses to give brown polymers and co-polymers; and

ii) the reaction of mannose (among the carbohydrates) with amino groups to form brown compounds (Cornelius, 1965).

The physical and chemical characteristics of 3% caramel powder mixture in water are presented in Table 2. The liquid can mix in water to give either brown colour or light yellow colour. It has a pH of 4.4 with acidity equivalent to 17ml 0.1N NaOH per 100ml of mixture. The total solids content is 1.9% W/W. The reducing sugars and total sugars are 0.9g/ml and 1.2g/ml respectively.

The next phase of this work will involve study of the application of the caramel material in various food preparations.

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