

Glucose, TSS and nutrient content of dates, mango, apple and banana: A comparative study

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Abstract

Dates, mango, apple and banana fruits are the prime fruit crops in Saudi Arabia as well as all of the world. Fruit is mostly used as fruit, juice and source of different types of food products. These are traditional and common fruit with the health benefits and nutritional value. The study was carried out to investigate the carbohydrate content as represented by glucose, total soluble solids and micro-macro nutrient content in different fruits. Ten fruit of dates, banana, apple and mango were thoroughly washed with distilled water, cut using a sterile knife and were blended. Then the juice samples were filtered and kept in the freezer to analyze. Fruit glucose content was found higher in dates and apple than in mango and banana. However, pH content was found higher in dates and banana than in mango and apple. Moreover, total soluble solids (TSS) content was the highest in dates. P, Ca and K content were higher in dates compared to the mango, apple and banana. Mg content was the highest in banana. Comparatively more micronutrient was found in dates than in mango, banana and apple. The highest correlation was found in dates with glucose and fruits varieties. The results conclude that dates and banana contain better biochemical (glucose, TSS and pH) than apple and mango as well as nutrient content was better in dates and mango than banana and apple.

Keywords: fruit, glucose, TSS, nutrient content

Introduction

Fruits are an important edible and favorite food. It is extensively grown all over the world. Fruit is rich a lot of nutrition and used as food consumption as the healthiest alternative food content from fruit source. Fruits contain a form of sugar that gives the body high levels of mobility and heat energy and which can be easily broken down in the body. Furthermore, this sugar is not glucose, which rapidly raises the level of blood sugar but also the fruit sugar fructose^[1,2]. Fruits contain a great many vitamins and minerals. They are very rich in fiber, fat and proteins. They also contain sodium, potassium, calcium, magnesium, iron, sulfur, phosphorus and chlorine, as well as vitamins A, beta-carotene, B1, B2, B3 and B6. The substance of oxytocin, which is present in the date, is used in modern medicine to facilitate birth. In fact, oxytocin means "rapid birth." It is also known to increase levels of mother's milk after birth^[1]. It was reported³ that nutrient content was affected by environmental factors in Kiwi fruit. They are very rich in fibre, fat and proteins. It has been reported that date fruits, depending on the variety and location as well as weather, contained significant but quite variable amounts of macro-elements (calcium, phosphorous, potassium etc.) and micro-elements., (iron, zinc, copper etc) respectively^[4]. It was stated⁵ that nutritional quality was found different in different varieties of water apple fruit. They also recommended that it might be variation in different varieties of fruit. It was reported⁶ that potassium content and total sugar

were different in different varieties of dates and olive fruit. Hossain *et al*^[7, 8, 9] recommended that nutrient and carbohydrate content significantly difference in different fruit species^[10, 11]. However, few literatures related to the present research are found. The study of the assessment of the carbohydrate and nutritional quality of dates, mango, apple and banana fruit for healthy benefits in Hail region is totally new. The following objectives were undertaken

1. To determine the micronutrient (P, K, Ca, Mg) and macronutrient (Fe, Zn, Mn, B, Mo, Cu and Na) content at different fruits
2. To evaluate the biochemical content (TSS, pH, glucose) at different fruits.

Materials and METHODS

Materials

Dates were collected from the dates farm in Jeddah, KSA. Mango, apple and banana were collected from the fruit farm, Serdang and Kuala Lumpur, Malaysia and Hail University Farm, KSA.

Methods

Sample preparation

Ten fruit of dates, banana, apple and mango were thoroughly washed with distilled water, cut using a sterile knife and were blended by using a sterilized automatic juice blender and

Distilled water as 1:2, fruit: water ratio. Then the juice samples were filtered and kept in the freezer to analyze. 5ml of juice were used from each sample.

Glucose determination

Glucose was checked by using glucose refractometer. Three drops of juice sample were placed on the disc of the meter and data were observed and documented.

TSS and pH test

Total soluble solid (%brix) was determined by Refractometer. pH was determined by pH meter.

Nutrient content analysis

Micronutrient content, potassium (K) was determined by Horiba Scientific Nutrient meter (Made in USA) and P, Ca, Mg and micronutrient (Fe, Zn, Mn, B, Mo, Cu and Na) were determined by MOA Spectrophometry.

Statistical Analysis

Data were analyzed statistically. Standard error (SE) and Least Significant difference Test (LSDT) was employed.

Results and Discussion

Fruit glucose content was exhibited maximum (19.5%) in dates (Table 1). Glucose content was found higher in dates (19.5%) and apple (15.2%) than in mango (13.2) and banana (13.5) (Table 1). Total soluble solids (TSS) content was the highest (25.0 %) in dates. However, pH content was found higher in dates and banana than in mango and apple (Table 1). Phosphorus, Calcium and potassium content were higher in dates compared to the mango, apple and banana (Table 2). Moreover, magnesium (Mg) content was higher in banana and mango than in dates and apple (Table 2). Comparatively more micronutrients were found in dates and mango than in banana and apple (Table 3). Fe, Zn, Na and Mn were found higher in dates and mango than in banana and apple. The highest correlation was found in dates followed by apple, banana and mango with glucose (Fig.1).

Table 1: Determination of glucose, pH and TSS content

Fruits	Glucose (%)	pH	TSS (%)
Dates	19.5±0.2	7.2±0.1	25.0±0.5
Mango	13.2±0.3	6.0±0.1	15.8±0.4
Apple	15.2±0.2	5.8±0.3	11.5±0.3
Banana	13.5±0.2	6.8±0.2	17.5±0.1

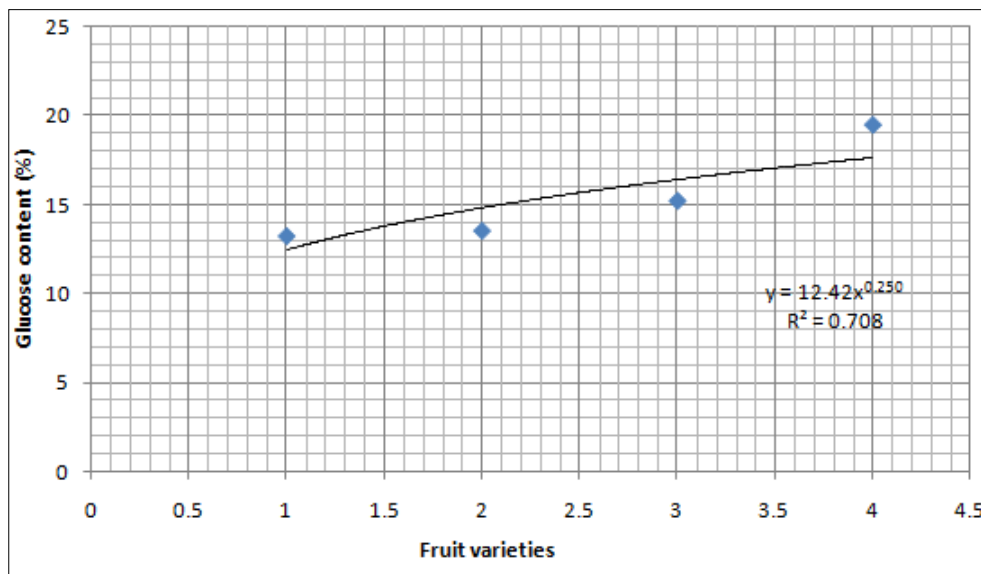


Fig 1: Correlation between the fruits varieties and glucose content. 1= Mango, 2= Banana, 3 = Apple, 4= Dates

Table 2: Macro nutrient content in dates, mango, apple and banana

Fruits	P (mg/100g)	Ca (mg/100g)	Mg (mg/100g)	K (mg/100g)
Dates	17.0±0.1	35.0±0.2	15.0±0.3	78.3±0.4
Mango	13.5±0.3	11.0±0.4	15.5±0.4	16.8±0.3
Apple	10±0.2	5.5±0.2	9.0±0.1	11.0±0.2
Banana	7.55±0.3	5.8±0.1	18.5±0.2	35.5±0.3

Table 3: Micro nutrient content in dates, mango, apple and banana

Fruits	Mn (mg/100g)	Fe (mg/100g)	Zn (mg/100g)	B (mg/100g)	Mo (mg/100g)	Cu (mg/100g)	Na (mg/100g)
Dates	2.5±0.03	5.0±0.1	1.8±0.2	0.8±0.03	0.70±0.03	0.1±0.02	14.0±0.3
Mango	7.0±0.1	2.1±0.1	4.5±0.3	1.5±0.02	0	0	12.0±0.4
Apple	0.1±0.03	0.5±0.01	0.1±0.02	0.1±0.01	0	0	5.5±0.2
Banana	4.0±0.2	2.5±0.1	6.0±0.3	0	0	0.5±0.04	1.5±0.1

For the above results it can be described that the highest glucose, TSS, pH and nutrient content was found in dates compared to the others fruits. It may be due to the location and environmental factors affected the fruits. Hossain *et al* [7, 8, 9] recommended that nutrient and carbohydrate content significantly difference in different fruit species [10]. It has been reported that date fruits, depending on the variety and location as well as weather, contained significant but quite variable amounts of macro-elements (calcium, phosphorous, potassium etc.) and micro-elements., (iron, zinc, copper etc) respectively [4, 14]. It was reported³ that nutrient content was affected by environmental factors in Kiwi fruit. It was reported⁶ potassium content and total sugar were different in different varieties of dates and olive fruit. It was stated [5, 12, 13] that nutritional quality was found different in different varieties of water apple fruit. They also recommended that it might be variation in different varieties and location of fruit. However, few literatures related to the present research are found.

Conclusion

It can be concluded that dates and banana contain higher biochemical (glucose, TSS and pH) content than apple and mango. Moreover, macro and micronutrient contents were found better in dates and mango than banana and apple.

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