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A Comparative Study on the Proximate Composition and Nutrient Analysis of Three Varieties of Pine Apples (*Annanas Comosus*) Grown In Bangladesh

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Abstract: *The present study was undertaken to investigate the nutritive values of three different varieties of locally grown pineapples (Annanas comosus). Nutritional parameters analyzed include moisture, protein, fat, carbohydrate, energy, ash, fiber, total sugar, vitamin C, B_1 and vitamin B_2, minerals (Ca, P, Fe, Zn, Cu and Mg) and the amino acids compositions as determined by Amino Analyzer. Among the three varieties Kalender (Giant Kew) contained the highest amount of Protein, carbohydrate, total sugar ash and energy. Jaldubi (Honey Queen) contains the highest amount of moisture while Kalender the lowest. Fat content varies from 0.09% to 0.032%. The present study also revealed that with the exception of vitamin C and Ca, P, Fe, Mg, pineapples do not contain very much of the other vitamins and minerals.*

Keywords: *Pineapple, Comparative study, proximate, mineral elements, amino acids*

I. Introduction

The pineapple is the most popular of all tropical fruits, and is grown in hot regions all around the world. Pineapple is the second harvest of importance after bananas, contributing to over 20 % of the world production of tropical fruits [1]. Thailand, Philippines, Brazil and China are the main pineapple producers in the world supplying nearly 50 % of the total output. Other important producers include India, Nigeria, Kenya, Indonesia, México and Costa Rica and these countries provide most of the remaining fruit available (50%) [2]. Pineapples are now cultivated in almost all the districts of Bangladesh although Sylhet, Tangail, Dhaka and Rangamati have more acreage under cultivation. About 20,000 ha of land in Bangladesh are now under pineapple cultivation with total production of about 2, 00,000 M tons (Banglapedia: Pineapple (Anarash) and 153,000 Mt in 2003 [3] (FAO, 2004).

Viewing the nutritional and biochemical importance of pineapple in health and diseases, studies were made by many researchers all over the world, especially in Brazil, Hawaii, Thailand and United States of America. However, information regarding the nutritive values of pineapples produced in Bangladesh is very scanty. The present study was undertaken to evaluate and compare the proximate composition namely moisture, protein, fat, carbohydrate, energy, ash, fiber, total sugar, vitamins and minerals of the three selected varieties of pineapples to clarify which one is best from the nutritional point of view.

II. Materials And Methods

2.1 Collection and Treatment of Sample

The Pineapples used in this study were obtained from a local market in Dhaka, Bangladesh and were identified as Kalender (local name) (Giant Kew), Jaldubi (Honey Queen) and Ghorashal (Red Spanish) by a taxonomist in the Department of Horticulture, Bangladesh Agriculture University (BAU), Mymensingh, Bangladesh for nutritive values analysis.

The Samples were screened to remove bad ones, shelled manually and further screened. All the chemicals and solvents used in this study were analytical grade and were purchased from local market. Samples of each variety mentioned above were chemically analyzed to find their proximate values (namely moisture, protein, fat, carbohydrate, energy, ash, fiber, total sugar, vitamins, minerals and amino acids) composition. From each variety, triplet samples were taken and analyzed.

2.2 Proximate Composition

Results have been shown as mean ± SD in gram per 100g edible portions. The proximate analysis of the samples for moisture, total ash and crude fiber were carried out using methods described by AOAC [4]. The nitrogen was determined by micro Kjeldahl method described by Pearson [5] and the nitrogen content was converted to protein by multiplying by a factor of 6.25. The crude fat/lipid content of the samples was done using the method of Bligh and dyer [6] using chloroform: methanol (2:1, v/v) as the extracting solvent. Total carbohydrate content was estimated by 'difference'. All the proximate values were reported in percentage (%).

Total sugar content of pineapple was determined calorimetrically by the Anthrone Method [7]; Calorie content was determined by multiplying the total values (per 100g) of carbohydrate, protein and fat by Atwater factors i. e. 4, 4 and 9 respectively described by Osborne and Voogt [8].

2.3 Estimation of Vitamins

Vitamin C content was determined by the titrimetric method described by Bessey and King [9]; vitamin B_1 and B_2 content was determined following the method of Anon [10].

2.4 Estimation of Mineral Element

The mineral composition of the sample was analyzed by dry-ashing the samples at 550 °C to constant weight and dissolving the ash in volumetric flask using distilled, ionized water with a few drops of concentrated HCl. Phosphorous content was determined by the method of Boltz [11]; Calcium content was determined by titrimetric method previously described by Oser [12] and iron content was measured by the method of Davies and Hilary [13] using Atomic Absorption Spectrophotometer. All the other minerals were determined by Atomic Absorption Spectrophotometer (SHIMADZU Corporation, AA-6200). The minerals content were reported as mg/100g. 2g of the each sample was defatted with chloroform/methanol mixture using Soxhlet extraction apparatus (Cehmglass) while the extraction lasted for 15 hours. Between 30-50g of defatted sample was weighed into glass ampoule. 7ml of 6M HCl was added and oxygen expelled by passing nitrogen into the ampoule. The sealed ampoule was put in an oven at about 110 °C for 22 hours and later allowed to cool before the content was filtered. The filtrate evaporated to dryness at 40 ° C under vacuum in a rotary evaporator. Residue was dissolved with acetate buffer (pH 2).

2.5 Estimation of Mineral Element

By using the Amino Acid Analyzer (SHIMADZU CLASS-VP V-6.12), the amino acid content of the three varieties were analyzed. Mean values of these varieties were calculated from the triplicate results.

III. Result And Discussion

The proximate composition (Moisture, Ash, Fiber, Total sugar, Fat, Protein, Carbohydrate, Vitamins minerals, amino acids) and energy content of the analyzed samples have been presented in Table 1 and 2. The moisture content of the pineapple varieties studied was found to range between 85.77% to 89.02%, where the lowest value (85.77%) was in Giant Kew and the highest value (89.02%) was in Honey Queen. Table 1 also shows that the ash content of pineapple varieties studied ranges between 0.22% to 0.27%.

Table 1. *Moisture, Ash, Fiber, Total sugar, Fat, Protein, Carbohydrate, Energy, Vitamin C, Vitamin B_1, Vitamin B_2, Calcium, Phosphorus, Iron, Zinc, Copper and Magnesium content of different varieties of pineapples (values/100g edible portion).*

Parameters	**Giant Kew**	**Honey Queen**	**Red Spanish**
Moisture (g)	85.77±0.21	89.02±0.14	87.22±0.11
Ash (g)	0.27±0.12	0.22±0.14	0.24±0.09
Fiber(g)	1.4±0.08	1.32±0.09	1.36±0.03
Total sugar(g)	9.35±0.14	7.02±0.16	8.04±0.19
Fat(g)	0.12±0.09	0.10±0.06	0.13±0.02
Protein(g)	0.53±0.08	0.45±0.05	0.51±0.04
Carbohydrate(g)	13.31±0.14	10.22±0.13	11.90±0.12
Energy(K cal)	53.86±0.11	44.58±0.06	51.09±0.09
Vitamin C (mg)	38.0±0.03	21.09±0.05	17.9±0.07
Vitamin B_1 (mg)	0.070±0.005	0.081±0.003	0.079±0.002
Vitamin B_2 (mg)	0.030±0.004	0.021±0.002	0.035±0.003
Calcium(mg)	17.21±0.03	10.02±0.05	12.34±0.06
Phosphorus(mg)	10.32±0.02	7.10±0.02	8.17±0.04
Iron(mg)	0.35±0.01	0.23±0.09	0.25±0.02
Zinc(mg)	0.10±0.02	0.08±0.04	0.096±0.01
Copper(mg)	0.099±0.01	0.095±0.02	0.089±0.05
Magnesium(mg)	13.21±0.05	14.00±0.06	12.36±0.09

(Values are mean ± SD of triplicate analysis)

The fiber content in the samples analyzed was found to range from 1.32% to 1.40%. The fat content of the studied pineapple was found to range between 0.10% to 0.13%. The content of protein of the samples analyzed ranges from 0.45% to 0.53% (Table 1). The carbohydrate content of the samples was found to range from 10.22% to 13.31%. The energy content of the samples ranges from 44.58 Kcal to 53.86 Kcal per 100g edible portion (Table 1). Vitamins (Vitamin C, Vitamin B_1 and Vitamin B_2) content of the different varieties of pineapples have been shown in Table 1. Giant Kew contains the highest amount (38.0%) whereas Red Spanish

the lowest (17.9%). Vitamin B_1 and Vitamin B_2 are also found to a lesser extent. The calcium content of the pineapple varieties studied was found to range between 10.02mg to 17.21mg, where the lowest value (10.02mg) was in Honey Queen and the highest value (17.21mg) was in Giant Kew.

Table 2. *Essential Amino acids content of different varieties of pineapples (values/100g edible portion).*

Amino acid (g)	**Giant Kew**	**Honey Queen**	**Red Spanish**
Valine	0.0065	0.0062	0.0061
Lysine	0.001	0.0047	0.003
Isoleucine	0.0002	0.0048	0.0021
Leucine	0.008	0.014	0.009
Methionine	0.0041	0.0017	0.003
Phenylalanine	0.0095	0.0051	0.0096
Threonine	0.0054	0.0065	0.0051
Histidine	0.016	0.007	0.011
Asparticacid	0.037	0.0324	0.034
Serine	0.021	0.012	0.020
Glutamic acid	0.022	0.024	0.021
Glycine	0.029	0.034	0.031
Alanine	0.014	0.017	0.015
Tyrosine	0.025	0.0074	0.026
Arginine	0.0064	0.0042	0.05

Data presented in Table1 also shows that the phosphorous content of pineapple varieties studied ranges between 7.10mg to10.32mg. The magnesium content in the samples analyzed was found to range from 12.36mg to 14.00mg. Iron, Copper and Zinc are also found in a lower amount. The results presented above are more or less consistent with that of the results reported for American pineapples [14]. Minor differences obtained in the present study might be due to different varieties, climate and soil condition etc. The overall results suggest that Giant Kew variety should be given more attention for the yield and production of pineapples.

IV. Conclusion

The results of the study have shown that more attention should be given to the Kalender variety for yield and production of Pineapple in large scale, which contain the highest percentage of nutritive values.

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