Advanced Studies in Pure Science and Applied Science

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ISBN No. 978-93-82995-25-8

Published by:
Anuradha Publications
Cidco-Nanded

Publication Year: 2018-19

Price- Rs. 250/-

Printed by
Gurukrupa Offset,
Near Police Station, Gangakhed

Typesetting by:
Simran Computers
Gangakhed Dist.Parbhani

Cover Designby:
Mr. Imran K. Mohammad

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Physico-Chemical Analysis of Pineapple Juice and Pineapple Waste

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INTRODUCTION

Green mature pineapples are usually allowed to ripen during storage. The pineapple fruits are normally eaten fresh or as fresh pineapple juice. Pineapple fruits are an excellent source of vitamins and minerals. One healthy ripe pineapple fruit can supply of about 16.2% of daily requirement for vitamin C. Several physiochemical parameters like starch, reducing sugar, nonreducing sugar, total sugar, protein, ascorbic acid are present in juice and waste. Pineapple waste contains high concentration of biodegradable organic material and suspended solid. The pineapple solid waste from pineapple processing was estimated about 40-50% from fresh fruit as pineapple peels and core [1]. Pineapple waste contains valuable components which are mainly sucrose, glucose, fructose and other nutrients [2,3]. The conversion of these nutrients into useful products of higher value added products like ethanol or even as raw material for other Industries or for use as food or feed after its biological treatment [4]. The aim of this investigation was to compare the physicochemical characteristics of pineapple juice and pineapple waste.

EXPERIMENTAL

Pineapple fruits were collected from market. Pineapple juice and waste was used for small scale fermentation. The physical parameters like pH, temperature were measured using pH meter and thermometer. The turbidity of the juice and waste were analyzed using Nephelometer. The moisture content of the fruit sample and waste were determined by hot-air oven method and ash content was calculated by keeping the sample in a muffle furnace and ash at a temperature exceeding 525 °C for 6 hours. The ash was then cooled in a desiccator and weighed. The ash content was recorded as 1.8mg/100g of fresh weight [5].

The tritratable acidity was calculated by mincing fresh fruit samples (10g) were mixed with 200 cm 3 distilled water, boiled for 1 hour, cooled and the mixture was then filtered. The filtrate (10cm 3) was titrated with 0.1M sodium hydroxide up to pH 8.1 using p H meter. The results were expressed as 2.03% citric acid/gm fresh weight [6]. The reducing sugar was measured by alkaline 3,5 dinitrosalicylic acid (DNS) method[7] and total sugar content was measured by anthrone method[8].Soluble protein was analyzed by Lowry et al.[9]. The ascorbic acid content was measured by Colorimetric method [10].

RESULTS AND DISCUSSION

The physical and chemical composition of pineapple juice and waste can be seen in table (1).The pineapple waste had high moisture content (91.35%) and moderate titratable acidity. Inyang and Agbo reported that moisture content of pineapple range from 69 to 89.5%.But it was decreased during room temperature storage and ripening period[11].The Indian Pineapple had high moisture content[12] when compared with Mbezi pineapples (79.3), Guatemela Pineapples (71.8) and Joaspine Pineapples of Malaysia (70.5)[13].The high moisture content have a low energy value for the fruits thus suggesting usefulness in the treatment of obesity as observed by Muller & Tobin[14].The moisture content of fruit gives a natural laxative property.

Pineapple contains low ash content .The maximum concentration of ash was observed in pineapple pulp (1.8mg/100g).Asare Bediako et.al (2007) reported a higher ash content of 0.5mg/100fw for pineapples from Ghana [15]. The titrable acidity value of 2.03% for Indian pineapple juice and 1.86% for waste. This was compared with fruits of Mbezi Pineapple (1.505%), found to be lower than Indian pineapples. The titrable acidity for the pineapple fruits ranged from 0.80 to 1.50%.In citrus fruits, the predominant acid is citric acid[16].The average ascorbic acid content of pulp (21.5 mg/100g)) and waste (26.5mg/100g) were measured. Achinewhu and Hart (1994) reported ascorbic acid value of 22.5 -33.5 mg/100g-fw for pineapple from Nigeria [17]. Ascorbic acid content was slightly decreased in ripening stage of pineapple fruits [18].The usual adult dose of ascorbic acid as dietary supplement is between 30 – 200mg/day. (NDA).

Table 1: Physical and chemical constituents of pineapple pulp and pineapple waste:

S. No	Parameters	Pineapple Pulp	Pineapple Waste
1	Moisture (%)	87.3	91.35
2	Ash Content(mg/100g)	1.8	0.04
3	Acidity (%)	2.03	1.86
4	Ascorbic acid (mg/100g)	21.5	26.5
5	Reducing Sugars (%)	10.5	8.2
6	No reducing sugars (%)	7.4	8.8
7	Soluble solids (%)	13.3	10.2
8	Total sugars (%)	8.64	9.75
9	Crude fibre(g/100g-fw)	0.41	0.61
10	Protein (mg/100g)	7.2	9.8

The reducing sugars was found to be higher in pineapple pulp when compared with pineapple waste. The maximum amount of reducing sugar was observed in pineapple pulp (10.5%)than waste(32%).The reducing sugar content of pineapple was found to be lower in Indian Varieties of pineapple (10-12.5) when compared with Mbezi pineapples (14.2%). Cayenne pineapples (13.8%) [17].But Ghana pineapples were found to be very higher in reducing sugar content (16.5%) [15].The total soluble solids (TSS) value of

Indian pineapple was found to be higher in pulp(13.3%) than waste(10.2%). The total soluble solids value of 15.3% was found to be similar to TSS value of 15.2% reported for Mauritius pineapples by Weerahewa and Adikaaram [19]. Malaysian Josapine pineapple had a TSS Value of 13.5% [20]. The total sugar content of Indian variety was found to be higher in waste (9.75%) than pulp (8.66%).The total sugar content of pearl pineapples of Brazil had a total sugar content of 14.5%.

The pineapple waste contained higher amount of crude fiber (0.60g/100g-fw) than fruit (0.41g/100g.fw). The average crude fibre content of 0.41g/100gfw for Mbezi pineapple similar to Indian pineapples 0.399g/100gfw [17]. Pineapples pulp had average crude fibre content of 0.45±0.03g/100g.Ramulu and Rao reported that crude fibre content of Indian pineapple had 0.5g/100g-fw in fruit [12]. Fibre helps to maintain the health of gastrointestinal tract but in excess it may bind some trace elements [21].The pineapple skin waste was found to be higher amount of total sugar (9.75%) and non-reducing sugar (8.8%)than juice, which is essential for growth of microorganism and also found to be higher protein content in waste (10mg). Total sugar and non-reducing sugar and proteins are suitable for yeast fermentation [22].

CONCLUSION

Thus pineapple fruits exhibit high moisture, high sugars, soluble solid content ascorbic acid and low crude fiber. The pineapple waste shows high amount of crude fiber. The pineapple waste contain non reducing sugars and carbohydrates and protein which are used as a nutrient medium for growth of microbes and fermentation using yeast to produce ethanol and single cell protein. Thus pineapple can be used as supplementary nutritional fruit for good personal health.

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