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ORIGINAL ARTICLE

Effect of some preservative methods on the physicochemical and organoleptic properties of pineapple and watermelon fruit juices

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Fruit juices are important sources of nutrient and it contains several important therapeutic properties that may reduce the risk of various diseases. This study was based on the effect of different preservative methods on fruit juices (pineapple and watermelon) and determination of the best method. The fruit juice were preserved using sodium benzoate, lime, pasteurization and the combination of sodium benzoate and pasteurization. Twenty three bacteria and twelve fungi were isolated from the fruit juice. Bacteria isolates include; *Salmonella spp, Campylobacter jejuni, Shigella spp* and *Escherichia coli*. Fungi isolated from the pineapple juice include: *Aspergillus flavus, Aspergillus niger, Ochrocosis gallopava, Geotrichum candidum* and *Ochrococus gallapava* among others. The result obtained shows that the juice maintained colour, aroma and taste when both sodium benzoate and pasteurization were used to compare when no preservation was used. There is a noticeable increase in the microbial load of the juice when lime was used as the only preservatives at day 0 (4×10^{-5}) compared to when sodium benzoate and pasteurization was used at day 0 (1×10^{-5}). While combination of sodium benzoate and pasteurization was the best among all other preservative methods. The pH value of the juice was also checked and it was observed that pineapple juice had the lower pH when compared with that of water melon.

Keywords: Fruit juices, Pasteurization, Preservation, Microbial load, Sodium benzoate.

Introduction

A fruit is a part of a flowering plant that derives from specific tissues of the flower tissues, one or more ovaries and in some cases, accessory tissue. Fruits are the means by which these plants disseminate seeds. Many of them that bear edible fruits, in particular have propagated with the movement of humans and animals in a symbiotic relationship as a means for seed dispersal and nutrition, respectively, humans and many animals have become dependent on fruits as a source of food (Davidson, 2008). Fruit juices are important sources of nutrient and it contains several important therapeutic properties that may reduce the risk of various diseases. They contain large amounts of antioxidants, vitamins C and E, with pleasant taste and aroma (Abbo, Olurin and Odeyemi, 2006).

Fruit juice promotes detoxification in the human body (Deanna and Jeffry, 2007). Consumption of fruit and fruit juices have substantially risen over the last few years, mostly due to the increasing demand for low calorie food products with fresh like characteristics. In addition there is scientific evidence that consumption of fruits and vegetables helps to prevent many degenerative diseases such as cardiovascular disease and cancers (Maji, Omale and Okoli, 2011). Juices produced from tropical fruits have increasingly gained global importance due to their health effect. There are different types of tropical fruits namely: orange, grape, pineapple, banana, guava, water melon and African star apple which are readily available for the production of fruit juices. The juices may be produced from single fruit or from combination of fruits which are sold by street vendors.

The constituents of processed juices are mainly water, sugar, chemical preservatives, colour and fruit pulp, however, as a result of inappropriate preparation and storage conditions, both pathogenic and spoilage microorganisms may contaminate a fruit juice product thus increasing risk of microbial disease and spoilage (Bates, Morris and Crandell, 2001). In fact, the number of outbreaks and illness caused by consumption of fresh fruits has increased in the last years (Ahmad, Chaudlgry and Khan, 1986). Quality losses in fresh cut fruits and unpasteurized juices may occur as a result of microbiological, enzymatic, chemical or physical changes. Safety and quality losses by microbiological causes are very important due to two reasons. Firstly, it constitutes hazard for consumers by the possible presence of microbial toxins or pathogenic microorganisms in the products, secondly by economic losses as a result of microbial spoilage. For these reason, fresh fruits are processed into fruit juices by many food preservation strategies such as chilling, freezing, water activity reduction, nutrient restriction, acidification, modified atmosphere, packaging, fermentation, non-thermal physical treatments or the use of antimicrobials have been traditionally applied to control microbial growth (Deanna and Jeffery, 2007). However, interest in the use of natural substances to prevent fruit juice from microbiological spoilage while assuring safety and maintaining quality characteristics has significantly increased in the last years due to the high demand of healthy, fresh and safe foods that contain as low amounts of preservatives as possible (Lund, 1975).

Fruits are generally too acidic for growth of the foodborne pathogens such as *Salmonella* and *Shigella, Listeria monocytogenes* can survive well on both chopped and whole tomatoes. Toxigenic moulds are also a problem since they can produce mycotoxins (Brackett and Splittstoesse, 2000).

The most common organisms are the Lactic acid bacteria *(Lactobacillus, Leuconostoc*), *yeast* and moulds. High levels of mould contamination are generally attributed to unsound fruits entering the processing plant machinery, mould*, Geotrichum candidum*, may be introduced from unsanitary equipment. Low numbers of heat resistant moulds such as *Byssochlamy spp* and *Neosartoya fischeri* are often common in raw fruits (Nwachukwu and Otokunefor, 2002).

Watermelon is a warm season crop and is grown worldwide, usually in the regions that have a long warm growing season (Riaz, Ali and Saleem, 1988). The plant have weak stems and climb by tendrils, which hang from tree as tall as 20 to 60 feet, the watermelon fruit matures on the ground. As a result of consumers demand for sweet, flavourful watermelon, total sugar content is an important quality factor (Abbo *et al*., 2006). Watermelon, scientifically called *Citrulluslanatus* is rich in vitamin C, vitamin B, amino acid and also carotenoid lycopene (Bariyewu, Amusa, Ayoola, and Babalola, 2009). Hence, consuming watermelon can boost energy levels.

Pineapple is one of the popular fruits and is liked by majority of the people irrespective of their age group. Scientifically, it is known as *Ananascomosus* and belongs to family *Bromeliaciae*, eaten fresh or eaten in a processed form. It is composed of nutrients which are good for human health. This delightful tropical fruit is high in the enzyme bromelain and the antioxidant vitamin C, both of which play a major role in the body healing process (Joy and Abraham, 2013).

Pineapple fruit is very low in saturated fat, cholesterol and sodium. It is a good source of dietary fibre (Abbo *et al*., 2013). Pineapple is rich in B complex of vitamins like foliates, thiamin, pyridoxine, riboflavin, minerals like copper, manganese and potassium. Potassium is an important component of cell and fluid helps in controlling heart rate and blood pressure. Copper is a helpful cofactor for the enzyme superoxide dismutase, which is very powerful free radicals (USDA, 2010).

Limes are a good source of vitamin C and are often used to accent the flavours of foods and beverages lime was used to prevent scurvy during the 19th century. British sailors were issued a daily allowance of citrus, such as lemon and later switched to lime (Srivastava, and Sangeer, 2003).

Materials and Method

Collection of sample

Pineapple (*Ananascomosus*) and watermelon (*Citrullus lanatus*) were purchased from Apete market in Ibadan, Oyo State, Nigeria. The fruits were transported in a sterile polythene bag and taken directly to the Biology Department Laboratory of the Polytechnic Ibadan. All the chemicals and reagents used in the study were of analytical grade.

Preparation of sodium benzoate and the fruit juices

Sodium benzoate ($Na_2C_6H_6COOH$) was prepared using to the following concentrations 0.08% (w/v), 0.06% (w/v), 0.04% (w/v) and 0.02 (w/v).

The pineapples were rinsed in warm distilled water, surface sterilized with 70% ethanol, hand peeled with a sterile knife (sterile glove worn), while the same procedure was done for watermelons and it was deseeded. 2400 g of the fruit pulp was blended with 600 ml of sterile distilled water inside a blender. The fruit was homogenized, filtered through a well sterile muslin cloth to obtain fruit juice. Then 25 ml portion from the juice was dispensed into each of 60 sterile bottle containers.

Preservation of fruit juices with lime

Fruit juices were preserved with lime fruit, fruit lime were first surface sterilized with 70% ethanol and peeled using a sterile knife. The fruit were then halved (using a sterile knife) and the juice was squeezed aseptically (sterile gloves worn) into sterile 100 ml conical flask. To each five other containers of fruit juice, 2 ml of lime juice was added aseptically. The remaining five containers of fruit juice were pasteurized at 60°C for 1 hour and 2 ml of lime juice was added into each container aseptically, and were labeled accordingly.

Organoleptic study

The sensory evaluation was carried on different treated containers and control containers and the sample was assessed based on four basic parameters which include: taste, colour, flavor and texture.

pH determination

The pH of each group of containers with different treatment was determined using a pH meter (Jenway pH meter model 3310) for the period of storage (8 days) at two days interval from the first day (day 0). The pH of each of the treated juice samples and the control were measured and recorded.

Total titratable acidity

Titrable acidity was estimated using 10mls of the fruit juice samples titrated against 0.1 M NaOH with phenolphthalein as indicator.

Bacteriological analysis of fruit juice samples

The fruit sample were thoroughly washed and rinsed with clean water. Each fruit was processed separately. 10 g of the solid sample (watermelon, pineapple and lime) were chopped annually with sterile cutter and then pulverize to paste using a sterile mortar and pestle. The paste were appropriately diluted in normal saline, watermelon, pineapple and lime were squeeze using a squeezer till considerable amount of liquid juice was obtained. 1 ml of the fruit juice was transferred into test tube containing 10 ml of peptone water and serially diluted, 1 ml of diluted into 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4},10^{-5},10^{-6},10^{-7},10^{-8}, 10^{-9} and 10^{-10}. The 10^{-10} dilution is then inoculated into a sterile petri-dish using an auto pipette and 15 ml of nutrient agar is pour and carefully homogenized, this was done for the total viable count of the faecal samples. The tenth dilutions of the samples were also cultured on differential and selective media for bacteria cultivation in order to isolate bacteria entero-pathogens. The cultured plate were incubated overnight the temperature of 37°C (Dubey, 2005). Eosin Methylene Blue agar (EMBA), Nutrient Agar (NA), *Salmonella shigella* agar (SSA) and Potato Dextrose Agar (PDA) were used for the isolation of bacteria pathogens.

Biochemical characterization of bacteria isolates

The identification of each isolates was carried out by biochemical tests using the MICROBACT 12A and 12B identification kits (OXOID, England) (Table 1).

Result

There were 23 bacteria isolates from watermelon juice and 12 fungi isolates from pineapple juice. Table 1 shows the result of pasteurized pineapple juice and indicated pH, total titrable acidity and organoleptic characteristics. Table 2 shows the result of unpasteurizated pineapple juice that indicated the pH, total titrable acidity and organoleptic characteristics. Table 3 shows the result of pasteurized watermelon juice also were the pH, total titrible acidity and organoleptic characteristics. Tables 4 and 5 shows the result of unpasteurizated watermelon juice, pH, total titratable acidity and organoleptic characteristics. Tables 6 and 7 show the microbial population in pineapple and watermelon juice.

Table 1. Morphological, physiological and biochemical characterization of lab isolates.

S.No	Isolates code	Gram staining	Morphological characteristics	Catalase	Indole	Oxidase
1	JP	+ve	C	-ve	-ve	-ve
2	JPL	+ve	C	-ve	-ve	-ve
3	JP^2	+ve	C	-ve	-ve	-ve
4	JP^4	+ve	C	-ve	-ve	-ve
5	JP^6	(-ve	Rod	-ve	-ve	-ve
6	JP^8	+ve	C	-ve	-ve	-ve
7	JP	+ve	C	-ve	-ve	-ve
8	JPL	+ve	C	-ve	-ve	-ve
9	JP^2	+ve	C	-ve	-ve	-ve
10	JP^4	+ve	Rod	-ve	-ve	-ve
11	JP^6	(-ve	Rod	-ve	-ve	-ve
12	JP^8	+ve	C	-ve	-ve	-ve
13	JP	+ve	C	-ve	-ve	-ve
14	JPL	+ve	C	-ve	-ve	-ve
15	JP^2	+ve	C	-ve	-ve	-ve
16	JP^4	+ve	C	-ve	-ve	-ve
17	JP^6	+ve	C	-ve	-ve	-ve
18	JP^8	+ve	C	-ve	-ve	-ve
19	JP	+ve	C	-ve	-ve	-ve
20	JPL	+ve	C	-ve	-ve	-ve
21	JP^2	+ve	C	-ve	-ve	-ve
22	JP^4	+ve	C	-ve	-ve	-ve
23	JP^6	+ve	Rod	-ve	-ve	-ve
24	JP^8	+ve	C	-ve	-ve	-ve

Table 2. Shows result of organoleptic, pH and titratable acidity of pasteurized pineapple.

Days	Isolate Code	Taste	Odour	Colour	Gas Released	pH	Titratable Acidity	Precipitate Formed
	JP	Sweet	Pleasant	Orange	No	5.90	1.70	No
	JPL	Sweet	Pleasant	Orange	No	5.80	2.07	No
	JP^2	Sweet	Pleasant	Orange	No	5.85	1.50	No
Day 0	JP^4	Sweet	Pleasant	Orange	No	5.86	1.50	No
	JP^6	Sweet	Pleasant	Orange	No	5.84	0.55	No
	JP^8	Sweet	Pleasant	Orange	No	5.81	0.75	No
	JP	Sweet	Pleasant	Orange	No	5.96	0.70	No
	JPL	Sour	Pleasant	Orange	Yes	5.84	2.07	Yes
	JP^2	Sweet	Pleasant	Orange	Yes	5.87	1.50	No
Day 2	JP^4	Sweet	Pleasant	Orange	Yes	5.86	1.50	No
	JP^6	Sweet	Pleasant	Orange	Yes	5.84	0.55	No

	JP^8	Sweet	Pleasant	Orange	Yes	5.81	0.75	No
	JP	Sweet	Pleasant	Cream	No	5.90	2.00	No
	JPL	Sweet	Pleasant	Cream	No	5.50	2.20	No
Day 4	JP^2	Sweet	Pleasant	Cream	No	5.80	2.00	No
	JP^4	Sweet	Pleasant	Cream	No	5.76	2.30	No
	JP^6	Sweet	Pleasant	Cream	No	5.74	2.40	No
	JP^8	Sweet	Pleasant	Cream	No	5.87	2.20	No
	JP	Sweet	Pleasant	Orange	No	5.86	2.70	Yes
	JPL	Sweet	Pleasant	Orange	No	5.44	2.80	Yes
	JP^2	Sour	Pleasant	Orange	No	5.51	2.50	Yes
Day 6	JP^4	Sour	Pleasant	Orange	No	6.60	2.90	Yes
	JP^6	Sour	Pleasant	Orange	No	4.78	2.95	Yes
	JP^8	Sour	Pleasant	Orange	No	5.72	2.97	Yes
	JP	Sour	Pleasant	Orange	No	5.92	0.80	Yes
	JPL	Sour	Pleasant	Orange	No	5.50	2.50	Yes
	JP^2	Sour	Pleasant	Orange	No	5.42	0.90	Yes
Day 8	JP^4	Sour	Pleasant	Orange	No	6.50	0.90	Yes
	JP^6	Sour	Pleasant	Orange	No	4.58	0.92	Yes
	JP^8	Sour	Pleasant	Orange	No	6.00	0.89	Yes

Table 3. Shows result of organoleptic, pH and titratable acidity of unpasteurized pineapple.

Days	Isolate Code	Taste	Odour	Color	Gas Released	pH	Titratable Acidity	Precipitate Formed
	JC	Sweet	Pleasant	Orange	No	5.10	1.70	No
	JL	Sweet	Pleasant	Orange	No	5.80	2.07	No
	JU^2	Sweet	Pleasant	Orange	No	5.85	1.50	No
Day 0	JU^4	Sweet	Pleasant	Orange	No	5.86	1.50	No
	JU^6	Sweet	Pleasant	Orange	No	5.84	0.55	No
	JU^8	Sweet	Pleasant	Orange	No	5.81	0.75	No
	JC	Sweet	Pleasant	Orange	Yes	5.90	0.75	Yes
	JL	Sweet	Pleasant	Orange	Yes	5.78	2.70	Yes
	JU^2	Sweet	Pleasant	Orange	Yes	5.84	0.85	Yes
Day 2	JU^4	Sweet	Pleasant	Orange	Yes	5.90	1.10	Yes
	JU^6	Sweet	Pleasant	Orange	Yes	5.85	1.20	Yes
	JU^8	Sweet	Pleasant	Orange	Yes	5.83	1.70	Yes
	JC	Sour	Pleasant	Orange	No	5.64	1.85	No
	JL	Sour	Pleasant	Orange	No	5.20	2.50	No
Day 4	JU^2	Sour	Pleasant	Orange	No	5.50	2.00	No
	JU^4	Sour	Pleasant	Orange	No	5.50	2.20	No
	JU^6	Sour	Pleasant	Orange	No	5.40	2.30	No
	JU^8	Sour	Pleasant	Orange	No	5.45	2.10	No
	JC	Sour	Pleasant	Orange	No	5.68	1.95	No
	JL	Sour	Pleasant	Orange	No	5.69	2.50	Yes
	JU^2	Sour	Pleasant	Orange	No	5.62	1.90	No
Day 6	JU^4	Sour	Pleasant	Orange	No	4.76	1.80	No
	JU^6	Sour	Pleasant	Orange	No	5.82	1.75	Yes
	JU^8	Sour	Pleasant	Orange	No	5.80	1.95	Yes
	JC	Sour	Pleasant	Orange	No	5.90	1.80	Yes
	JL	Sour	Pleasant	Orange	No	5.70	2.07	Yes
	JU^2	Sour	Pleasant	Orange	No	5.74	1.75	No
Day 8	JU^4	Sour	Pleasant	Orange	No	4.80	1.70	Yes
	JU^6	Sour	Pleasant	Orange	No	5.76	1.80	Yes
	JU^8	Sour	Pleasant	Orange	No	5.80	1.90	Yes

Table 4. Shows result of organoleptic, pH and titratable acidity of pasteurized water melon.

Days	Isolate Code	Taste	Odour	Color	Gas Released	pH	Titratable Acidity	Precipitate Formed
	JC	Sweet	Pleasant	Cream	No	6.19	1.00	No
	JL	Sweet	Pleasant	Cream	No	5.37	1.50	No
	JU^2	Sweet	Pleasant	Cream	No	5.92	0.50	No
Day 0	JU^4	Sweet	Pleasant	Cream	No	6.17	0.75	No
	JU^6	Sweet	Pleasant	Cream	No	6.09	0.50	No
	JU^8	Sweet	Pleasant	Cream	No	5.95	1.50	No
	JC	Sweet	Pleasant	Cream	No	6.82	0.50	No
	JL	Sweet	Pleasant	Cream	No	6.57	2.05	No
	JU^2	Sweet	Pleasant	Cream	No	6.86	0.75	No
Day 2	JU^4	Sweet	Pleasant	Cream	No	6.91	0.75	No
	JU^6	Sweet	Pleasant	Cream	No	6.80	0.10	No
	JU^8	Sweet	Pleasant	Cream	No	6.83	0.20	No
	JC	Sweet	Pleasant	Cream	No	5.80	0.50	No
	JL	Sweet	Pleasant	Cream	No	6.20	2.70	No
Day 4	JU^2	Sweet	Pleasant	Cream	No	5.81	0.10	No
	JU^4	Sweet	Pleasant	Cream	No	5.79	1.00	No
	JU^6	Sweet	Pleasant	Cream	No	5.60	0.90	No
	JU^8	Sweet	Pleasant	Cream	No	5.70	1.20	No
	JC	Sweet	Pleasant	Cream	No	7.22	1.20	No
	JL	Sweet	Pleasant	Cream	No	6.09	1.80	No
	JU^2	Sweet	Pleasant	Cream	No	6.00	1.20	No
Day 6	JU^4	Sweet	Pleasant	Cream	No	5.90	1.30	No
	JU^6	Sweet	Pleasant	Cream	No	5.95	1.40	No
	JU^8	Sweet	Pleasant	Cream	No	6.04	1.50	No
	JC	Sweet	Pleasant	Cream	No	6.79	0.60	No
	JL	Sweet	Pleasant	Cream	No	6.59	2.00	No
	JU^2	Sweet	Pleasant	Cream	No	6.87	0.80	No
Day 8	JU^4	Sweet	Pleasant	Cream	No	6.80	0.80	No
	JU^6	Sweet	Pleasant	Cream	No	6.80	0.82	No
	JU^8	Sweet	Pleasant	Cream	No	6.78	0.79	No

Table 5. Shows result of organoleptic, pH and titratable acidity for unpasteurized water melon.

Days	Isolate Code	Taste	Odour	Color	Gas Released	pH	Titratable Acidity	Precipitate Formed
	JC	Sweet	Pleasant	Cream	No	6.23	0.50	No
	JL	Sweet	Pleasant	Cream	No	5.95	2.50	No
	JU^2	Sweet	Pleasant	Cream	No	6.17	0.10	No
Day 0	JU^4	Sweet	Pleasant	Cream	No	6.17	0.50	No
	JU^6	Sweet	Pleasant	Cream	No	6.19	0.25	No
	JU^8	Sweet	Pleasant	Cream	No	6.42	0.75	No
	JC	Sweet	Pleasant	Cream	No	5.53	0.10	No
	JL	Sweet	Pleasant	Cream	No	6.10	2.50	No
	JU^2	Sweet	Pleasant	Cream	No	6.97	0.10	No
Day 2	JU^4	Sweet	Pleasant	Cream	No	6.50	0.75	No
	JU^6	Sweet	Pleasant	Cream	No	6.42	0.95	No
	JU^8	Sweet	Pleasant	Cream	No	6.62	1.00	No
	JC	Sour	Pleasant	Cream	No	5.77	1.70	Yes
	JL	Sour	Pleasant	Cream	No	5.64	2.00	Yes
Day 4	JU^2	Sour	Pleasant	Cream	No	5.55	1.90	Yes
	JU^4	Sour	Pleasant	Cream	No	5.61	1.70	Yes
	JU^6	Sour	Pleasant	Cream	No	5.60	1.80	Yes
	JU^8	Sour	Pleasant	Cream	No	5.65	1.60	Yes
	JC	Sweet	Pleasant	Cream	No	5.80	1.80	No
	JL	Sweet	Pleasant	Cream	No	6.00	2.20	Yes
	JU^2	Sweet	Pleasant	Cream	No	5.70	1.60	Yes

Day 6	JU^4	Sweet	Pleasant	Cream	No	5.60	1.40	No
	JU^6	Sweet	Pleasant	Cream	No	5.80	1.50	No
	JU^8	Sweet	Pleasant	Cream	No	5.80	1.70	No
	JC	Sweet	Pleasant	Cream	No	7.12	1.70	Yes
	JL	Sweet	Pleasant	Cream	No	6.10	2.05	Yes
	JU^2	Sweet	Pleasant	Cream	No	7.00	1.65	Yes
Day 8	JU^4	Sweet	Pleasant	Cream	No	6.82	1.60	Yes
	JU^6	Sweet	Pleasant	Cream	No	6.72	1.70	Yes
	JU^8	Sweet	Pleasant	Cream	No	6.70	1.80	Yes

Table 6. Microbial load of watermelon juice during the period of storage (cfu/ml).

	Days of storage				
Treatment	**0**	**2**	**4**	**6**	**8**
JC	9×10^{-4}	1.0×10^{-3}	1.5×10^{-3}	12.0×10^{-3}	2.5×10^{-3}
LJ	2.0×10^{-4}	3×10^{-4}	5×10^{-4}	9×10^{-4}	1.3×10^{-3}
JU^2	1.0×10^{-4}	3×10^{-4}	5×10^{-4}	6×10^{-4}	8×10^{-3}
JU^4	1.0×10^{-4}	2×10^{-4}	3×10^{-4}	5×10^{-4}	7×10^{4}
JU^6	0	2×10^{-4}	3×10^{-4}	5×10^{-4}	6×10^{-4}
JU^8	0	0	1×10^{-4}	1×10^{-4}	2×10^{-4}
JP	1×10^{-4}	1×10^{-4}	2×10^{-4}	1×10^{-4}	2×10^{-4}
LJP	0	0	1×10^{-4}	1×10^{-4}	2×10^{-4}
JU^2	0	0	1×10^{-4}	1×10^{-4}	2×10^{-4}
JU	0	0	1×10^{-4}	1×10^{-4}	2×10^{-4}
JU^6	0	0	0	0	1×10^{-4}
JU^8	0	0	0	0	1×10^{-4}

Table 7. Microbial load of pineapple juice during the period of storage (cfu/ml).

	Days of storage				
Treatment	**0**	**2**	**4**	**6**	**8**
JC	9×10^{-4}	1.0×10^{-3}	1.0×10^{-3}	1.5×10^{-3}	2.0×10^{-3}
LJ	2.0×10^{-4}	3×10^{-4}	5×10^{-4}	9×10^{-4}	1.3×10^{-3}
JU^2	1.0×10^{-4}	3×10^{-4}	5×10^{-4}	6×10^{-4}	8×10^{-4}
JU^4	1.0×10^{-4}	2×10^{-4}	3×10^{-4}	5×10^{-4}	7×10^{4}
JU^6	0	1×10^{-4}	2×10^{-4}	2×10^{-4}	3×10^{-4}
JU^8	0	0	1×10^{-4}	1×10^{-4}	2×10^{-4}
JP	1×10^{-4}	1×10^{-4}	2×10^{-4}	1×10^{-4}	2×10^{-4}
LJP	0	0	1×10^{-4}	1×10^{-4}	2×10^{-4}
JU^2	0	0	1×10^{-4}	1×10^{-4}	2×10^{-4}
JU	0	0	1×10^{-4}	1×10^{-4}	2×10^{-4}
JU^6	0	0	0	0	1×10^{-4}
JU^8	0	0	0	0	1×10^{-4}

JC: Juice Control, LJ: Lime Juice, JP: Pasteurized juice, LJP: Lemon juice pasteurize

Discussion

This study was carried out to select suitable chemical preservative doses either in single or in combination for satisfactory storage of pineapple and watermelon at room temperature. Information regarding quality parameters, preservatives efficacy and storage behavior of the fruit juice. The isolates were characterized with respect to morphological, biochemical test and identified bacteria and fungi organisms for bacteria: *Salmonella spp, Shigella spp, Campylobacter jejuni, Escherichia coli* and for fungi: *Aspergillus niger, Aspergillus flavus*, *Ochrocosis gallopova*. In this study, *Campylobacter jejuni, Listeria monocytogene, Shigella spp, Salmonella enteritidis, Neosartoya fischeri, Escherichia coli, Aspergillus flavin, Aspergillus niger; Ochrocosis gallopova,* were predominated microorganisms isolated. *Salmonella* and *Shigella* isolated in watermelon samples in evidence that fruit is a suitable substrate for cultivation of *Salmonella* and *Shigella.*

There was decrease in the pH of the juice due to added treatment and storage time which is in accordance to (Riaz *et al*., 1988) that the storage intervals and treatment had a significant effect on acid content of juice during storage due to breakdown of pectin to pectenic acid.

Conclusion

This study revealed the possibilities of harmful microorganisms to be present in fruit juice. Though bacteria and fungi are present in the environment both of the farm and the storage places, but total prevention of microbial contamination of fruits at the farm is impossible, but it can be minimized by cleaning the fruits and adding preservatives. The sample that contains sodium benzoate and pasteurization has best preservation having preserved the juice for at least one week.

Recommendation

Fruit is said to be an essential food especially during infancy and early childhood also when one is getting old. It is nutritious and major source of vitamins and other minerals and little percentage of protein. It has been discovered that many pathogenic microorganism still grow and causes consequent spoilage which is of health hazard to the consumers. Hence, it is not enough to assume that fruit drinks are free of contaminants, so one of the fruits and the addition of preservatives that will ensure that these fruits maintained its efficacy. The best preservative method recommended is the combination of sodium benzoate and pasteurization which preserve the fruits from spoilage and prevents the growth of microorganisms which is in accordance to Riaz et al., 1988.

References

Abbo, E.S., Olurin, T., Odeyemi, G. (2006). Studies on the storage stability of soursop (Annanamuricata L.) Juice African Journal of Biotechnology 5:108-112.

Ahmad, M., Chaudlgry, M., Khan, A. (1986). Technological studico on citrus and other fruit base drinks. Nucleus, 23:41-45.

Ashuosh, D., Verma, A.K. (2000). College of bani science and flumanities. G.B.Pant University of Agriculture and Technology, Pantnegar India.

Bariyewu, R.A., Amusa, N.A., Ayoola, O.A., Babalola, O.O. (2009). Survey of the post harvest Diseases and Aflatoxin contamination of marketed pawpaw fruit (carica papaya) in South Western Nigeria. African Journal of Agricultural Reserarch, 2:178-181.

Bates, R.P., Morris, J.R, Crandell, P.G. (2001). Principles and practices of small and medium scale fruit juice processing. Food Agricultural Services, United Nation Rome.

Bracket, R.E., Splittstoessr, D.F. (2001). Fruits and vegetables, p:515.

Davidson, A. (2008). The peryuin companion to food. Peryuin Books.

Deana, M.M., Jeffry, J.S. (2007). Acid-alkaline balance: role in chronic disease and detoxification, Alternative.

Joy, P.P., Abraham, M. (2013). Pineapple research station. Kerala Agriculture University, Vazhakulan 686670, Muvatthpuzha, Emekulan, Kera, Indian.

Lund, D.B. (1975). Effect of pasteurization blanching and sterilization on nutrients. In nutritional evolution of food processing, pp:205-239.

Maji, A.A, Omale, J, Okoli, E.C. (2011). Effects of chemical treatment and pasteurization on the shelf life of kununzaki (sorghum and maize gruel). European Journal of Food Pesticides and Review, 1:61-70.

Nwachukwu, E., Otokunefor, T.V. (2002). Pathogenic potentials of Escherichia Coli isolated from rural water supplies. African Journal of Clinical Experimental microbialogy, 3:64-68.

Riaz, R.A., Ali, A., Saleem, M. (1988). Studies on the preparation and storage stability of communited kin now fruit beverages bases. Pakistan Journal of Scientific and Industrial Research, 32:574-578.

Srivastava, R.P., Sangeer, K. (2003). Fruit and vegetable preservative principle and practices: important methods for analysis of fruits? Vegetables and their products. International Book Distribution Co., Lucknow, India, p:363.

USDA. (2010). Nutri-national values for orange juice and recommendations for adult. United States Department of Agriculture, USA.

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