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Development and Quality Evaluation of Sweet Potato Jam Blended with *Cucumis Sativus* and *Beta Vulgaris*

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Abstract: - Jam is a thick sweet food that is made by cooking fruit pulp with a large amount of sugar, pectin and citric acid. It should contain 60% or more TSS and at least 40% pulp. Sweet potato *(Ipomoea batatus*) is a good source of vitamins, minerals and dietry fibers. It belongs to the family *Convolvulaceae.* Cucumber *(Cucumis sativus L.*) is one of a widely cultivated vegetables and used by every class of people in day to day life. It belongs to the family *Cucurbitaceae*. It helps to promote health and cure many diseases. Beetroot (*Beta vulgaris*) is a traditional and popular vegetable in many parts of the world. It may be used as a coloring agents in bakery and confectionery products. The present study was carried out with the objective to prepare jam by incorporating sweet potato, cucumber and carrot and to access the acceptability and nutritive value of products prepared. It showed a positive result in terms of nutrient content, taste, color and appearance and shows considerable change in physiochemical properties.

Key Words: — ***Sweet potato, Cucumber, Beetroot, Jam, pulp.***

I. INTRODUCTION

The Jam is a semi-solid food product made by boiling fruit or vegetable pulp with sufficient sugar, citric acid and pectin. It should contain 60% or more TSS and at least 40% pulp. Jams generally have two types, the one which is developed from pulp of single fruit while the second type is prepared by blending two or more fruit pulp. Good jam has a soft consistency without distinct pieces, color, texture and good flavor [1]. Sweet potato (*Ipomoea batatus*) or American potato is a dicotyledonous plant which belongs to the family *Convolvulaceae*. It contains complex carbohydrates, simple sugars; the sweet potato glycemic index is quite high and it is unsuitable for overweight persons [2]. The outer skin of sweet potato is either white or shade of purple or red. The inner flesh is usually white or yellow. These are the good source of vitamins, dietry fibers, potassium and iron. It serves as an important protein source for many world population and it has a high nutritional value due to its abundance of phytochemicals beneficial to health. Cucumber (*Cucumis sativus L.*) is a widely cultivated vegetable and used by every class of people in day to day life. It is a nutritious and delicious vegetable of tropical part of the world. It belongs to the family *Cucurbitaceae*. The tender green pulp of cucumber is used as salad, pickles, jam and known as super food in recent days. It is rich in carbohydrates, proteins, fibers, vitamins mainly A, B1, B2, B6, C, D, E and minerals like Na, K, Ca, Cu, Fe, Ze [3]. It helps to promote health and cure diseases. It's flesh fruit is rich source of moisture and it can be used for preparing squash, jam and jelly. Beetroot (*Beta vulgaris*) is a traditional and popular vegetable in many parts of the world. It is rich in fibre as well as sugar and has a moderate caloric value. It contains bio active constituents, antioxidants including carotenoids, betalins, phenolic compounds and goodness of other nutrients. It may be used as a coloring agents in cakes, biscuits and other preparation to enhance its asthetic appeal and give valuable nutrients [4]. Citric acid is added in the form of preservative in jams in order to prevent the microbial growth [5]. In the present project, lemon is used in jam preparation instead of citric acid. The sweet potato, cucumber and beetroot jam are enriched in carbohydrates, vitamin A and as well as Potassium and iron. So this blended jam will have more nutrient content and health benefits also.

II. MATERIALS AND METHODOLOGY

Sweet potato, cucumber and beetroot were purchased from local market and were taken to the laboratory for processing. The present investigation was undertaken at Department of Food technology, JCT college of engineering and technology, Coimbatore.

A. Preparation of Sweet potato pulp:

Sweet potatoes were collected from the local market. They are washed thoroughly in tap water, cut into pieces and blanched by using hot water. After blanching, the outer skin was removed. The obtained fruit pulp was grinded in food processor.

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Table.1. Nutritional Content of *Ipomoea Batatus* (Sweet Potato) 100g. [6]

Nutrients	Energy
Proteins	2.21g
Energy	**105 Kal**
Water	73.27%
Starch	14.38
Total sugar	3.41%
Glucose	0.55
Cellulose	1.11%

Fig.1. Sweet potato

Table.2. Nutritional content of Beta vulgaris (100g)[7]

Nutrients	Energy
Carbohydrates	9.52g
Water	87.3g
Protein	1.66g
Fat	0.13g
Fibers	2.7g
Energy	44Kcal
Sodium	77mg
Potassium	322mg
Calcium	16mg
Phosphate	39mg
Zinc	0.34mg
Iron	0.8 mg
Vitamin A	360U
Vitamin B2	0.040mg
Vitamin B6	0.066mg
Vitamin E	0.300mg
Vitamin C	4.8mg
Niacin	0.331mg

B. Preparation of Beetroot pulp:

Beetroots were washed and the unwanted portions were removed. Then they were blanched in hot water. After blanching, obtained pulp was grinded in food processor.

Fig.2. Beetroot

C. Preparation of Cucumber pulp:

Fresh cucumber was purchased from the local market. They were washed using distilled water and then blanched. Finally, the pulp was made by grinding cucumbers in food processor.

Fig.3. Fresh Cucumber

Fig.4. Cucumber pulp

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Table.3. Standardized Incorporated Ratio of Preparing Jam (For 1kg)

S.no	Ingredients	Quantity (gm)
1	Sweet potato pulp	700gm
2	Beetroot pulp	150gm
3	Cucumber pulp	150gm
4	Sugar	530gm
5	Lemon juice	3ml
6	Pectin	1 gm
7	Essence	2-3 drops

D. Flow chart for making jam:

SELECTION OF VEGETABLES
(Sweet potato, cucumber, beetroot)

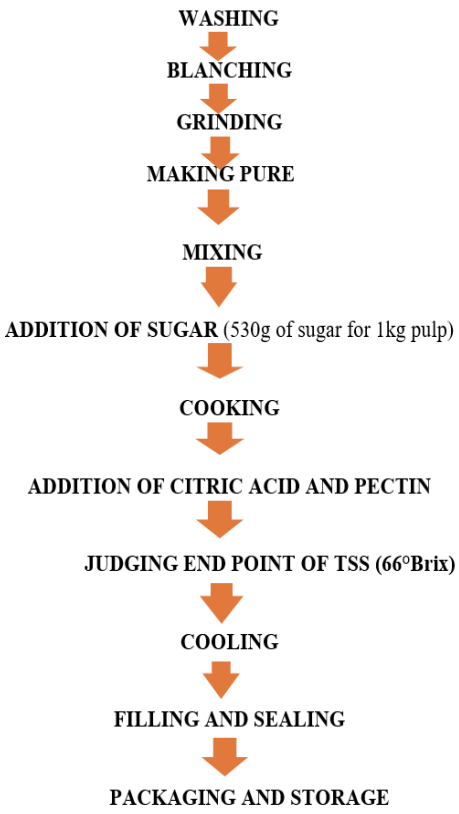

Table.4. Various concentrations ratio of pulp

Components	T1 sample	T2 sample	T3 sample
Sweet potato pulp%	50	25	25
Beetroot pulp%	25	50	25
Cucumber pulp%	25	25	50

E. Sensory evaluation:

The sensory evaluation study was carried out by evaluating five major sensory attributes such as texture, flavor, taste, color and appearance using 9point hedonic scale.

III. ANALYSIS

A. Biochemical analysis:

- The pH, soluble solids and sugar contents were determined using the AOAC method [9].
- The method proposed by water house was used to evaluate the phenolic content of the prepared jam [10].
- 25 grams of prepared jam are mixed with 225ml of 0.1% peptone water and serial dilutions were made. From each dilution 0.1ml was taken and transferred into petri dishes containing Dichloran Rose Bengal Chloramphenicol (DRPC). then the dishes were incubated at 25 degrees Celsius for 5 - 8 days. Then the colony forming units were determined.

B. Shelf life study:

The prepared jam was packed and sealed in polyethylene pouches. The changes in water activity, sensory attributes such as texture, color, appearance, flavor and overall acceptance were evaluated at an interval of one month upto 6 months.

IV. RESULTS AND DISCUSSIONS

The sweet potato jam blended with beetroot and cucumbers showed enhanced nutrient content, color, texture and flavor.

Fig.5. Prepared jam

Table.5. Sensory evaluation of prepared jam

Samples	T1	T2	T3
Appearance	7.2	7.5	7.6
Taste	7.4	7.4	7.9
Color	7.2	7.4	7.9
Flavor	7.3	7.2	8.3
Texture	7.2	6.6	8.2
Overall acceptability	7.2	7.0	8.0

The nutritional content of the prepared jam was determined using different methods and the results are shown in Table 6. T3 sample is more acceptable for hedonic scale rating. After the gaining, highest rating sample is estimate the nutrition value of jam. The beetroot is added because increase the nutritional value of jam and also increase the color of the product.

Table.6. Chemical composition of prepared jam

Parameters	Results
Moisture	24%
Acidity	0.4%
Total sugar	49.88g
TSS	66°Brix

V. CONCLUSION

The sweet potato, beetroot, cucumber mixed jam shows considerable changes in nutritional and physiochemical properties. The production of this jam is an attractive way for processing this sweet potato, beetroot and cucumber. This jam was developed by using no artificial preservatives. It's sensory attributes such as texture, color, appearance and flavor was analyzed and it is overall being acceptedd. Thus, a nutritious jam was prepared by blending sweet potato, beetroot and cucumber which was sensorial accepted with good quality also.

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