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Research Article

Formulation and Evaluation of Nutritionally Enriched Vegetables Jam

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Abstract

The present study was carried out with the objective to prepare nutritionally enriched mixed vegetables jam by incorporation of various nutritive vegetables (Sweet potato, carrot, beetroot, potato, peas, bottle gourd) and to assess the acceptability and nutritive value of the products prepared. In market fruits jam and vegetable jam prepared from one or two vegetables are available but we have prepared jam from various vegetables to increase nutitive benefits. Jam is prepared from vegetables pulp by boiling with sufficient quantity of jaggery to a moderately thick consistency. The prepared mixed vegetable jam evaluated by performing physicochemical test such as pH (5.28), ash content (1%), moisture Content (2.9%), Spread ability (good), sensory evaluation test, color, odour, texture, taste, and identification test of carbohydrate, proteins, minerals. The jam has been prepared with no added sugar in it so it is diabetic friendly too.. Jam can be consumed by people of all age and childrens who don't like to eat vegetables they can be consumed. Our jam is totally organic we have to prepared from vegetables, cardamom and nutmeg as favouring agent, lemon as preservative and pectin (apple based) as gelling agent.

Keywords: Nutraceuticals; Nutritionally Enriched Vegetables Jam; Physicochemical Property; Sensory Evaluation

Introduction

Nutraceutical is food or part of a food that gives clinical or medical advantages, including the counteraction or potentially therapy of an infection.

Jam can be characterized as a transitional dampness food plan by cooking sugar with natural product mash, pectin, corrosive and different fixings to a reasonably consistency.

Great jam has a delicate even consistency without particular bits of organic product, a brilliant variety, great flavor and a semi-solidified surface that is not difficult to spread however has no free fluid. Natural products are significant food varieties with magnificent dietary and practical properties. Populaces that consumes diet wealthy in products of the soil have essentially lower paces of many kinds of tumors. Jams are profoundly enjoyed and nutritious food varieties in human eating regimen. Jam is made by bubbling of vegetables puree with adequate sugar sensibly thick consistency [7].

Bottle Gourd (*Lageneria Siceraria*) having a place with family cucurbitaceae is plentiful in minerals like calcium, phosphorous and furthermore have great wellspring of dietary filaments. It has activity in the avoidance and control of the sicknesses like heartburn, ulcers, stress, wretchedness and untimely turning gray of hairs. Despite this container gourd is additionally go about as

solution for illnesses like craziness, epilepsy and apprehensive problems and fiber present in it supportive in decrease of coronary heart sicknesses and diabetic event.

Pea (*Pisum sativum*) having a place with family Fabaceae. Pea seeds are phenomenal wellsprings of protein, dietary fiber, and mineral supplements. Utilization of heartbeats, including peas, can assist with diminishing gamble of malignant growth and cardiovascular illness. Moreover, remembering peas for the eating regimen can assist with overseeing diabetes by managing blood glucose [10].

Beetroot (*Beta vulgaris*) having a place with family Amaranthaceae is one of the vegetables in planning of vegetable predicament because of its normal profound rosy purple tone. This extreme red tone is fundamentally gotten from betalinin that is utilized as a characteristic colorant in food industry. Betalinin is a decent wellspring of cell reinforcement and mitigating specialist. Beetroot juice is a rich wellspring of potassium, magnesium, folic corrosive. Iron, zinc, calcium, phosphorus, sodium. Niacin, biotin, B6, and dissolvable fiber. Successful wholesome and way of life mediations are keys to forestall hypertension and related cardiovascular complexities [6].

Yam (*Ipomoea batatas*) has a place with the group of convolvulaceae. The nutritive worth of the yam is for the most part in it is starch content. It is likewise contains some free sugar, favorable to vitamin A, carotenoids is beta carotene, L-ascorbic acid, vitamin E as well as dietary fiber, potassium, and iron, and they are low in fat and cholesterol [3].

Carrot is a root vegetable it has a place with Apiaceae family gives fundamental bioactive constituents like carotenoids, anthocynins and other phenolic compounds, dietary vitamin An admission through alpha and beta carotene, B nutrients including thiamin, riboflavin, niacin, pantothenic corrosive, folate and vitamin B6 are found in carrot in calculable amounts when contrasted and other usually consume vegetables [6].

Potato, (*Solanum tuberosum*), having a place with solanaceae. Annual plant in the nightshade family (Solanaceae), developed for its dull eatable tubers. slight extent of starch is impervious to enzymatic debasement in the stomach and small digestive system, and hence makes comparative physiological impacts and medical advantages for the microbiota as dietary fiber. Potatoes contain a limited quantity of protein, fundamental amino acids lysine, L-ascorbic acid and B6, follow sums (thiamin, riboflavin, folate, and niacin). Dietary fiber is tracked down in potatoes in a measure of 0.5 to 2%, a big part of which is found in the tissue.

Citrus extract, (*Citrus limonis*) having a place with family Rutaceae is utilized as normal additive utilized in dilemma definition.

Pectin is a significant polysaccharide with applications in food sources, Drugs, and various different businesses. In nature, it capabilities as the underlying “concrete” that helps hold cell walls together. In arrangement, gelatin can frame a cross section that traps fluid, sets as it cools, and, for the situation of predicament, supports suspended bits of natural product. Gelatin needs accomplices, specifically corrosive and sugar, to finish the work of gelling appropriately [7].

Cardamom Seasoning Specialist is utilized in dishes from one side of the planet to the other. This multipurpose food enhancing can be utilized in different desserts and beverages. It contains a sweet and tasty flavor that preferences astounding when utilized in treats and pastries [1].

Nutmeg (*Myristica fragrans*) has been utilized as a characteristic enhancing specialist and as a scent in the corrective enterprises. Various wellbeing experts prescribe supplanting sugar with jaggery to get more prominent dietary benefits from a sugar. That are expected for sustenance and which are fundamental for wellbeing. Bottle gourd is plentiful in minerals like calcium, phosphorous and furthermore have great wellspring of dietary filaments. As of late, the fixation on bottle gourd has been expanding as a nourishing component/wellbeing supplement in the eating regimen due its activity in the counteraction and control of the illnesses like heartburn, ulcers, stress, discouragement and untimely turning gray of hairs.

Potato, (*Solanum tuberosum*), yearly plant in the nightshade family (Solanaceae), developed for its dull palatable tubers. slight extent of starch is impervious to enzymatic debasement in the stomach and small digestive tract, and thusly makes comparable

physiological impacts and medical advantages for the microbiota as dietary fiber Potatoes contain a modest quantity of protein, however its natural worth is high because of the presence of fundamental amino acids, for example, lysine and metabolites that can build its use. Potatoes contribute impressive measures of nutrients C and B6, and follow sums (thiamin, riboflavin, folate, and niacin). Dietary fiber is tracked down in potatoes in a measure of 0.5 to 2%, a big part of which is found in the tissue.

Citrus extract is crucial for precise equilibrium, which is expected in predicament and jams arrangement. Lemon and lime juices have more prominent measure of citrus extract. pectin, (got from apple) having a place with family Rosactar is a significant polysaccharide with applications in food varieties, Drugs, and various different businesses. It has gelling property [10].

Cardamom (*Gerera eletharia*) having a place with family Zingiberaceae and Nutmeg (Myristica scent) having a place with family Myristicaceae is utilized as enhancing specialist in dishes from one side of the planet to the other [1].

Jaggery (*Saccharum officinarum*) having a place with family Graminae is utilized as sugar in dilemma definition, which increment energy level and has cell reinforcement property [2].

Objective

- To study health benefits of nutritionally enriched vegetables jam.
- To formulate nutritionally enriched vegetables jam.
- To carry out evaluation test for nutritionally enriched vegetables jam.
- To study Stability of nutritionally enriched vegetables jam.

Material and Methods

Mixed vegetable jam has been prepared with no added sugar in it. Jam can be consumed by people of all age and because of its sugar free nature it is diabetic friendly too.

Materials

Selection of vegetables and other ingredients

- It is well believed that vegetables are rich in fibres, vitamin, protein, Fats, antioxidants means vegetables have nutritional value.
- Fresh, mature undamaged vegetables was purchased from the local market of Osmanabad.
- Vegetables such as Sweet potato, Bottle guard, Beet root, Pea, Carrot and Potato are used.
- Other ingredients includes pectin, jiggery, cardamom, nutmeg and lemon.

Calculation of ingredients

Sr. No.	Ingredients	Quantity (1 kg)
1.	Sweet Potato	100gm
2.	Carrot	100gm
3.	Potato	75gm
4.	Bottle Gourd	100gm
5.	Pea	75gm
6.	Beetroot	100gm
7.	Pectin	1gm
8.	Citric Acid	1gm
9.	Jaggery	450gm
10.	Cardamom	q.s
11.	Nutmeg	q.s

Table 1: Formula of vegetables Jam for 1 kg.

Equipment

Sr. No	Instruments/Equipment	Model Name
1.	Hot air oven	BIO TECHNICS INDIA
2.	Muffle furnace	SUNRAY
3.	Uv visible spectrophotometer	BioEra
4.	PH meter	EQUIP-TRONICS
5.	Weighing Balance	BioEra
6.	Burette	BOROSIL
7.	Beaker	DOLPHIN
8.	Stirrer	BOROSIL
9.	Test tube	DOLPHIN
10	Pipette	BOROSIL

Table 2: List of instruments/equipment used for jam formulation.

Methods

Procedure for preparation of jam

Procedure for preparation of nutritionally enriched vegetables jam.

It has been carried out as follows:-

Raw vegetables
↓
Washing and peeling
↓
Balancing
↓
Cutting and boiled in pressure cooker
↓
After boiling excess water removed by straining
↓
Grind in a mixer
↓
Passing through sieve to form homogeneous consistency
↓
Boiled in nonstick pan to evaporate excess moisture
↓
Add required quantity of jaggery until jam like consistency is achieved
↓
By adding Cardamom and nutmeg powder turn off the gas
↓
After cooling add citric acid and Pectin
↓
Prepared jam can be stored in sterilized jar / bottle.

Figure 1: Jam formulation.

Evaluation test carried out for nutritionally enriched vegetables jam

Physical evaluation

Physical parameters such as colour, appearance, and consistency were checked.

- Colour- Reddish brown
- Odour- Sweety
- Taste- Sweet and Good
- Consistency- Coarser and thicker

Figure 2: Jam.

Spreadability:

Spreadability of Jam was measured with glass slide apparatus, excess of gel was placed between two slides and 1kg weight was placed on slide for 5 min to compress the sample to uniform thickness, time in seconds to separate two slides was taken as measure of Spreadability.

S= wl/t

Where,

S = spreadability (g cm/sec)

W = weight on upper slide (g)

l = length of slide (cm)

t = time taken in sec

Figure 3: Spreadability Test of Jam.

Homogenecity

The prepared Jam was tested for homogeneity by visual inspection after the Jam have been set in the container spread on glass slide, for the appearance, tested for the presence of any lumps, flocculates or aggregates. The prepared jam is homogenous, because jam pulp passed through fine mesh sieve.

pH

The pH of the prepared Jam in distilled water (10% v/v) was evaluated by pH meter. pH was found to be 5.5 to 6.

Figure 4: pH Test of Jam.

Moisture content

Moisture content is determined by drying the weighed sample to a constant weight in hot air oven and measuring the loss in weight to express the moisture content in percent.

Moisture content of Jam = 2.9%

Ash content

A crucible was pre-heated in a muffle furnace at 500°C, cooled in desiccator and weighed. 2 g of the sample was transferred into the crucible and weighed. The crucible and its content were kept in the muffle furnace at 525°C until white ash was obtained after twelve

Hours. The organic matter content was calculated.

Ash content= 1%

Figure 5: Ash content Test of Jam.

Determination of ʎmax

The extent to which a sample absorbs light depends upon the wavelength of light. The wavelength at which a substance shows maximum absorbance is called absorption maximum or ʎmax.

Procedure for determination of ʎmax

Weigh accurately 100 mg if jam in sufficient quantity of distilled water and make up volume up to 100 ml with distilled water. From above solution pipette out 4 ml solution and make up the volume up to 100 ml which will be 40 µg/ml solution. Switch on colorimeter and get stabilise for 15-20 min. Calibrate it with distilled water. Then measure the absorbance of solution at different wavelengths. Find out ʎ max. When the maximum- absorbance found report the result.

The maximum absorbance of jam formulation was found to be 1.74 at wavelength 500 nm.

Sr. No.	ʎmax (nm)	Absorbance
	400	1.23
	420	1.35
	470	1.53
	500	1.74
	530	1.48
	620	0.29
	660	0.27
	700	0.244

Table 3: Determination of ʎmax of Jam.

Identification test

Identification tests for anions, cations, carbohydrate, protein and minerals are done to check their presence.

Sr. No	Test	Present/Absent
	Carbohydrate	Present
	Protein	Present
	Sodium	Present
	Potassium	Present
	Iodide	Absent
	Citrate	Present
	Ammonia	Absent
	Calcium	Present
	Chloride	Absent
	Zinc	Present

Table 4: Identification test for different essential element in jam.

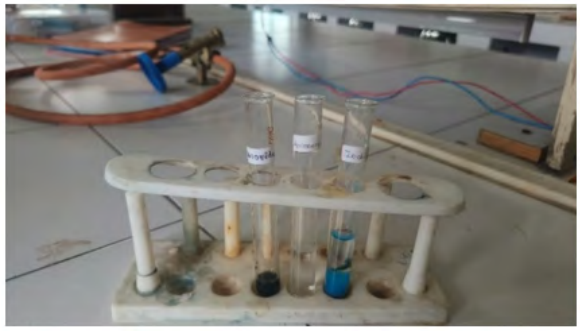

Figure 6: Identification test for different essential element in jam.

Stability test

Stability test of Jam samples for moisture content, ash content, pH and colour, odour, taste were tested for a period 1 month by keeping intervals of 5 days under room temperature.

Result

The nutritionally enriched vegetables jam was prepared from various vegetables and evaluation test such as sensory evaluation, spreadability, pH, moisture content, ash content, ʎ max has been carried out. The result of evaluation test obtained as required. This are as follows.

Discussion

The present work formulation and evaluation of neutritionally enriched jam was aimed to formulate a jam using vegetables which

Days (1 month)	Moisture Content	Ash Content	pH	Colour	Taste	Odour
0	2.9	1%	5.28	Reddish brown	Sweet	No Change
5	2.9	0.99%	5.28	Reddish brown	Sweet	No Change
10	2.88	1%	5.29	Reddish brown	Sweet	No Change
15	2.85	0.98%	5.30	Reddish brown	Sweet	No Change
20	2.81	0.97%	5.31	Reddish brown	Sweet	No Change
25	2.72	0.99%	5.33	Reddish brown	Sweet	No Change
30	2.69	1%	5.33	Just dark Reddish brown	Sweet	No Change

Table 5: Stability Test of Jam formulation for 1 month.

Sr. No	Evaluation Tests	Result Obtained
	Colour	Reddish brown
	Odour	Characteristics
	Taste	Sweet and characteristics
	Consistency	Coarser and thicker
	Spreadability	Good
	Homogenecity	Homogenous
	pH	5.28
	Moisture content	2.9%
	Ash content	1%
	ʎ max	500 nm

Table 6: Result of total evaluation of jam.

comes under the category of netraceuticals. The Vegetables used are potato, sweet potato, carrot, bottel gourd, pea, beetroot.

Other ingredients such as pectin is used as jelling agent, citric acid is used as preservative, jaggery is used as sweetening agent and cardamom and nutmeg are used as flavouring agents. The vegetables used are rich in carbohydrates, proteins, and minerals. The formulated jam has been evaluated by general test of evaluation such as physical examination, spreadability, homogeneity, pH, moisture content, ash content, ʎmax. All these test shows results in acceptable range so the formulated jam is safe to use and does not causes any side effects. The jam shows goods spreadability property so it can be easily spread.

All vegetables used are neutritionally enriched so the combination of these vegetables in the formulation of jam shows good nutrition. Due to the sweet test this can be eaten by children's also who don't like to eat vegetables.

It also consume by the diabetic patients, it is sugar free jam made from jaggery.

Conclusion

Jam is defined as an intermediate moisture food prepared by cooking sugar or jaggery with vegetables pulp. Jam is highly liked and nutritious food in human diet. This jam is part of neutraceuticals which is nutritionally enriched. The term nutraceutical was coined from nutrition and pharmaceutical. Nutraceutical can be defined as a good or part of food that provides medical or health.

The jam is prepared by vegetables like Sweet potato, potato, carrot, beet root, bottle gourd, pea, and cardamom and nutmeg are used as flavouring agents and pectin used as gelling agent while Jaggery used as sweetener, lemon as preservatives. The jam has been prepared with no added sugar in it. Jam can be consumed by people of all age and because of its sugar free nature it is diabetic friendly too.

The jam evaluated as its colour, odour, taste, texture, spredability, homogenicity, pH, ash content, Moisture content, Identification test benefits including the prevention and treatment of a disease. All evaluation test was performed manually.

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