

Value Added Products from Yam (*Dioscorea* spp.)

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Abstract

Yams are believed to be originated in Asia and Africa. They are packed with a bunch of nutrients like Vitamin C, Potassium, Manganese, Copper, and Phytochemicals. The present study was aimed to provide good nutritional products using tuber vegetable Yam. Attempts were made to prepare yam payasam (YPP) and yam vadai (YVP) and subjected to different pre-treatment, and value-added products were standardized. 5 point hedonic scales were used for sensory evaluation. From the result, the present study shows the product YPP shows good quality, sensory, and consumer acceptability.

Keywords: Yam vadai, Yam payasam, Nutrients, Phytochemicals, Sensory evaluation and Hedonic scales

Introduction

Tropical tubers are known as the energy reservoirs of nature. They provide much-needed calories about 1200 million to people around the world, more specifically in developing countries in Asia and Africa (Peter, 2016). India represents an important food crop rich in starch. It is utilized as a fresh vegetable after boiling or cooking the peeled and sliced tubers (Arvind Kumar et al., 2018). Tamil Nadu produced yam in 38.76 tons in the year 2015-2016. West Bengal is the first and leading state to produce yam in 293.84 tons in the same year (National Horticultural Board, 2016). It is a tropical and subtropical crop. It requires well-distributed rainfall with humid and warm weather during the vegetative phase and cool and dry weather during the crop development period (TNAU, 2016). Arginine is the amino acid present in yam (Shih-Chuan Liu et al., 2015).

India's population is estimated at 1.273 billion in 2020, with a small marginal portion of uncertainty. The work force in crop production had declined to 54 percent by the beginning of this century and was lower in many states, which have diversified agriculture. For each possible crop set in each region using potential crop yield and cost of cultivation data for each crop value added in agriculture can be worked out (Yoginder, 2014).

Vegetables are an important part of everyone's life and also as a part of Indian cuisine (Prasad et al., 2017). Vegetables are the store house of carotene, riboflavin, folic acid, vitamin C, and calcium. Vegetables also supply water and roughage to the body (Raheena Begum, 2006). Based on the nutritive evaluation studies on the wild edible yams consumed by the tribals Kanikkars and Palliyars, it can be summarized that most of them were found to be a good source of protein, lipid, crude fiber, starch, vitamins and minerals

(Shajeela et al., 2011). Yams are good sources of vitamin c, which is vital in fighting infections such as cold and flu and quick healing (Beatrice Nabibuka, 2018). Tubers have an immense potential as functional foods and nutraceutical ingredients to be explored in disease risk reduction and wellness (Anoma Chandrasekhar and Thamilini Joseph Kumar, 2016).

Yam contains antioxidants, and these antioxidants may help to reduce inflammation (Cheri Bantilan, 2019). Yams are rich in diosgenin, which is a special compound that is known for improving neuron growth and overall brain health. The roots of yams provide a beneficial fiber known as glucomannan, which is thought to help with weight loss. (<https://www.conserve-energy-future.com>).

Value addition in yams could be helpful to promote consumer preferences enabling the producers to increase their income (SurajitMitra and Tarafdar, 2012). In light of the above facts realizing the importance of yam, the study was undertaken with the following objects:

- To prepare value-added products like payasam and vadai from Yam (*Dioscorea* spp.)
- To assess the sensory evaluation of the prepared product.
- To know the shelf life, storage quality of the prepared product under room temperature.
- To know the shelf life, storage quality of the prepared product under refrigeration temperature.

Methodology

Selection of the Samples

The samples were collected from the Palayamkottai market in Tirunelveli. Other ingredients like jaggery, milk, ghee, cardamom, nuts, raisins oils, onion, and green chilies were purchased from a local super market named Ananda near Tirunelveli for research purpose. The samples have been collected as per the requirement and stored in refrigeration for future use. It was collected during the month of December 2017

Pretreatment Employed

Washing is one of the simplest food processing operations that you can carry out, but one of the most important. Fruit and vegetables should be washed to

remove surface dust and dirt and any bacteria that may be contaminating the outer skin. Only clean, chlorinated water should be used for washing (Susan Azam Ali and Cherlotte Dufour, 2018).

The sample, after collecting thoroughly washed in running water 2-3 times. The samples were cleaned to remove the stones and dust particles. Then it was shade dried, and with careful attention, the samples were packed in polyethylene bags and stored in refrigeration for further analysis.

Material Used

Electronic Weighing Balance: The electronic weighing balance of the AY-220 model was used to weigh the samples in terms of grams and milligrams.

Refrigerator: Refrigerator (Kelvinator) with a temperature range of 6-200C was used to store the samples.

Mixer: A mixer model of 2k-458 was used to grind the samples for separation.

Strainer: Stainless steel strainer was used for the extraction of the sample

Formulation of the Product

Preparation of Yam Payasam

Fig. 1: Investigator Preparing Yam Payasam



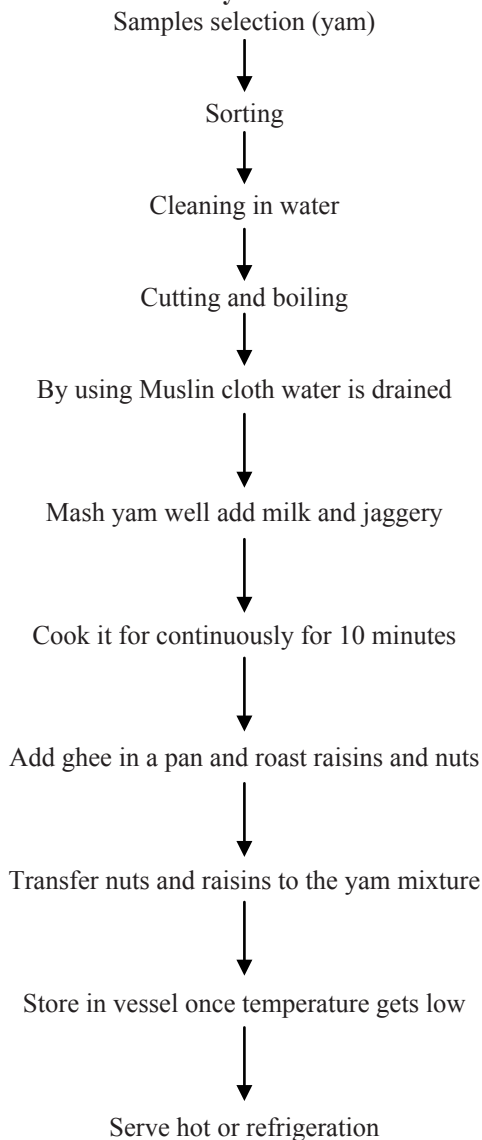
Table 1: Ingredients used for making Yam Payasam

S. No	Ingredients used	Amount
1	Yam	100 g
2	Jaggery	125 g
3	Milk	50 ml
4	Ghee	40 g

5	Cardamon	05 g
6	Nuts	10 g
7	Raisins	10 g

Yam Payasam was prepared from 100g of Yam, 125g of Jaggery, 50ml of Milk, 40g of Ghee, 05g of Cardamon, 10g of Nuts, and 10g of Raisins. The methodology for preparing Yam Payasam is given below in flow chart no 1.

Flow Chart 1: Methodology for Preparing Yam Payasam



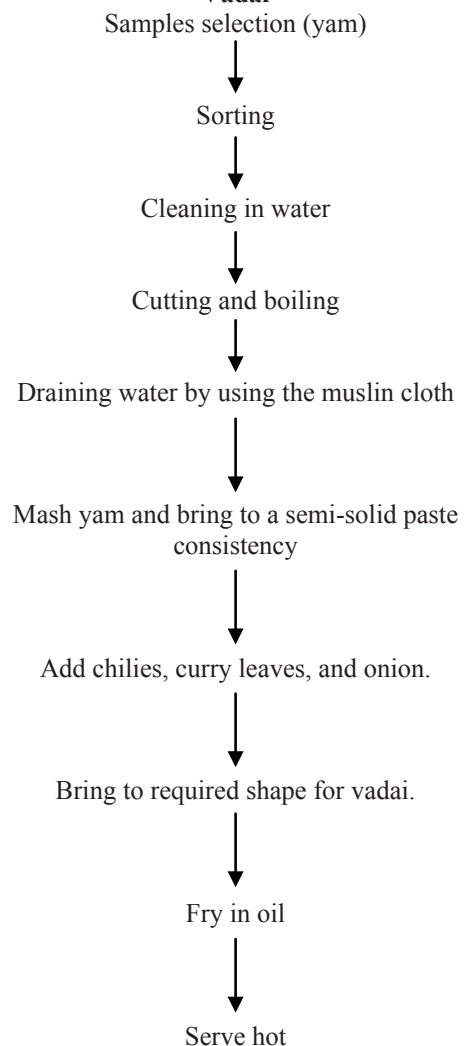
Preparation of Yam Vadai

Table 2: Ingredients used for making Yam Vadai

S. No	Ingredients used	Amount
1	Yam	100 g
2	Onion	50 g
3	Green Chilies	10 g
4	Oil	100 ml
5	Curry Leaves	10 g

Yam vadai was prepared from 100g of yam, Onion 50 g, 10g of chilies, 100 ml of Oil, and 10g of curry leaves. The methodology for preparing yam vadai is given below in flow chart no 2.

Flow Chart 2: Methodology for Preparing Yam Vadai



Sensory Evaluation



Fig. 2: Sensory Panel Evaluation

The prepared products were subjected to 06 trained panel members for a point five hedonic rating scale, and results were recorded.

Shelf Life Study

Every product must possess a good shelf life study. For this, the prepared products were carefully observed in refrigerated and in room temperature for about one week

Statistical Analysis

Each sample must be subjected to statistical values; here standard deviation is carried out.

Results and Discussion

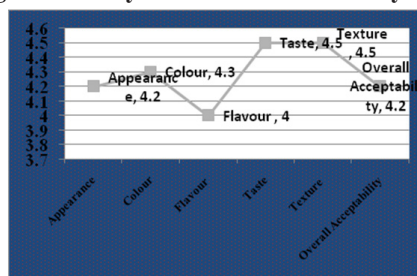
Sensory Evaluation of Prepared Yam Payasam and Yam Vadai

Sensory evaluation is a scientific method that evokes, measures, analyses, and interprets responses to products as perceived through the senses of sight, smell, touch, taste, and sound (Stone and Sidel, 2004). The methods used to measure these attributes are known as sensory or organoleptic tests (Sumathi et al., 2003).

The formulated product was organoleptically evaluated by using the numerical card to estimate the acceptance by 06 trained panel members. The panel members were asked to evaluate the product for appearance, color, flavor, taste, texture, and overall acceptability. The formulated and standardized product yam payasam (YPP) and yam vadai (YVP) for sensory evaluation and the mean score

obtained are given below in fig no 03 and fig no 04, respectively.

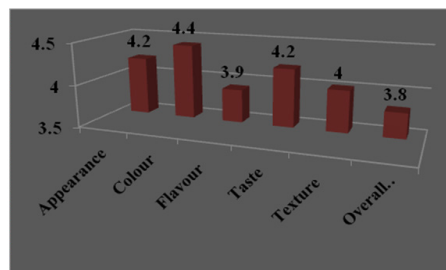
Fig. 3: Sensory evaluation of Yam Payasam



SD = 0.177169; Mean = 4.28333

From fig no 3, it was concluded that the overall acceptability scored was 4.2 while for color it obtained a value of 4.3, flavor 4.0, taste 4.5, texture, 4.5, and the last values 4.2 goes to appearance with a standard deviation value of 0.177169 and a mean value of 4.28333.

Fig. 4: Sensory evaluation of Yam Vadai



SD = 0.20344; Mean = 4.0833

From fig no 4, it was concluded that the overall acceptability scored was 3.8 while for color it obtained a value of 4.4, flavor 3.9, taste 4.2, texture, 4.0, and for appearance 4.2 with a standard deviation value of 0.20344 and a mean value of 4.0833

Shelf Life Study

Shelf life is the determination of how long a product will hold its quality as perceived by customers. The shelf life of a product is important when considering distribution channels. Shelf life can be determined through the use of accelerated or real-time testing (Fadi Aramouni and Kathryn Deschenes, 2015). Samples should be transported and stored at the correct temperature and humidity. Records should be kept of fridge and freezer temperatures (Sarah E. Kemp et al., 2009).

Prepared yam payasam and yam vadai were stored in refrigeration and normal room temperature to assess their storage pattern. Care was taken to see that the jars were stored in a clean, dry place where sunlight does not enter. Every day the containers were checked to see any microbial growth and the development of off-flavor. Prepared products were kept for one week to find out the production of gases. The selected products were stored in airtight plastic containers for analyzing various parameters.

Table 3: Shelf-life study of the Yam Payasam (YPP)

S. No	Days	Refrigeration Temperature	Room Temperature
1	1 st day	No Change	No change
2	2 nd day	No Change	Change in Taste, Appearance, Flavor, Texture, and Off Flavor Developed
3	3 rd day	No Change	
4	4 th day	No Change	
5	5 th day	No Change	
6	6 th day	No Change	
7	7 th day	No Change	

Concerning table no 3, there were no changes in appearance, flavor, taste, texture as described in the table under refrigeration temperature from day 1 to day 7. This may be due to the amount of jaggery used, which acts as a preserving agent. Regarding room temperature storage, no change is observed on the 1st day, but from the 2nd day to 7th-day change in taste, appearance, flavor, texture, and off-flavor developed.

Yams have a unique taste too. Compared to sweet potatoes, yams are less sweet and much starchier and dry. They also tend to have a good shelf life. However, certain varieties store better than others. (Mary Jane Brown, 2017). Tuber crops have a prominent role in feeding the world, and these crops are going to be an important component in food security systems in the coming decades (Parvathi et al., 2016)

Table 4: Shelf-life study of the Yam Vadai (YVP)

S. No	Days	Refrigeration Temperature	Room Temperature
1	1 st day	No Change	Change in Taste, Appearance, Flavor, Texture, and Off Flavor Developed
2	2 nd day	No Change	
3	3 rd day	No Change	
4	4 th day	No Change	
5	5 th day	Change in Colour	
6	6 th day	Change in Flavor	
7	7 th day	Change in Taste	

According to the table no 4, there were no changes in appearance, flavor, taste, texture as described in the table till the 4th day, but from the 5th-day change in color, 6th-day change in flavor, and 7th-day change in taste observed. Regarding room temperature storage on the 1st day itself, the product showed changes in taste, appearance, flavor, texture, and off-flavor developed.

Conclusion

It is concluded that since commercial foods are prepared from food additives, they lack phytonutrients, so added sugars and preservatives serve as food sources for alleviating disease. Keeping this in mind, a trial is made formulating foods prepared from yam. Many studies revealed that the samples have no side effects, so considering this statement, the present study was undertaken. The study highlighted the fact that certain value-added products can be prepared from yam. This prepared product can be used for children since any type of preservatives, or artificial additive is not added. The prepared product has over all acceptability of a good score.

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