

Value Addition of Horticultural Crops

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Abstract

Value added refers to the additional value created with a product to extend its shelf life of products Value- addition in agricultural products is the process done on the various farm products to reap the benefits of providing a processed form of the raw commodity. It is also a process of increasing the economic value and consumer appeal of a commodity. Value added products have the potential to create community economic development opportunities. The exponential increase of world's population and the trend towards the utilization of eco-friendly and viable agricultural by products creates a steady platform for the continuation of innovation.

Papaya is expected to minimize losses and support food diversification programme. This research was divided into three steps namely formula optimization using statistical design techniques, process optimization using response surface methodology, and final product and microbial analysis Beside available traditional food products, it could be utilized in development of fast moving consumer food like RTS (Ready to Serve) beverage. However, Consumer trend towards papaya products emphasize the need of its value enhancement with fortification of novel ingredients to promote it as a high valued product. Bitter gourd is one of the major vegetable crops, which belongs to the family Cucurbitaceous. It is used not only as a food but also as medicine. Bitter gourd is rich in many valuable compounds and nutrients. It is useful for diabetics' patients. The present study aimed to develop special pickle for diabetic patient to increase the bitter gourd pickle were prepared by different way. Dragon fruit to standardize the process for preparation of dragon fruit jelly.

Keywords: Value addition of Fruit and Vegetable Papaya, Mango, bitter gourd, Dragon fruit Anola

Introduction

Value addition is the “Process of changing or transforming a product from its original state to a more valuable state”. The benefits of value-added products include providing better nutrition to children and mothers; greater income for producers; access to new markets; and new processes to improve packaging and storage to reduce waste and ensure greater food safety. Value addition in agriculture is needed for the profitability of the farmers, to empower the farmers and weaker sections of the society, to provide safe, quality and branded food to the consumers, to reduce post-harvest losses, reduction in import and increasing exports, encourage the growth of subsidiary industries. Value added product can be any product that has been the subject of additional actions or combined with additional products to increase the overall value of the product value added products are an important aspect of the agricultural sector. Value addition in agriculture is needed for the profitability of the farmers, to empower the farmers and weaker sections of the society to provide safe, quality and branded food to the consumers to reduce post-harvest losses, reduction in import and increasing exports, encourage the growth and subsidiary industry. (Vishal Tripathi *et al.* 2022)

Jams are usually made from pulp and juice of fruit, combination of several fruits and the combination with vegetables. Berries and other small fruits are most frequently used, though larger fruits such as papaya, apricots, peaches, or plums cut into small pieces or crushed are also used for jams. The combination of high acidity (pH around 3.0) and high sugar content (68-72%) prevents mould growth after opening the jar. Good jam has a soft, even consistency without distinct pieces of fruit, a bright color, a good fruit flavor and a semi-jellied texture that is easy to spread but has no free liquid. Jam gel formation occurs only within a narrow range of pH values. Optimum pH conditions are found near 3.2 for gel formation. The optimum solids range is slightly above 65%. It is possible to have gel formation at 60% solids, by increasing the pectin and acid levels. The quantity of pectin required for gel formation is dependent upon the quality of pectin components (Wasnik, *et al.* 2016)

Importance Of Value Addition

Fruits & vegetables are rich in vitamins & minerals, recognized as protective foods. One example is the power of the citrus fruit to heal scurvy, a disease widely distributed among naval personnel. They significantly contribute to human well-being because of their great nutritional content,

easy accessibility, and low cost. ICMR recommends consuming 120g of fruits and 280g of vegetables per person per day after realizing the importance of fruits and vegetables to human health. (Sudhanshu Singh *et. Al.*, 2024)

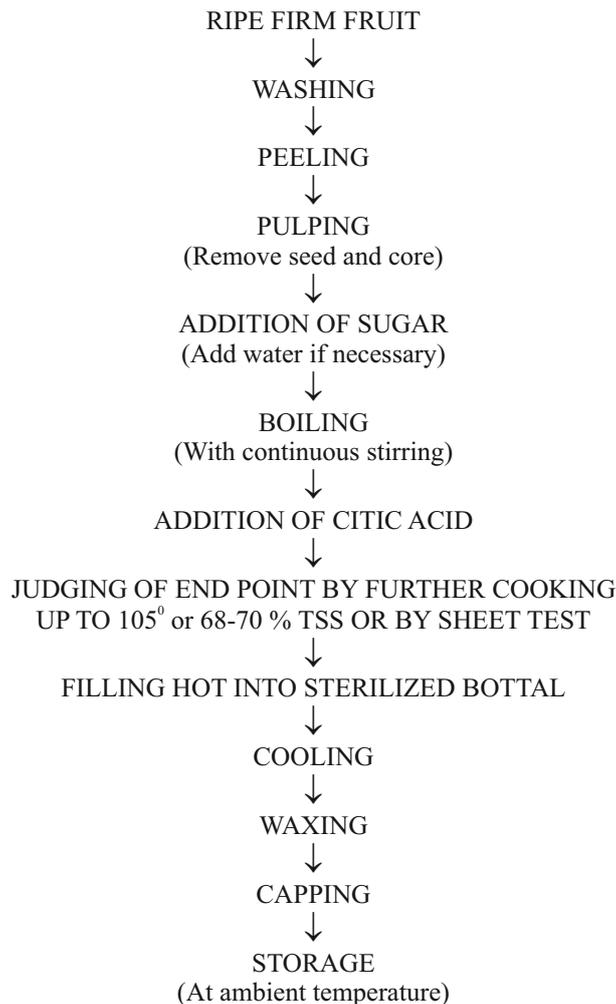
Value Addition Of Different Products Papaya Jam

Papaya and sugar was collected from local market of whereas citric acid to be added. Papaya was used as the major ingredient for the jam preparation. Fresh ripe papaya was washed thoroughly with running water to remove all the dirt. After removing the seeds, it was peeled followed by cutting in to small cubes with the help of sharp knife. Ascorbic acid, TSS, pH, protein, TS were analyzed using methods depicted in (Ranganna 1986).

Acidity and reducing sugar was calculated by (A.O.A.C 2000), whereas analysis of ash and moisture was carried out by A. O. A. C. (1975) and ISI (1984) methods respectively. Sensory analysis was done using 9 point Hedonic scale. The data was analyzed statically by using Analysis of variance at 5% level of significance. Cubes of papaya were boiled

separately for about 10 minutes (with approximately 250 ml water per 100 gm.) After boiling, the mass was blended with the help of grinder. Blended pulp was distributed into different ratio as per the treatments. The mixture of pulp was placed in the stainless steel pot with the help of ladle and then the required amount of sugar (@75%). pectin and citric acid (@0.5% each) was added to it. Small amount of water can be mixed if required. Papaya has a source of natural pectin. Addition of excess pectin results in harder jam and using more sugar can make it sticky. Sugar which binds to the water molecules frees up the pectin chains to form their gelling network. Mixture was heated and specified amount of citric acid was added while boiling itself. The mixture was heated up to 105°C (68-70% TSS) to ensure proper setting of jam. Stirring was done continuously and all the way to the bottom so as to avoid burning. Jam was heated with low flame till it reached to the end point (TSS 68%- 70%). Drop test carried out to confirm the end of cooking where a little amount of jam was taken with spoon and dropped in to the beaker containing cold water. Conjugated drop was the indication that the jam was ready (Fatima Irfan *et. al.*, 2018).

Tecnology flow-sheet for processing of Jam



(Sanjeev kumar, 2001)

Papaya Candy (*Carica Papaya L.*) Fruits

The aim of this research experiment is to develop osmotic dehydrated candy from ripe papaya by utilizing of ripe papaya for its excellent nutritional value. Value addition from ripe papaya is negligible hence it is utilized for the preparation of osmotic dehydrated product. The present study was carried out for preparation of candy from ripe papaya (*Carica papaya* Linn.) fruits cv. Taiwan Red Lady by osmosis using different treatments viz, osmosis in 500 g, 750 g and 1000 g sugar/kg pieces as well as 50°B, 60°B and 70°B TSS sugar syrup/kg pieces followed by air dehydration. The observations for physico-chemical as well as organoleptic properties of candy were studied at interval of two months up to 6 months and data were analyzed in Completely Randomized Design with four repetitions. The results revealed that the mass transfer out and mass transfer in of papaya candy were increased gradually during osmotic treatment up to four days. During storage of six months at ambient condition the acidity, carotene, moisture and ascorbic acid content of papaya candy decreased whereas, total and reducing sugars increased with the advancement of storage period. Although the sensory characters of candy exhibited a gradual decline but were acceptable up to a period of six months. The results of the study revealed that the papaya candy prepared by mixing of 1 kg syrup (50°B) per kg pieces remained shelf stable up to six months and found more acceptable on the basis of sensory scores and higher retention of physico-chemical composition. (Nilam, V. Patel et al 2021)

Preparation Of Mix Fruit Pickle Bitter Gourd

(*Momordica charantia*) belongs to family cucurbitaceous and commonly known as Karela in India it is tropical and subtropical vine of family cucurbitaceous widely grown for edible fruit which among the bitter of fruit name for the plant and its fruit include bitter melon bitter gourd. It native of tropics it is widely grown in India and other part of Indian subcontinent southeast Asia china Africa and Caribbean climate and soil requirement. Metabolic and hypoglycemic effects of bitter gourd extracts have been demonstrated in cell culture, animal, and human studies (Michael B. et al., 2006).

Chilli

(*Capsicum annum* L) belongs to the family Solanaceae, are herbaceous or semi-woody annuals or perennials. Fresh chilli is good source of vitamin A, vitamin B and vitamin C (Howard et al., 2000). The high content of carotenoids is the reason for chilli's nutritional value because it acts as pro vitamin A which after digestion is converted into vitamin A. Chilli is highly in demand throughout the year whether in household or as spices in commercial market. The reason for high demand is its varied uses in fresh as well as in cooked and dried form. Chilli is highly perishable in nature having

low shelf life and is susceptible to postharvest losses like shriveling, wilting and is also susceptible to fungal infections (Barkai Golan et al., 1981). The reduction in quality causes huge loss to farmers, wholesaler, retailer and consumer. Thus, there is need for reduction of postharvest losses and processing into value added products appears to be an important goal for sustainable development.

Pretreatment Of Bitter Gourd

Good quality bitter gourd, lemon, and green chilly were procured from local vegetable market of Bitter gourd, lemon, chilly were washed with clean water to remove soil portion. Stem portion cut down and cut into lengthwise and sprinkle salt on bitter gourd pieces and kept for two hours. Lemon and chilly cut removed seed from lemon and after two hours pressing bitter gourd pieces and removed excess salt water. (Sonwane Chandrakala et al., 2020).

Spice Mix

Good quality different spices like mustard seed, fenugreek seed, asafetida, turmeric, red chili powder, were selected from market. These spices were clean and shallow fried one by one then spices fine grounded by mixer (Sonwane Chandrakala et al., 2020).

Pickle Formulation

Pretreated raw material mixed in different proportion order to know the acceptability of from this combination. Various proportions are given (Sonwane Chandrakala et al., 2020).

Mango Pickle

Mango (*Mangifera indica* L) is the most important fruit of India and is known as "King of fruits". The fruit is cultivated in the largest area i.e., 2,312 thousand ha and the production are around 22.35 million tons and productivity are 7.3 MT/ha in India, contributing 40.48% of the total world production of mango. The main mango producing states in India are Uttar Pradesh, Andhra Pradesh, Maharashtra, Karnataka, Bihar and Gujarat. Rajasthan have highest productivity of mango in India (NHB Database 2018). World Scenario - Mango covers an area of 4,369 thousand ha with a production of 55.9 million tons. India occupies top position among mango growing countries of the world and produces 40.48% of the total world mango production. India has first rank and Indonesia and China stand second and third among mango producing countries (NHB Database 2018). Fruit is drupe, variable in form and size having thick or thin skin, leathery green, yellowish or red in colour. Unripe mango fruits due to their acidic taste are utilized for the culinary purpose as well as for the pickle preparation in India. Mango is a seasonal fruit, so quite a considerable portion of the fruits are processed for various products. Pickle is one of the oldest preserved products which is made from unripe mango. Mangoes have

unique varieties that are only used for pickling and are rarely eaten as ripe fruit. The term pickle is derived from the Dutch word “Pekel” meaning brine (Siddanna Rashmi 2010). Pickle is an edible product preserved in common salt, vinegar, & spices. Pickles are made from various fruits & vegetables like mango, lime, jackfruit, cauliflower, turnip, carrot & bamboo shoots. Among them mango pickle rank first and is mostly used throughout the country. Pickles are divided into four categories: vinegar pickles, citrus juice pickles, brine pickles and oil pickles. Besides from the basic fruit or vegetable, vinegar, sugar, salt, oil and spices are commonly added to pickles. Mango pickles have nutritional value about 78 calories, protein 0.2 g, carbohydrates 18.5 g, fibre 0.3 g and fat 0.4 g per tablespoon (Tarla Dalal et al., 2019). Mango pickle is loaded with vitamin C which helps to boost the immune system and improves absorption of iron. All three genotypes of mango are roundish in shape, pointed beak, pulp colour is whitish and whitish yellow, average weight of fruits about 200-270 g, pulp percentage is about 96.44 per cent and the peel thickness is about 13.2 mm (Gahane et al., 2019).

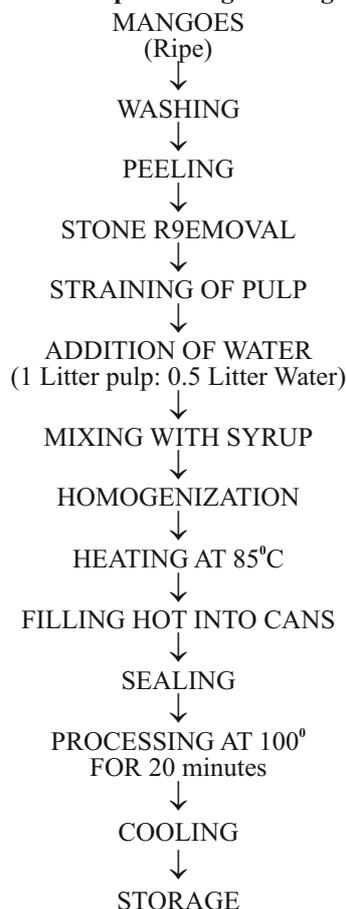
Mango Rts

A beverage is a liquid intended for human consumption, in addition to their basic function of satisfying thirst, beverages play an important role in human culture (Anonymous,2019).

Beverages are of two types- unfermented (non-alcoholic) and fermented (alcoholic). Blended beverages with using different fruits, vegetables, spices extract and plants of medicinal values as new food products will definitely attract the consumers in the interpretation of sensory and nutritional characteristics. (Harendra and Bhagwan Deen et al., 2021).

Mango is the king among tropical fruits which is botanically known as *Mangifera indica* L. and belongs to the family Anacardiaceae. It is also known as Aam, National fruit of India, Bathroom fruit and Symbol of love. It is originated in South-East-Asia, particularly in Indo-Burma region. On the basis of analysis of different varieties of mango, it is reported that mango fruit contains moisture 73.0 – 86.7%, carbohydrate 11.6 – 24.3%, protein 0.3 – 1.0%, fat 0.1 – 0.8%, fibers 0.8%, minerals 0.3 – 0.7%, Vitamin A 650 – 25940 I.U., Vitamin C 3 – 83 mg/100g, calcium 0.01%, phosphorous 0.02% and iron 4.5 mg/100g (Anon., 1966). Ripe mango fruits are utilized in preparation of pulp, juice, syrup, squash, jam, jelly, preserve, nectar, canned slices, dried powder, RTS, baby food, mango leather (Aam Papar), toffee, candy and many other products. This conventional type of mango products have been developed to a considerable level and a significant demand has been built up by the processing industry, both for domestic and export market (Sadhu and Bose, 1976; Rameshwar et al., 1979; Kalra et al., 1981)

Flow-sheet for processing of mango juice

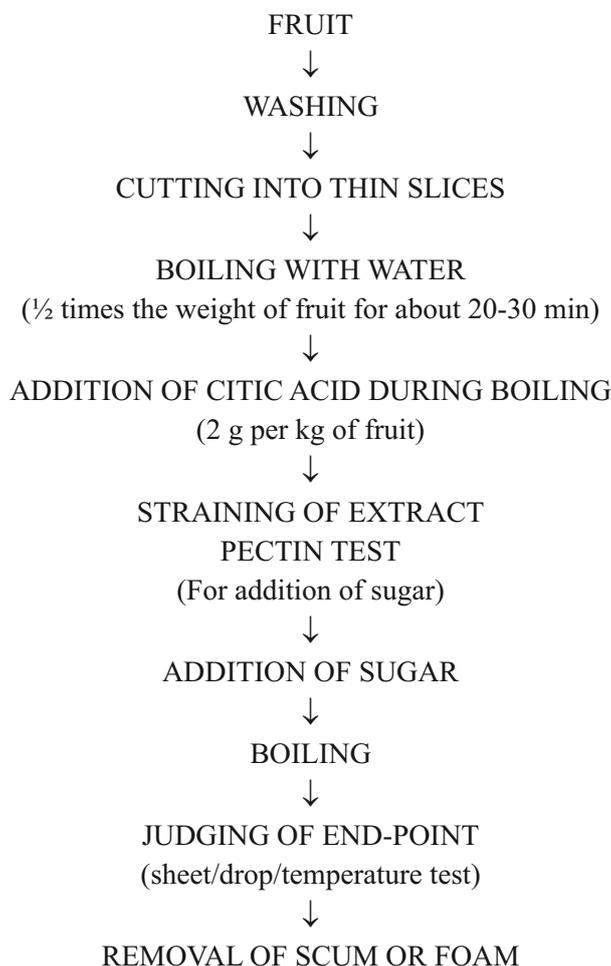


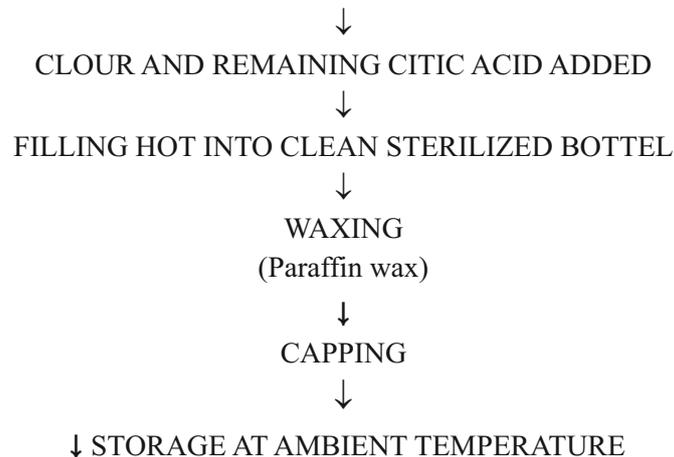
(Sanjeev kumar, 2001)

Dragon Fruit Jelly (*Hylocereus Undatus*)

Dragon fruit is a perennial, epiphytic tropical climbing cactus with a triangular fleshy jointed stems which belongs to family Cactaceae and of genus *Hylocereus* (Cheah *et al.*, 2016; Tripathi *et al.*, 2014 and Gunasen *et al.*, 2006). There are three species of dragon fruit which include *Selenicereus megalanthus* (white flesh with yellow peel dragon fruit), *Hylocereus undatus* (white-flesh with red peel dragon fruit) and *Hylocereus polyrhizus* (redflesh with red peel dragon fruit). *Hylocereus undatus* is the most cultivated and consumed species of dragon fruit. The fruits of this species present market demand, due to its very attractive sensory characteristics. Until recently, this fruit was unknown and has come to represent a growing niche in the exotic fruit market due to appreciation of the organoleptic characteristics when eaten raw or inserted in gastronomy (Granulado *et al.*, 2012). The dragon fruit was introduced in India late 90s. But the area under dragon fruit is still very limited. In India, it is cultivated on very limited scale. A very few farmers of Karnataka, Kerala, Tamil Nadu, Maharashtra, Gujarat and Andhra Pradesh have taken up dragon fruit cultivation. The total area under dragon fruit cultivation is less than 100 acres (Tripathi *et al.*, 2014).

India the indigenous fruits are processed into a number of value added products like, jam, juice, jelly, cheese, preserves etc. But the exotic fruits like kiwi, avocado, mangosteen, dragon fruit and their processed fruit products are rarely available in our markets as well as very little work has been done on processing of dragon fruit in our country. So there is scope for utilizing dragon fruit remains bright in India. A number of locally processed fruit products are now available in the market. If quality products from dragon fruit are developed, it might be welcomed by the consumers, because of this dragon fruit has gained much interest in the society due to its exotic features attractive colours, nutritional value and pleasant taste. Dragon fruit contains 0.20-1.04 % pectin (Kanjana *et al.*, 2006) so its jam and jelly usually calls for added pectin (Islam *et al.*, 2012 and Sharma *et al.*, 2017). Different concentrations of added pectin bring variability in organoleptic and physico-chemical properties of jelly. Development of varieties of products like jam, jelly and squash utilizing local produces is critically important for expanding the country's developing food industries. Conversely, product diversification or preservation methods are not undertaken too much for this fruit in India.

TECHNOLOGY FLOE-SHEET FOR PROCESSING OF JELLY)



(Sanjeev kumar, 2001)

Aonla Candy

Aonla (*Phyllanthus emblica*), the king of arid fruits, popularly known as Indian Gooseberry is a minor Sub-tropical deciduous tree indigenous to Indian sub-continent. India ranks first in the world in aonla area and production volume. The tree belongs to the family of Euphorbiaceae botanically known as Phyllanthus Emblica. It is known by different names like Amla, Amalakki, Nelli, Indian Gooseberry etc. The main varieties of aonla are Banarasi, Chakaiya, Hathijhool, Bansi Red, Pink-tinged and NA-7. The aonla gets ready for harvesting during November-December. However, the fruit may be allowed to remain on the tree till February without much fruit drops. A fully mature aonla tree may yield 250-300 kg of fruit annually. Aonla is the one of the oldest Indian fruits and considered as “Wonder fruit for health” because of its unique qualities. It has played an important therapeutic role from time immemorial and is frequently recommended for its synergistic effects in both the ayurvedic and unani systems of medicine. It is the highest source of vitamin C (478.56 mg/100 ml). In addition to Vitamin C, it also contains calcium, iron, protein and tannic acids, sugars, phosphorous, carbohydrates etc. Aonla primarily contains tannins, alkaloids, phenolics compounds, amino acids and carbohydrates. The fruit is highly perishable in nature. Its storage life in atmospheric conditions after harvesting is only 5-6 days. The fresh fruits are generally not consumed due to their high astringency but it has got great potential in processed forms. Hence attention has been focused on the preparation of different value added products from aonla. Candy is a sweet food prepared from fruits or vegetables by impregnating them with sugar syrup followed by draining of excessive syrup and then drying the product to a shelf stable state. White sugar is the usual sweetening agent used in preparation of candies. Such sugar contains sucrose (99.7%). Aonla candies are becoming more and more popular because of high acceptability, minimum volume, higher nutritional value and longer storage life. These have additional advantages of being least thirst provoking and

ready to eat snacks (Vikram *et al.* 2014). The dried products save energy, money and space in packaging, storage and transportation (Nayak *et al.* 2012). Aonla is presently an underutilized fruit, but has enormous potential in the world market. It is almost entirely unknown in the world market and needs to be popularized. In view of the health benefits, there is need to make the fruits more and more amenable to value added products. Among the unique products of aonla, the candy has much demand in domestic as well as export point of view. To strengthen market, storability and superior quality of aonla candy is of prime importance. Hence, the attempt to processing aonla to various value added products like aonla candies will be helpful in alleviating distress sale of the aonla fruits often observed in the market when the harvesting reaches the peak. Therefore, the present work has been attempted to investigate the effects of sucrose concentration on the physicochemical properties of aonla candy.

Conclusion

Value added product can be any product that has been the subject of additional actions or combined with additional products to increase the overall value of the product value added products are an important aspect of the agricultural sector.

Value addition in agriculture is needed for the profitability of the farmers, to empower the farmers and weaker sections of the society to provide safe, quality and branded food to the consumers to reduce post-harvest losses, reduction in import and increasing exports, encourage the growth and subsidiary industry.

Value addition is the “Process of changing or transforming a product from its original state to a more valuable state”. The benefits of value-added products include providing better nutrition to children and mothers; greater income for producers; access to new markets; and new processes to improve packaging and storage to reduce waste and ensure greater food safety. Value addition in agriculture is needed for the profitability of the farmers, to empower the farmers and

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