



## Value Addition of Discarded Strawberry Fruits: A Potential to Generate Income for the Farmers

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### ABSTRACT

India is endowed with varied agro-climatic conditions which offer immense scope for the cultivation of various kinds of horticultural crops. As, India is the second largest producer of fruits and vegetables. Both fruits and vegetables is out of total production 60% of produce is wasted. Waste utilization concept in horticulture crops is one step forward in harnessing the profit by farmers. Thus minimization of post harvest losses and value addition of perishable horticultural crops could be major contributor to the goal achieving doubling the farmer's income. Strawberry is herbaceous perennial and short day. Strawberry is known for its pleasant aroma. It is amongst the few crops, which gives quick and very high returns per unit area on the capital investment, as the crop is ready for harvesting within six months of planting. It is highly nutritious having a rich source of vitamins A, B, C and niacin, minerals, like phosphorus, potassium, calcium and iron. Medicinally, Strawberry has been known to kill certain viruses like polio, herpes and these may block the formation of nitrosamine, which causes cancer. Observation on TSS and organoleptic quality revealed a gradual decrease in subsequent month during six month of storage in ambient condition. As nutrition point of view and it is seasonal fruit and rich in nutrition it can be used in off season as well as it can generate employment to rural farm women and also help the farmer to double their income.

### KEYWORD

Strawberry, TSS, Organoleptic, Squash, Storage, Quality

### INTRODUCTION

India is endowed with varied agro-climatic conditions which offer immense scope for the cultivation of various kinds of horticultural crops. This provides an excellent platform for the country to emerge as a leading producer of horticulture crops. India is the second largest producer of fruits and vegetables in the world after china. As per National Horticulture Database published by National Horticulture Board, during 2015-16 India produced 91.44 Million Metric Tons (MT) of fruits and 116.60 million MT of vegetables. The production of which has tripled during the last 50 years. Diversification and value addition will be the key words of Indian Horticulture in the twenty first century (Hayes 1966).

Majority of horticultural produce are highly perishable commodities and a significant quality of the harvested produce is wasted due to defective methods of harvesting, handling, packing, transport, storage and marketing procedures. Besides increases the crop productivity and reducing input cost, the costs, and the profitability of farmers can be increased by reducing these post harvest losses. By following appropriate post harvest strategies, considerable reduction in quantitative as well as qualitative post harvest losses can be achieved leading to higher price realization for farmers and better quality produce reaching the consumer. Simple post harvest management practice like proper curing, sorting and washing can minimize post harvest losses in some horticultural crops. Similarly simple grading operation of harvested produce as per the market need can fetch better income to farmers. However, due to explosion of population and wastage of the harvested produce, the per capita availability of fruits (40 g against the recommended 120 g per day) is far below the required level (Panday, 1990). Hence, it is urgently necessary to increase the availability of fruits by increasing the area and the productions and by checking wastage of the produce through preservation.

Glut in the market causes fall in the prices for farmers and use of appropriate post-harvest treatment and storage technologies would help in extending the marketable period and fetch better returns from the stored horticultural at produce. Better ripening conditions will reduce ripening losses and adoption simple artificial ripening technology can be taken up as a small business by farmers for harnessing profits for their produce. Increasing processing, value addition and improving linkages with markets and nearby food processing industries with further add to the income of the farmer. These fruits can be converted to many value added processed products like jam, jellies, pickles, squashes etc. and minimal processing can generate employment to whole family of farmers so that their income can be increased. Waste utilization concept in horticulture crops is one step forward in harnessing the profit by farmers. Thus minimization of post harvest losses and value addition of perishable horticultural crops could be major contributor to the goal achieving doubling the farmer's income. With the increased availability of horticultural produce on farm, there is a need for entrepreneurship development for providing appropriate skills and infrastructure to permit the farmers receive due benefits for his/her efforts.

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Fruits and vegetables are living vibrant system even after detachment from the parent plant. As living biological entities, respire and transpire. The physiological changes of respiration, transpiration and biosynthesis are affected by intrinsic (i.e climacteric vs. non climacteric commodities) and extrinsic (i.e. temperature, ethylene, O<sub>2</sub> and CO<sub>2</sub> concentration) factors (Kadar *et. al.*, 1989). Shelf life extension is the ultimate goal of most post harvest physiology research (Borochoor and Woodson, 1989). Shelf-life is the period a product remains acceptable during storage at any condition by whatever limiting criterion (Tijskens, 1995). Shelf-life extension maybe achieved by many means but the principal techniques is

- (i) Retarding deterioration of physiological processes or
- (ii) Preserving the tissue by inactivating the physiological process. i.e. food preservation.

Strawberry is herbaceous perennial and short day. Strawberry is known for its pleasant aroma. It is amongst the few crops, which gives quick and very high returns per unit area on the capital investment, as the crop is ready for harvesting within six months of planting (Bakshi *et. al.*, 2014). It is a crop cherished by the growers of sub tropical and temperate regions of the world due to its low cost of growing and high returns per unit area. It is widely, adapted in geographically diverse area in world (Biswas *et. al.*, 2009). Strawberry is a delicious with a unique shape, highly perishable fruit with a pleasant flavor (Sharma and Yamdagni, 2000). It is highly nutritious having a rich source of vitamins A, B, C and niacin, minerals like phosphorus, potassium, calcium and iron (Karkara and Dwivedi, 2002). Medicinally, Strawberry has been known to kill certain viruses like polio, herpes and these may block the formation of nitrosamine, which causes cancer (Rieger, 2006).

Strawberries are good for health as they contain different bioactive components. They are highly perishable and normally last for only couple of days after harvesting. Processing of strawberry into some suitable products would help preserving them, there by adding market value to it. Introduction of high valued and nutritious and prolific bearer is also necessary for taking into consider action of preserving strawberry by developing strawberry squash.

Post-harvest treatment is a very important step in maintaining product quality and extending the shelf-life. There are varieties of different post harvest technologies available (Halevy and Mayak, 1981 and Turk and Celik, 1993)

#### Value addition

- i) Economically add value to a product and form characteristics more preferred in the market place.
- ii) Any additional activity that is one way or other changes the nature of product thus adding to its value at the time of sale.

#### MATERIAL AND METHODS

The present investigation was carried out in District Aurangabad. Strawberry is cultivated in farmer's field and post harvest work was carried out in KVK, Aurangabad, Bihar during the year 2017-18.

The discarded Strawberry fruit was collected from farmer's field. It was brought the KVK laboratory for preparation of squash. The fruits were washed in running tap water. The flow chart of preparation of Strawberry squash is shown in Fig 1.

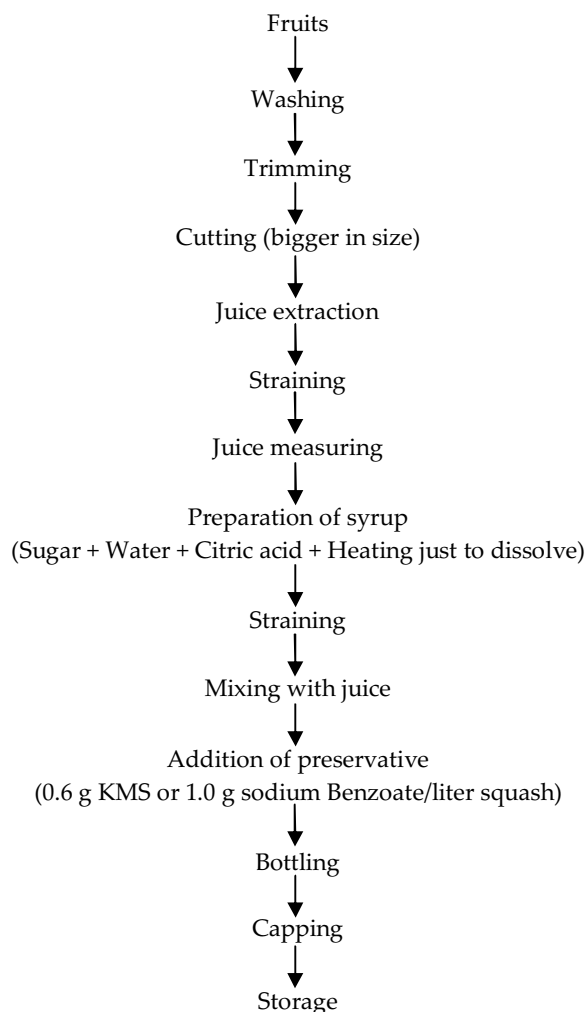


Fig. 1: Flow chart of preparation of Strawberry squash

The Strawberry squash were bottled in pre sterilized bottles and stored under ambient condition TSS and sensory evaluation of stored squash was carried out at an interval of one month up to six month for determination of shelf life. Therefore, 21 bottles each of 100 ml were opened for these analytical determinations in each month.

The total soluble solids (TSS) were estimated using Erma Hand Refractrometer (30-60° Brix). The observed reading was corrected using temperature correction chart to obtain TSS value at 20° C. The estimation was done in triplicate and average was taken.

### Sensory analysis for consumer acceptability

The method described by Piggot (1988) was analyzed through a trained panel of 10 people. Hedonic rating for over all acceptability was used for organoleptic evaluation.

### TSS

The TSS content of Strawberry squash was affected by storage under ambient conditions. The highest value of TSS was recorded in initial periods (50.80<sup>o</sup> Brix) after six month of storage it decreased up to (47.40<sup>o</sup> Brix) (Table 2). This findings are also in accordance with the findings of (Krishnaveni *et. al.*, 2001) on jackfruit and Alex *et. al.* (2003) on Litchi juice where TSS contents were decreased with an increase in the storage period. The decrease in TSS in subsequent months in all the treatments was due to enhanced microbial activity that

**Table 2:** Levels of Total Soluble Solids of Strawberry during storage

Treatment	Initial	1 <sup>st</sup> month	2 <sup>nd</sup> month	3 <sup>rd</sup> month	4 <sup>th</sup> month	5 <sup>th</sup> month	6 <sup>th</sup> month
Strawberry squash	50.80	50.78	50.22	49.63	48.83	48.02	47.40

### Organoleptic

The observation recorded values of organoleptic quality test of different formulation of squash of Strawberry is shown in Table 3 which indicated that the score value of Strawberry squash varied from 8.74 to 6.03. The maximum hedonic score observed in (8.74) in the initial month which reduce to (6.03)

**Table 3:** Levels of organoleptic test of Strawberry squash during storage

Treatment	Initial	1 <sup>st</sup> month	2 <sup>nd</sup> month	3 <sup>rd</sup> month	4 <sup>th</sup> month	5 <sup>th</sup> month	6 <sup>th</sup> month
Strawberry squash	8.74	8.56	8.36	7.06	6.86	6.43	6.03

### CONCLUSION

Observation on TSS and Organoleptic quality revealed a gradual decrease in subsequent month during six month of storage in ambient condition.

If the discarded fruit is been utilized by value addition like

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**Table 1:** Nine point over Hedonic scale used for sensory evaluation

Score	Liking
9	Like extremely
8	Like very much
7	Like moderately
6	Like slightly
5	Neither like nor dislike
4	Dislike slightly
3	Dislike moderately
2	Dislike very much
1	Dislike extremely

utilized soluble solid for their metabolic activity.

after six month of storage. Thus it is concluded that at 6<sup>th</sup> month of storage hedonic score of Strawberry squash like slightly by consumers. The change in colour and flavor of the product might be due to the chemical reaction during processing and storage.

squash etc. the fruits can be utilized for various product instead of wasting. As nutrition point of view and it is seasonal fruit and rich in nutrition it can be used in off season as well as it can generate employment to rural farm women and also help the farmer to double their income.

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