International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2021; SP-9(1): 343-345

Received: 17-10-2020
Accepted: 27-12-2020

T Tejaswini
Department of Vegetable Science, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

T Thomson
Department of Vegetable Science, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

G Koteswara Rao
Department of Vegetable Science, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

Corresponding Author:
T Tejaswini
Department of Vegetable Science, College of Horticulture, Dr. YSR Horticultural University, Venkataramannagudem, West Godavari, Andhra Pradesh, India

Value addition in vegetable crops: A review

T Tejaswini, T Thomson and G Koteswara Rao

DOI: https://doi.org/10.22271/chemi.2021.v9.i1f.11836

Abstract
Vegetable is the herbaceous plant or parts of the plant or whole plant is used for cooking, raw consumption, table purpose and processing purpose. They are rich in nutrients like, carbohydrates, proteins, fats, minerals and vitamins. Mostly cultivated around the year throughout the country. India is second largest producer of vegetables in the world with annual estimated production of 187.47 million tonnes from an area of 10.43 million hectares. The term value addition indicates that for the same volume of primary product a high price is realized by means of processing, packing, upgrading the quality or other such methods. The aims of value addition in vegetables is to receive maximum profit, for easy post-harvest handling, increase sale of vegetables, increase demand of economic products prepared from vegetables, to fulfill the customer's need for quality vegetables, to prevent wastage of harvested vegetables, to utilize unsold vegetables in market, to promote export of vegetables and their economic products.

Keywords: Value addition, vegetables

Introduction
Vegetables are an important nutritional requirement of human beings as vegetables not only cater the taste of our daily foods but also supply vitamins, minerals and disease preventing phytochemicals. Vegetable production is seasonal in nature as a result the availability of vegetables is confined to 3-4 months a year. It is therefore, necessary to make them available for consumption throughout the year in the form of processed or preserved form. India is second largest producer of vegetables in the world with annual estimated production of 187.47 million tonnes from an area of 10.43 million hectares. However, due to poor post-harvest management facility and non-availability of adequate low cost cold chain facilities, large quantities of vegetables perish accounting to the loss of Rs. 500 billion annually. Since they are highly perishable, they need to be preserved and processed in various value added products. The term value addition indicates that for the same volume of primary product, a high price is realized by means of processing, packing, upgrading the quality or other such methods. In view of increase in literacy, awareness and income, the demand of processed vegetables is increasing. Fruits and vegetable processing sector is very important for overall growth and increase in Indian economy.

Aims of value addition in vegetables
- To receive maximum profit.
- For easy post harvest handling.
- To increase sale of vegetables.
- To increase demand of economic products prepared from vegetables.
- To fulfil the customer's need for quality vegetables.
- To prevent wastage of harvested vegetables.
- To utilize unsold vegetables in market.
- To promote export of vegetables and their economic products.

Heat Preservation and Processing
Heat is widely used in preservation of food by cooking, microwave heating, blanching, frying, canning, pasteurization, boiling or heating foods prior to consumption. The thermal processed foods are totally sterile. In these processed foods both pathogenic and toxin producing

organism are destroyed. By the application of heat, both microbial and enzymatic spoilage can be well checked.

Canning
For canning, vegetables should be absolutely fresh. Tender, fully ripe and firm vegetables are ideal. The fruit operations include sorting and grading, washing, peeling, coring and pitting, blanching, can filling, brining, lidding or clinching, exhausting, sealing and processing by heating to inactive bacteria. Vegetables require to be processed at high temperature 115-121^{0}c in the auto clave.

Bottling
Bottles which can stand high temperature can be sealed airtight. Pasteurization, canning, freezing, carbonation and drying are used for preservation. Various tomato products are heat processed.

Pasteurization
Pasteurization of vegetable juices by overflow method by heat is most popular. The heating of juice at 85-90^{0}c for 30 minutes can kill spore forming bacteria, mould spore and enzymes. They can be flash pasteurized, i.e. at a high temperature for short time only (90-95^{0}c for 1 minute) and then filled into containers which are sealed airtight under cover of steam to sterilize the seal and then cooled.

Low temperature preservation and processing
Freezing and cold storage are the oldest methods of food preservation. Commercial and household refrigerators are usually run at 4.4^0-7.2^{0}c, whereas in frozen storages frozen condition is maintained at zero degree or below. Refrigerated or cool storage preserves perishables for days or weeks depending upon the commodity. Frozen storage preserves perishables for months or even years because of very low temperature. Freezing preserves the food without major changes in its physic-chemical composition. For frozen peas, fresh, clean, sound, whole immature seeds should be selected washed and blanched for 2-3 minutes in boiling water to ensure adequate colour and flavour. The cooking time and blanching for quick frozen peas may vary according to the variety, maturity and size of peas. After blanching they are cooled and packed in polyethylene or laminate pouches. The quick freezing process requires -18^0 to -25^{0}c. For frozen beans, same method is followed as for peas except that blanching time varies from 4-5 minutes.

Preservation by removing moisture
Drying helps in preservation of foods. Microbes cannot grow and multiply in absence of sufficient water in their environment. Many of the enzymatic reactions are hydrophilic in nature, requiring water. Chemical reactions in food materials are slowed down when the reactions are in solid state. Hence by removing water from the commodity, it should be possible to preserve them by checking the important spoilage agents.

Sun-Drying
Sun-drying of vegetables is practiced by solar energy widely in tropical and subtropical regions. In direct solar drying, the vegetables are spread on trays, which are kept in a close compartment or cabinet drier. In solar drier, the air is heated by direct sun rays and carried to the drier from bottom and goes out from the top of chimney. For drying vegetables at home, home drier is ideal.

Preservation with sugar
Preserve is made by cooking or heat processing of raw or mature, peeled or punctured and pre-treated whole or cut vegetables in sugar syrup. Number of fruits and few vegetables are used for preserve making. The manufacture vegetable preserves involves selection of raw material, peeling, puncturing (to promote sugar penetration), blanching with or without additives to effectively inactive natural enzymes, sugar addition and cooking or concentration in sugar syrup, control of fermentation by preservatives and then packaging.

Preservation by salt
The concentration of salt necessary to inhibit the growth of microorganisms in food is related to water content, type of infection, pH, temperature, protein content and presence of inhibitory substances such as acids. The water content is obviously of major importance, since it is the concentration of salt in water phase and not the amount in food as a whole which is significant. Curing of raw vegetables in dry salt or brine and subsequent preserving by spices and condiment or in vinegar is known as pickling. Spices, condiments and edible oils may also be used to improve their palatability. Turnip, carrot, cauliflower, onion and mixed vegetables are important for pickle making.

Preservation by food additives
A chemical additive or food additive can be defined as a chemical (substance) or mixture of chemicals, other than basic food stuff that is added intentionally either during production, processing, storage or packaging directly or indirectly to improve or maintain nutritional value, enhance quality and consumer acceptability, improve keeping quality and check spoilage caused by microbes and enzymes and facilitate preparation. Use of food additives is another effective approach/method for preserving vegetables. Preservation by this method is cheap and easy to operate technology, best suited for its application in the developing countries to preserve perishable commodities.

Chemical Preservation
Seasonal fruit pulps and juices from fruits and vegetables such as peaches, plums, bael, apricot, mango, guava, pineapple, litchi, citrus fruits, phalsa, jamun, carrot, tomato etc., can easily be preserved and stored after heating them to 80^0-85^{0}c and then by adding chemical preservative (Potassium metabisulphite or sodium benzoate) and acid (citric acid)

Processing of sauce, chutney and ketchup
Chutney and sauces are made in Indian homes and also on a commercial scale, standard recipes have been modified according to consumers acceptability. Onion, garlic, spices, salt, sugar and acid are added for flavour and to make them more palatable. Vinegar also serves as a preservative. Chutney should have at least 50% total soluble solids and 1.0% acidity.

Preservation by Fermentation
Fermentation encourages the multiplication of microorganisms and their metabolic activities in food. In this method, food is preserved chemically. Microorganism are used to ferment sugar either by complete oxidation or partial oxidation in alcoholic fermentation, acetic fermentations and lactic fermentation and other minor fermentative acgtions.

Fermentation is a low cost technology for preservation of fruits and vegetables. Lactic acid fermentation is of great importance in food preservation. Lactic acid producing bacteria require small amount of salt for their growth and multiplication. Sodium chloride is useful in lactic fermentation of foods since it limits the growth of putrefactive organism and inhibits the growth of a large number of undesirable microorganism.

Fermented foods have many advantages – prolonged shelf life, extended seasonal life, less time for cooking and sometimes increased acceptability and digestibility. This also acts as a laxative agent. The vegetables can be preserved by the simple method of lactic acid fermentation which enhances acceptability and nutritional quality of fresh vegetables. By this low cost technology, some vegetables (individually or mixed) and can be preserved safely and popularized.

Fermented spiced beverage juice from black carrot (kanji) is very popular in North India. It has a cooling effect especially in summer and it has attractive crimson colour. This beverage can be prepared and preserved for off season use. Kanji can be prepared either from black carrot slices in brine or by its juice along with salt, chilli and mustard powder. Hence lactic acid fermentation is involved and it takes 7-10 days to complete fermentation. The quality of fermented products is better at low temperature (20^0-25^0c) than at higher temperatures.

Research work

Value addition by prolonging shelf life

Dash and Chandra (2001) [2] found that zero energy cool chambers greatly extends shelf life of fresh vegetables.

Kumar *et al.* (2002) [5] concluded that genotypes MS/92-2105, Kufri Pukhraj and JW-160 are more suitable when stored for 60 days.

Value Addition by Processing

Katiyar *et al.* (2000) [3] observed that Kufri Bahar was the best in potato chips production on the basis of the minimum time required for fry and highest grade content.

Lakshmi and Vimala (2000) [6] concluded that sun drying took longer time as compared to cabinet drying and cost of 100 gm of sun dried green leafy vegetables powder was more than cabinet dried powder.

Singh *et al*. (2002) demonstrated that genotypes Kufri Chipsona-1, Kufri Chipsona-2 and HT/92-621 for making good quality french fry basis on the high dry matter and low reducing sugar content.

Khurana and Ezekiel (2003) [4] demponstrated that Indian variety Kufri Chipsona-2 is more suitable for processing quality.

Pandey *et al.* (2003) [8] demonstrated that both Atlantic and Kufri Chipsona-2 are good chip colour of potato varieties basis on the high dry matter, low reducing sugar and chip colour.

Meena and Lal (2005) [7] recommended the maximum b:c ratio 1.21 was obtained with 0.3 cm thickness, peeled and sulphured slices dried under solar dryer.

Conclusion

With the experience of golden revolution, India has made milestones in vegetable production. But other neglected sectors are vegetable productivity, post harvest handling and processing which are on growing stages and need more attention. There are many techniques developed to increase vegetable productivity, shelf-life and to add the value in vegetables for reducing post harvest loss. Further there is need to develop indigenous technology based on area specific for diversification in processing sector to succeed the rainbow revolution.

References

1. Nagulwar MM, More DR, Mandhare LL. Nutritional properties and value addition of mushroom: A review. Pharma Innovation 2020;9(10):395-398. DOI: 10.22271/tpi.2020.v9.i10f.5266
2. Dash KS, Chandra P. Shelf life of some vegetables in zero energy cool chamber. Indian Food Packer 2001, 79-86.
3. Katiyar H, Singh NP, Raghav M. Effect of variety on chipping quality and dry matter content of potato tubers. Prog. Hort 2000;32(2):161-171.
4. Khurana SC, Ezekiel B. Processing quality of some popular Indian potato varieties. All India coordinated potato improvement project sdau, deesa (Gujarat) 2003.
5. Kumar J, Lal S, Bhutani RD, Khurana SC. Physiological loss in weight (PLW) and decay loss in potato. Haryana J Hort. Sci. 2002;32(1&2):150-151.
6. Lakshmi B, Vimala V. Drying characteristics of sun-dried and cabinet- dried green leafy vegetables. J Food Sci. Tech 2000;37(5):465-471.
7. Meena ML, Lal G. Effect of different treatments on drying and quality of Kachari (*Cucumis callosus*). Indian J Hort 2005;62(1):99-101.
8. Pandey SK, Khurana SM, Singh SV, Kumar D, Kumar P. Total processing grade yield, reducing sugars, dry matter and chip colour of potato. Indian J Hort 2003;62(2):155-159.
9. Selvakumar R. A text book of Glaustas Olericulture. New Vishal Publications 2014, 1104-1108.
10. Anonymous. Indian Horticulture Database. National Horticulture Board, Ministry of Agriculture, Government of India, New Delhi 2018-19.