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**Dr. Anjali Mishra**  
Assistant Programme, (Krishi  
Vigyan Kendra Bilaspur,  
Chhattisgarh, India

## Processing and value addition of onion: A review

**Dr. Anjali Mishra**

### Abstract

The development of vegetable product is always important as it is help is mentioning long life of the vegetables and it also improve the quality of vegetable by the addition of value in it. This paper consists of processing and value addition of different vegetables. In India there are various types of under-utilized vegetable are available because they are not utilizing properly although they have very high nutritive value. These crops have high potential in maintaining sustainability in terms of economy of country. Many of the vegetables are under estimate in terms of processing although they have high processing capacity. This review give information about processing of some of the major vegetable crops and it also cover processed product of this vegetables.

**Keywords:** Value addition, vegetable, sustainability

### Introduction

India is the one of the top vegetables producing country in the world. Vegetables are good source for dietary nutrients such as vitamins, fibers and minerals. In fresh vegetable the moisture content is more than 80% (Orsat *et al.*, 2006) <sup>[60]</sup>. Fresh vegetables are more nutritive than processed ones. Vegetables whose roots and tubers are consume are best source of calories, natural vitamins and minerals. In green leafy vegetables like spinach (*Spinacia oleracea*), amaranthus (*Amaranthus viridis*), bathua (*Chenopodium album*), mint (*Mentha spicata*) etc. along with carrot are rich source for Beta carotene which is an important antioxidant. Beta carotene is the most important precursor of Vitamin A. Vitamin A is essential for the normal growth. Deficiency of Vitamin A decrease levels in the blood and low level in serum. Per capita consumption of vegetable in India is lower than daily requirement. It happens due to high post-harvest losses (20-40%) of fruits and vegetables in India. It is observed that the current status in availability of vegetables only meet half of the requirement of vitamins and minerals. Therefore, it is necessary to processes the available vegetables so it is important to evolve the system of processing of vegetables by developing such techniques, which is easy to operate as well as can also produce economic quality product. This will also ensure the availability of vegetable in offseason all over the year. In India less than 2% of the vegetables from total production is processed and in Brazil the 70% and in Malaysia around 83%. One of the most common methods for preservation of Vegetables is dehydration. Hot air drying by conventional tray drier or vacuum drier and sun drying can be used for dehydration of vegetables. Dehydrated forms of vegetables are consumed in several forms, without affecting its nutrient value.

Today cultivation of fruits and vegetables are very important. As it helps in generating employment throughout the year, it also used as a medium for foreign exchange. Fruits and vegetables have high nutritive value, so they play important role to fight hunger. Fruits and vegetables are good source for essential minerals, vitamins, dietary fiber, supply complex carbohydrates and proteins.

Powdered vegetables such as tomato (*Solanum lycopersicum*), carrot (*Daucus carota subsp. Sativus*) and leaves of fenugreek (*Trigonella foenum-graecum*) required simple technology for preparation. And they are used in incorporated in traditional food preparations, in this way each value is added in the product and nutrient value also maintained. Due to post harvest losses of vegetables due to poor management, the losses of farm produce are very high.

**Corresponding Author:**  
**Dr. Anjali Mishra**  
Assistant Programme, (Krishi  
Vigyan Kendra Bilaspur,  
Chhattisgarh, India

In studies it was recorded that 75,000-1,00,000 crore per year losses are caused due to post harvest management of food commodities.

In case of vegetables and fruits such as mango (*Mangifera indica* L.) and amla (*Embllica officinalis* L.) pickling is done. Pickling of cucumber is made in Africa, Asia, Europe, and Latin America (Steinkraus 2002) [46]. Khalpi is a cucumber pickle popular during summer months in Nepal (Dahal *et al.*, 2005) [57]. Number of methods is used for the purpose of pickling, but the most common method is placing the vegetable in 5% salt.

It can be seen that during the process of storage of goods in canned there is low loss of Ascorbic acid (<15%) compared to that of fresh and frozen products. In several studies that there is no statistically significant loss of ascorbic acid during storage of canned green beans at room temperature, and one study showed a slight loss of 6% after 18 months of storage of canned green beans (Marchesini *et al.*, 1975) [54], (Elkins 1979) [27] and (Fadel and Miller 1983) [2].

In India maximum vegetables are processed in order to prevent it from post-harvest losses. It also helps the vegetables to be prevented from not only physiological or chemical spoilage it also saves it from microbial spoilage. It is important to prevent vegetables from spoilage due to moisture, enzymes or packaging. Basically, value addition is the process to convert vegetable produce to a more valuable product from its original state. The value of changed product is termed as value addition. In today's world vegetable farming is an important source of employment as it provides employment throughout the year. And adding value is also very important for employment. In terms of nutrient vegetables are an important source of nutrient and helps in maintaining strong metabolism.

Since 2011 the global vegetable processing industry has grown and is also expected to grow after 2020. In developing countries such as in India & Afghanistan there is an increase in industrialization which leads them to attain a standard of living. Which includes good food with good health. But in some developed countries, like China, USA the processing of vegetable is declining as they prefer fresh produce which is being healthier than their processed product. As fresh vegetables are healthier than their processed product.

### Processing and Value addition in onion

**Carrot (*Daucus carota* L.):** It is one of the most important root crops of the world. It is consumed throughout the world in many forms such as fresh, as shredded, sliced, sticks or in the form of processed products. India has 88 thousand ha area under cultivation of carrot with annual carrot production of 1379 thousand MT out of which Haryana shares 27.80% followed by U P, Punjab and Tamil Nadu (Anon, 2016) [11]. Canned carrot Small carrots are usually used for the processes of canning. Canning can be done in many forms such as diced, halves, quartered or as a whole. The temperature requirement for blanching treatment is 71 °C for 6 to 8 minutes results in better quality of canned product. To improve the colour and quality, carrots were treated thermally which caused an increase in the number of carotenoids in the products (De Sa and Rodriguez-Amaya, 2004) [23]. Various studies reported that leaching of the soluble solids during blanching is the most responsible factor that causes the increase of carotenoids (Sulaeman *et al.*, 2001) [21] and (Puuponen-Pimia *et al.*, 2003) [67].

### Dehydrated carrot

It was reported that blanched pre-treated dried carrot contains higher  $\beta$ -carotene with reduction of ascorbic acid content in comparison to unblanched dried carrot. Blanching treatment

also prevents the nonenzymatic browning of carrot (Negi and Roy, 2001) [58]. Prolonged drying time and overheating of the product resulted in brownish colour, loss of flavor and decrease in rehydration ability (Giri and Prasad, 2007) [34]. Pre-treatment of carrot with 5% sugar solution during blanching of shredded carrot prior to dehydration was reported to be better in retaining colour and flavor (Alam *et al.*, 2013) [5] reported that convective drying at 65 °C temperature of citric acid blanched carrot was best among solar drying, sun drying and convective drying methods. The freeze drying has been the excellent tool not only for the retention of carotenoids (96-98%) but also the flavor and colour of carrot (Rodriguez-Amaya, 1997) [72]. Combination of vacuum and microwave drying minimizes the shrinkage during drying with lower breakdown of physical structure and higher porosity (Béttega *et al.*, 2014) [16]. Drying through Ultrasonic technology is an energy efficient technology. The ultrasound assisted vacuum drying of carrot will reduce the time of drying by three-fold (140 min) where as in vacuum drying it takes 340 min at same temperature of 75 °C. Rehydration, colour and nutritional properties of dried carrot were more influenced by ultrasound assisted vacuum drying as compared to conventional drying methods (Chen *et al.*, 2016) [21].

### Flow chart of dehydration of carrot

Selection of fresh carrots Washing and removal of peel (peeling) Cutting (0.3cm) Water blanching which contain 0.2% potassium metabisulphite, 2% starch and 1% salt at 92 °C For 3 min Dehydration at 45-50 °C for 10-11 h

### Carrot pickle

NaCl (sodium chloride) brine or potassium metabisulfite is used for the commercial production of pickle. It prevents the softening of the carrot also because it acts as a preservative (Fernads, 2000) [29]. The use of lactic acid helps in the processes of fermentation of the pickle of carrot. It has been reported that pickles are good appetizers and add the palatability of meal (Sultana *et al.*, 2014) [87].

### Carrot juice

Carrot juice is used to be mixed with other juices such as orange juice, pineapple juice and these juices are very popular in non-alcoholic beverages as it also uses in fermentation of yogurt. It was seen that the juice extract of blanched carrot is higher than the juice of cold squeezing and balanced carrot also has a high number of carotenoids. Grinding of carrot in particle size from 6-2 mm increased yield by 0.7% per millimeter and also improved colour of juice for blanched and macerated carrots (Bin-Lim and Kyung-Jwa, 1996) [17]. Juice of carrot is a rich source of  $\alpha$  and  $\beta$  carotene.

Carrot juice is used to reduce the bitterness of kinnow, mandarin juice. Salwa *et al.*, (2004) [74] have incorporated carrot juice at the concentration of 5-20% in milk and prepared excellent quality carrot yogurt. To preserve the juice for extended time, some newer techniques like ozone processing, ultrasound treatment (US), high pressure (HP) and ultraviolet treatments are employed (Adiamo *et al.*, 2018) [3]. It was reported that shelf life of UV treated carrot juice was increased up to 12 days with no significant change in physicochemical and sensory characteristics of the juice stored at 4 °C temperature (Riganakos *et al.*, 2017) [71].

### Carrot candy

It is a sweet food product prepared from carrot by immersing them in the sugar syrup followed by drying of excessive syrup

and drying to the stable state (Haq Raees-ul and Prasad, 2015)<sup>[69]</sup>. It was reported that the entire soluble solid content of the carrot candy should be 70-75°B (Beerh *et al.*, 1984)<sup>[15]</sup>. The carrot candy which are stored in glass and LDPE material have better sensory attributes. The product stored at low temperature (1-3 °C) stored in glass container retains  $\beta$  carotene up to 60% and can be served for 6 months (Sharma *et al.*, 2012)<sup>[97]</sup>.

### Carrot jam

It is prepared by boiling the pulp with predetermined quantity of sugar and pectin till it become jelly in nature. Jam production is favored for fruits, researchers have made successful attempts to extend it to some vegetables like tomato, cucumber, pumpkin, sweet potato and carrot (Haq Raees-ul and Prasad, 2015)<sup>[69]</sup>. Now a days in the preparation of jam carrot juice is added with citrus juice which helps in prevention of carotene to be get oxidize.

The prepared mixture is cooked with sugar and lemon juice with pectin for the formation of proper gel. The method is widely preferable as it retains most of the original compounds like phenolics, carotene, and potassium as well as colour attributes (Renna *et al.*, 2013)<sup>[70]</sup>. Black carrot juice has also been incorporated as a colouring agent in manufacturing of strawberry jam (Kirca *et al.*, 2007)<sup>[49]</sup>.

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