

Recent advances in vegetable based beverages

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ABSTRACT : India's agricultural base is quite strong but wastage is very high and processing of food products is very low. The country's processing sector is small and processing of food to consumable standards in India has reached only 10% recently. The processing level is around 2.2 percent in fruits and vegetables, 21% in meat and 6% in poultry products. All vegetable have more medicinal properties like Bottle gourd juice, Raw parsley juice, celery, lettuce, or spinach, pepper, sweet potatoes, Irish potato, Sweet Potato, Radish Juice, Rhubarb Juice, Sorrel Juice, Spinach Juice, Tomato Juice, String Bean Juice, Turnip Juice and Watercress Juice are maintain the blood vessels, kidneys and bladder, albuminuria, nephritis, and other kidney troubles, clearing up skin blemishes and flavones, β -carotene and anthocyanins for deep yellow, orange, and purple-fleshed sweet potatoes. found out minerals alkaline elements, potassium predominates, being slightly more than 20%; calcium is about 18%; sodium, 8%; magnesium, 5%; and iron about one-fourth of one per cent.

Key Words: Vegetables juice, medicinal properties of vegetables.

India is the second largest producer of vegetables in the world (after China) with an average production of 169.1 million tonnes (NHB-2015-16). Potatoes, onions, green peas, cauliflower, okra, cabbage, tomatoes, eggplant, carrots, green chilies are the most important vegetable crops grown in India at a large scale. Owing to increasing population, it is estimated that requirements of vegetable in the country, both area as well as productivity, will have to be increased to about two to three times more than present production. The estimated production is of 67.0 million tonnes grown over about 6.25 million hectare (NHB-2015-16). Many exotic and luxury vegetables like gourds, pumpkins, leeks, mushrooms, asparagus, cucumbers are also grown in India (El-Ramady, *et al.*, 2015).

India's agricultural base is quite strong but wastage is very high and processing of food products is very low. The country's processing sector is small and processing of food to consumable standards in India has reached only 10% recently. The processing level is around 2.2 percent in fruits and vegetables, 21% in meat and 6% in poultry products (Dhakal, 2017). India's share in exports of processed food in world trade has remained at about 1.5 per cent or \$3.2 billion. Fruit and vegetable processing, which is currently around 2% of total production is expected to increase to 25 per cent by 2025 (Food Processing, 2006). The post-harvest shelf life of maximum of fruits and vegetables is very limited due to their perishable nature. In India, more than 20-25% of fruits and vegetables are spoiled before utilization. Despite being the world's

second largest producer of fruits and vegetables, in India only 1.5 per cent of the total fruits and vegetables produced are processed (Dhakal *et al.*, 2017).

In spite of being underutilized, the utilization of highly nutritive fruits and vegetables is very limited due to high acidity, astringency, bitterness, and some other factors (Jena, 2018). While improving flavor, palatability, and nutritive and medicinal value of various fruit juices such as aonla, mango, papaya, pineapple, citrus, ber, pear, apple, watermelon, and vegetables including bottle gourd, carrot, beet root, bitter gourd, medicinal plants like aloe vera and spices can also be used for juice blending (Jena, *et al.* 2018). All these natural products are valued very highly for their refreshing juice, nutritional value, pleasant flavor, and medicinal properties. Fruits and vegetables are also a rich source of sugars, vitamins, and minerals. Blending of two or more fruit and vegetable juices with spices extract for the preparation of nutritive ready-to-serve (RTS), beverages is thought to be a convenient and economic alternative for utilization of these fruits and vegetables. Moreover, one could think of a new product development through blending in the form of a natural health drink, which may also serve as an appetizer (Singh *et al.*, 2018).

Vegetable based beverages

This article focusses on some of the vegetables to be utilized as nutritious and thirst quenching beverages.

Bottle guard Juice : Bottle gourd, sometimes called the white-flowered or calabash gourd, has a delicate nutty flavor; it makes up as a staple crop of Indian cui-

Table-1 : Dietary constituents of bottle guard Juice (Mohankumar *et al.*, 2011)

Sl. No.	Constituents	With Peel (g/100g of dry ghiya)	Without Peel (g/100g of dry ghiya)
1	Total sugar	5.870	8.290
2	Reducing sugar	5.220	7.920
3	Non-reducing sugar	0.650	0.290
4	Starch	1.310	1.570
5	Curd fiber	4.450	3.400
6	Neutral detergent fiber	22.710	21.160
7	Acid detergent fiber	16.260	15.670
8	Hemi cellulose	6.450	5.580
9	Cellulose	16.070	16.400
10	Lagenin	0.193	0.167

sine and it can also be juiced for a nutrient-packed beverage. Bottle gourd juice offers some health benefits, but owing to its bitterness, it cannot be consumed as such. However, its flavour can be improved by blending with other sweeter fruits. Table-1 represents the dietary constituents of bottle guard (Barot *et al.*, 2018).

Parsley Juice : Raw parsley juice is one of the most potent of the juices. It should never be taken alone in quantities of more than one or two ounces at a time unless mixed with a sufficient quantity of carrot or other raw vegetable juices such as celery, lettuce, or spinach, and even then, in not too great a proportion in relation to the volume of other juices. The elements in parsley are proportioned in such a manner that they help to maintain the blood vessels, kidneys and bladder, albuminuria, nephritis, and other kidney troubles (Walker *et al.*, 2010). It is also efficient in every ailment connected with the eyes and optic nerve system such as weak eyes, ulceration of the cornea, cataracts etc. Conjunctivitis and ophthalmia in all of its stages or laziness of the pupils have been effectively treated by drinking raw parsley juice mixed with carrot juice and with carrot, celery, and endive juices, particularly in conjunction with beet juice or with beet, carrot, and cucumber juices (Aziz and Sharma, 2001).

Parsnip Juice : This juice is rich in potassium, phosphorus, sulphur, silicon, and chlorine but low in calcium and sodium. Because of the low calcium-sodium content, the all-around food value of this vegetable is not as great as that of some of the other tubers, but the therapeutic value of the juice of its leaves and root place it high on the list of beneficial juices. The rich silicon-sulphur content is most helpful in correcting the condition of brittle nails. The phosphorus-chlo-

rine elements are of particular benefit to the lungs and the bronchial system. Thus making this juice an excellent food for tubercular and pneumonia victims, and those afflicted with emphysema. The high potassium content is of such excellent value to the brain that this juice has been effectively used in many mental disorders (Aziz and Sharma, 2001).

Pepper Juice (Green) : This juice has an abundance of silicon which is greatly needed by the nails and the hair. The tear-ducts and sebaceous glands also benefit greatly from the use of this juice. In combination with carrot juice, in a proportion of one-quarter to one-half of green pepper juice to the rest of carrot juice, it is an excellent aid in clearing up skin blemishes. It also helps those bothered with gas or wind in the alimentary canal, and those suffering from colic or flatulence, have found significant relief from drinking one pint of this juice combination every day. In addition, one should also drink a pint of carrot and spinach juice per day as well. (Kim and Park, 2015).

Potato Juice : The raw potato contains easily digestible natural sugars which, upon cooking, are converted into starch. Potatoes should be omitted from the diet of those suffering from venereal diseases and those afflicted with aphrodisiac tendencies. The combination of cooked meat and potatoes intensifies the solanine poison of the potato (an alkaloid poison more particularly prevalent in potatoes too green in color), which has an affinity for the nerves controlling the sexual organs; this, together with presence of uric acid crystals resulting from the ingestion of meat, may cause excessive irritation of these organs (Suda *et al.*, 2003).

When the potato is cooked, these are converted into inorganic atoms and, as such, they are of little or no

value for constructive purposes. The juice of raw potatoes, combined with that of carrot and celery, is a boon to those suffering from gastric, nerve, and muscle disturbances, such as gout and sciatica. In such cases, one half of this combination in addition to one half of carrot, beet, and cucumber juice daily, has often given complete relief from these discomforts in a surprisingly short time, provided that meat, fowl, and fish were eliminated completely from the diet. Some emphysema victims have found relief in using a combination of carrot, parsley and raw potato juices (Mastui *et al.*, 2001).

Sweet Potato : The juice of sweet potatoes has, therefore, more general beneficial value than that of the Irish potato. Care must be exercised in choosing them, as they are more readily spoiled by bruises and decayed spots, which quickly affect the whole tuber, than the Irish potatoes, which will stand rougher and careless handling with impunity. It was also rich in anthocyanins with peonidin aglycon. Sweet potato have same nutritive value as yellow-fleshed sweet potatoes, and contain several types of beneficial and functional pigments, such as flavones, β -carotene and anthocyanins for deep yellow, orange, and purple-fleshed sweet potatoes, respectively (Suda *et al.*, 2003).

Radish Juice : This juice is extracted from the leaves and the roots, but should never be taken alone, as it is too strong in its reaction if taken by itself. In conjunction with carrot juice, the combined elements help to restore the tone of the mucous membranes in the body (Jing *et al.*, 2012). It is used most effectively about one hour after taking horseradish as described in the section covering that subject. It has had the effect of soothing and healing the membranes and cleansing the body of the mucus which the horseradish sauce has dissolved. It has at the same time helped to regenerate and restore the mucous membranes to their normal state. Nearly one-third of the natural content of radishes is potassium, while of the remaining two-thirds, more than one-third is sodium (Verkerk *et al.*, 2001). The iron and magnesium content are both high, and it is from these that the healing and soothing qualities to the mucous membranes have been found. It is usually unnecessary in most cases to undergo surgical operations for the removal of the mucus which causes sinus troubles. While such operations remove some of the mucus, the after effect eventually may be devastating. The horseradish sauce on the other hand, has repeatedly given lasting benefits. Mucus is the result of drinking too much milk and eating concentrated starches, bread, and cereals in excess (Jing *et al.*, 2012).

Rhubarb Juice : Rhubarb is probably responsible for more kidney trouble among children than any other

single factor. Few if any other plants have such a high concentration of oxalic acid as rhubarb. When cooked, this acid is converted into an inorganic chemical hich, when eaten, deposits vast amounts of oxalic acid crystals in the body (Reiss *et al.*, 2012). Innumerable cases of rheumatism and rheumatic fever could be traced to the ingestion of cooked rhubarb. Some benefit can be derived from fresh-raw rhubarb juice, provided that it is used sparingly, and only in combination with other juices such as carrot, celery, or fruit, and their combinations. In this manner it can help stimulate the peristaltic action of the intestines. (Boffetta *et al.*, 2010).

Sorrel Juice : The juice of the broad-leafed French Sorrel is excellent in helping the sluggish and prolapsed intestines to re-establish their normal functions, when such necessary steps as colonic irrigations and enemas are taken to eliminate the accumulation of waste matter collected therein. This vegetable is rich in potassium oxalate which is valuable for the human system only in its vital organic raw state. It contains a particularly large percentage of iron and magnesium which the blood needs constantly, and vast amounts of the cleansing elements phosphorus, sulphur, and silicon which are used by every part of the system from head to foot. The combination of these rich elements makes this juice most valuable for nourishing all the glands in the body (Mounigan and Badrie, 2006).

Spinach Juice : Nature has furnished man with the finest organic material for the cleansing, reconstruction, and regeneration of the intestinal tract. Raw spinach juice properly prepared, taken at the rate of about one half daily, has often corrected the most aggravated case of constipation within a few days or weeks. Unfortunately, the use of purgatives for the cleansing of the intestinal tract is practiced without an understanding of exactly what takes place. Every manufactured chemical, inorganic purgative or laxative acts as an irritant, stimulating the muscles of the intestines to expel it. The spinach works by natural means to repair the most essential damage first; it is not always apparent to the individual where in his body the work of regeneration is progressing (Majumdar *et al.*, 2010).

Tomato Juice : This is probably one of the most widely used juices out of cans. Fresh-raw tomato juice is most beneficial and has an alkaline reaction if digested when no starches or sugars are present in concentrated form; but if these are present and eaten or drunk during the same meal, then the reaction is definitely acid. Tomatoes have a fairly high citric and malic acid content, and some oxalic acid. These acids are all needed and beneficial in the processes of metabolism, provided that they are vital organic. Fresh-raw tomato juice is rich in

sodium, calcium, potassium, and magnesium. There are innumerable varieties of tomatoes, all of which, if used fresh and raw, make excellent and beneficial juices (Bhowmik *et al.*, 2012).

String Bean Juice : This juice is of particular benefit to diabetics. Diabetes is a dietary disease resulting from the excessive consumption of concentrated starches and sugars, and is aggravated by the consumption of meat. It is definitely conceded that the hypodermic injection of Insulin does not furnish a cure for this disease (Walker, 2010). Diabetes is not a hereditary disease. It may, however be caused by the hereditary habit of the excessive use of concentrated carbohydrates. The feeding of inorganic, cooked flour and grain products and pasteurized or boiled cow's milk to infants is the contributing factor in the development of diabetes in children and adolescents primarily and in adults eventually. Insulin is a substance that the pancreatic gland secretes to enable the body to properly utilize natural sugars (not the manufactured sugars) as fuel for energy to carry on its activities (Walker, 2010).

Turnip Juice : No vegetable contains as high a percentage of calcium as the juice of turnip leaves, the calcium being more than one-half of all the other minerals and salts combined. It is therefore a most excellent food for growing children with softened or deformed bones, including the teeth (Karaoglan *et al.*, 2017). By combining turnip leaf juice with carrot and dandelion juice, a highly effective combination is obtained that helps in hardening of the teeth as well as the entire bone structure of the body. As most people include an excessive amount of devitalized, inorganic food in their daily meals, it is only natural to find that probably one-half of them have hemorrhoids, and know it, while the remainder may have them and do not know it. Not even a single case of hemorrhoids has been reported in adults of all ages who have been lifelong abstainers from these inorganic foods. On the other hand, we have seen an unending procession of people victimized by attempts to cure this natural affliction by means of injections, electric coagulation, and surgery. The turnip juices has helped immensely to the sufferers when they did in fact adhere rigidly to natural foods and natural methods (Manchali *et al.*, 2012).

Watercress Juice : This juice is exceedingly rich in sulphur, which represents more than one-third of all the other mineral elements and salts combined in the watercress. Nearly 45% of the elements in watercress are acid forming, including sulphur, phosphorus, and chlorine. As it is a very powerful intestinal cleanser, it should never be taken alone, but should always be used with other juices, mixing it, for example, with carrot or

celery. Of the alkaline elements, potassium predominates, being slightly more than 20%; calcium is about 18%; sodium, 8%; magnesium, 5%; and iron about one-fourth of one per cent (Manchali *et al.*, 2012). A combination of carrot and spinach juice with some lettuce, turnip leaves, and watercress juice, contains the components essential for the normal regeneration of the blood and particularly for increasing oxygen transmission in the blood stream. Watercress Juice is a valuable adjunct to carrot, parsley and potato juices, as a combination to help emphysema victims. The predominance of phosphorus and chlorine has thereby proved to be beneficial.

Vegetable based Confectionary

Certain vegetables finds tremendous application in confectionary industry like candies prepared from beet root (*Beta vulgaris*). These are rich in antioxidants, vitamins and polyphenols which show strong anti-inflammatory, anticarcinogenic and anti-allergic effects. Sweet potatoes can be used in preparation of muffins which is rich in antioxidants and can be used in fast. Candies prepared from beet root can be given to people suffering from cardiovascular diseases and diabetes. Potato can be used in French fries and chips. Similarly, carrot, spinach, cabbage can be used in confectionary industry for preparation of candies and cookies (Liu, 2013).

India is an excellent producer of vegetables and by implementing post harvest technologies, post-harvest losses can be minimized to a great extent, by processing these in some relishing health drinks possessing nutritional and functional benefits. Although Indian food industry is focusing on vegetable based beverages and confectionary, but it is still in nascent phase and it needs to be improved. There is an urgent need to aware the farmers, industrialists and entrepreneurs to take some major initiatives in this direction to improve the Indian economy by minimizing the huge annual postharvest losses of vegetables.

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