JUST AGRICULTURE
multidisciplinary e-Newsletter

Carrot And Beetroot Greens: An Underutilized Green Leafy Vegetables With Health Benefits

J. Prasoona[1], B. Anila Kumari[2], Supta Sarkar[3], V. Kavitha Kiran[4] and R. Swamy[5]

[1]PG Scholar , Post Graduate and Research CentrePJTS Agricultural University, Rajendranagar, Hyderabad, Telangana
[2]Assistant Professor, Post Graduate and Research Centre PJTS Agricultural University, Rajendranagar, Hyderabad, Telangana
[3]Assistant Professor, Department of Foods and Nutrition, College of Community Science, PJTSAU, Saifabad, Hyderabad
[4]Scientist, AICRIP-Home Science, Post Graduate & Research Centre, PJTSAU, Rajendranagar, Hyderabad
[5]Associate Dean & University Head (REE), College of Food Science and Technology, PJTSAU, Rudrur, Nizamabad

ARTICLE ID: 019

Introduction-

In the daily diet vegetables have been strongly associated to overcome many health problems like gastrointestinal health, good vision and reduced risk of heart disease, stroke, chronic diseases such as diabetes and some forms of cancer. Many other colored vegetables carrot is a gold mine of antioxidants. Carotenoids, polyphenols and vitamins present in carrot act as antioxidants, anticarcinogens, and immune enhancers. Carotenoids widely distributed in orange carrots are potent antioxidants which can neutralize the effect of free radicals. They have been shown to have inhibition mutagenesis activity contributing to decrease risk of some cancers.

The effect of biofortification on concentrations of bioactive compounds in carrots concluded that serum antioxidant capacity and retinol did not differ among treatment groups. Liver antioxidant capacity and vitamin A stores were higher in gerbils fed colored carrots than in those fed white carrots. Antioxidant activity is one of several proposed mechanisms by which plant foods, like bio fortified carrots, may provide additional health benefits beyond maintenance of vitamin A status.

According to these investigators higher blood glucose levels, as well as higher fasting levels of insulin, were observed in study participants with lower level of carotenoids.

JUST AGRICULTURE
multidisciplinary e-Newsletter

Carotenoid levels also decreased as the severity of glucose intolerance increased. These findings suggest that carrot and vitamin A-rich carotenoids might help diabetics to manage their condition.

Carrot showed cholesterol absorption mitigating effects in experimental carrot fed rats. Regulation in bile acid secretion and antioxidant status was also reported. A significant decrease in liver cholesterol and triglyceride levels was also observed by these investigators. Moreover, carrot consumption increased the vitamin E level in plasma and increased the ferric reducing ability of plasma.

Red beetroot (*Beta vulgaris rubra*) as a source of nitrate, provides a natural means of increasing *in vivo* nitric oxide (NO) availability. It is also being considered as a promising therapeutic treatment in a range of clinical pathologies associated with oxidative stress and inflammation. The betalain pigments, display potent antioxidant, anti-inflammatory and chemo-preventive activity *in vitro* and *in vivo*. It helps in prevent cardiovascular disease, cancer and it also helps to reduce blood pressure, attenuate inflammation, avert oxidative stress, preserve endothelial function and restore cerebro vascular haemo dynamics.

Beetroot is an excellent food which plays a very important role for the development and growth of human body. It also acts as fruit as well as vegetable. Fresh form of beetroot consumed generally as a salad. Other than as a food, it play another role as a natural colorant in textile industries and as a medicinal plant to cure the various illness.

Multiple health benefits of polyphenol consumption, beverages containing high amounts of them can be considered a positive addition to the diet. Additionally, both sensory characteristics and convenience would appear to be important factors in obtaining an increased level of consumption. The beetroot juice contributes to improve the hemoglobin in the blood. The price of beetroot is low compared to others and can be stored easily.

The *Beta vulgaris, L.* is a traditional and most popular vegetable in many parts of the world. Beet root leaves are rich source of potent nutrient, potassium and vitamin A, K and C, which are important for cardiovascular (CVD) health. Beetroot leaves are used to reduce blood pressure and also as a tool to fight against cancer. The beetroot leaves can be advised to children, adults, pregnant women and diabetes patients.

JUST AGRICULTURE
multidisciplinary e-Newsletter

In human studies to date, beetroot supplementation has been reported to reduce systolic and diastolic blood pressure, inhibit platelet aggregation, improve vascular and endothelial function, reduce blood glucose and improve insulin homeostasis, and possess reno-protective properties. Beetroot contains high concentration of phytochemicals and essential nutrients and is abundant in inorganic NO_3. Bioactive compounds are believed to play crucial roles within the mechanistic pathways and be responsible for the promising clinical effects.

Fruits and vegetable processing sector is very important as it ensures employment to large section of unemployed youth along with it prevents the huge post-harvest losses to meet the nutritional and food security of the growing population. In view of migration of rural population to urban areas, the demand of processed vegetables is increasing.

Generally, traditional preparations like chutneys, pickles and chutney powders are consumed along with rice, breakfast items such as vada, idly, dosa, chapathi, upma and samosa, and various snack foods, etc., as a side dish, which also increase appetite. The chutney powder has significant amounts of minerals, viz., calcium, iron and copper. Thus, the curry leaf chutney powder can be considered as a rich appetizing adjunct with a good amount of minerals and protein.

Post harvest losses of vegetables:

Post harvest losses in vegetables are a major problem in the supply chain from production in the field to the consumers table. Post harvest losses vary greatly among commodities and production areas and seasons. In India, the losses of fresh vegetables are estimated to range from two to 23 per cent, depending on the commodity, with an overall average of about 12 per cent between production and consumption.

Post harvest losses at farm level were estimated to be 9.40 quintals per hectare. It have been reported that total post harvest losses at market level was found to be 5.95 kg/q out of which contribution of losses at wholesaler and retailer level was 3.27 and 2.68 kg/q respectively. Therefore, the post harvest losses during harvesting and handling can be overcome by providing better financial facilities to the farmers so that they do not face problems regarding storage charges and using required equipments.

JUST AGRICULTURE
multidisciplinary e-Newsletter

Nutritional properties of carrot and beetroot vegetables:

Chemical properties of yellow carrot leaves and possibility to use its methanol and acetone extracts as a new source of natural antioxidants. Obtained results showed that carrot leaves could be considered as a source of carbohydrates and protein, which represented 61.36% and 20.27% (dry weight), respectively. Also, it was a good source of some minerals such as potassium (975.00 ppm). It was observed that extraction efficiency of methanol was higher than acetone where, it contained 82.07 mg/ml total phenols as galic acids. Both of two extracts had antioxidant effect.

Natural and dehydrated beetroot leaves in terms of fatty acid composition, proximate composition, minerals, total phenolic compounds (TPC) and antioxidant activity by DPPH in different stages (60, 80, and 100 days) of development. The beetroot leaves showed significant levels of protein and lipids in all developmental stages, and all proximate composition nutrients decreased during these maturation stages and the highest content was observed at 60 days. The Fe content decreased during the developmental stages (from 342.75 to 246.30 mg/kg), while the content of K increased (from 13,367.64 to 20,784.90 mg/kg). With regard to fatty acid composition, linolenic acid was present in the greatest quantity and it increased up to 2.58 mg/g (in natura) and 40.11 mg/g (dehydrated) at 100 days of development. The n-6/n-3 ratios were low in all stages.

Nutritional composition of beetroot leaves

S. No	Component	Content
1	Moisture (g/kg)	913.0±8.1
2	Carbohydrate (g/kg)	10.30±0.9
3	Ash (g/kg)	14.8±0.1
4	Protein (g/kg)	24.7±0.3
5	Total fat (g/kg)	7.9±0.3
6	Dietary fiber (g/kg)	29.3±0.3
7	Iron (mg/kg)	25.4±0.1
8	Zinc (mg/kg)	4.1±0.2
9	Calcium (mg/kg)	525.0±7.3
10	Energy value (kcal/kg)	211.4±0.4

JUST AGRICULTURE
multidisciplinary e-Newsletter

Fresh carrot leaves

Dried Carrot leaves powder

Fresh beet root leaves

Dried beetroot leaves powder

Preprocessed vegetable powders

Control instant chutney powder

ULV incorporated instant chutney powder

Standardized instant chutney powders

JUST AGRICULTURE
multidisciplinary e-Newsletter