

## Nutraceutical Vegetables: A Delicious Path to Improve Wellbeing

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ARTICLE ID: 43

In the global scenario, Vegetables play a significant role in nutrition and food security. India is producing 204.83million metric tonnes of vegetables from an area of 11.35 million hectares (2022-23). According to FAO (2021), India is the largest producer of okra and ginger among vegetables& ranks second in the production of onion, potato, cabbage, cauliflower and brinjal. India is also the second largest producer of vegetables in the world and accounts for 15 percent of the world's production. During 2021-22, India exported fresh vegetables worth Rs. 5745.34 crore and processed vegetables of Rs 3986.45 crore to Bangladesh, Nepal, UAE, Netherlands, Malaysia, Sri Lanka, U.K., Oman and Qatar countries and earned a sizeable foreign exchange. Recently farming communities have also been shifting from traditional cereal crops to vegetable farming due to high yield, short duration, intensive cropping system, high income and also more employment generations.

Vegetable crops have great potential to improve the nutrition as well as food security of the world. Vegetables are a rich source of many minerals, vitamins, dietary fibers and several biochemical constituents which are important for food nutrition and health. A healthy human is one who has the capacity to carry on all the daily routine functions expected from a normal human being. According to the Natural Institute of Nutrition, reported human being healthy diet needs to include nearly 100 g of green leafy vegetables, 200 g of other vegetables and 100 g of roots & tuber vegetables. Though the world over even in the non- vegetative diets the substantive role of the use of vegetables has been recognized the country like India where the majority population consumes vegetative diets particularly greens the importance of vegetables in human diets has increased not only because of abundance and cheap availability throughout the season but because of the fact that the vegetables check food problem and malnutrition leading to a good health.

Vegetables are generally low in energy and dry matter content, but immensely important as a source of protective nutrients, especially vitamins, minerals, dietary fibers and folic acids which are essentially required by our body for its proper maintenance. Vegetables are known as protective foods because the phytochemicals present in vegetables protect the human body from cancers and cardiovascular diseases. Leafy green is a rich source of calcium, phosphorus and iron. Although vitamin C (ascorbic acid) is only a minor constituent of vegetables, virtually, dietary vitamin C (approx. 90 %) is obtained from fruits and vegetables.

Leafy vegetables, roots and tubers are generally poor sources of protein, as they contain less than 2 percent protein. Peas, beans and other vegetables and legumes, which contain around (6-7 %) of protein, are good sources of easily digestible protein and vegetables also supply a fair amount of carbohydrates and calories (10%). They neutralize the acid produced during the digestion of meat, cheese and other high-energy foods. Due to their high-water content and fibers, leafy vegetables and roots probably aid in digestion and utilization of more concentrated foods in the human diet.

### **Nutrition from Vegetables:**

#### **Minerals:**

At least ten minerals are required for the proper growth and development of our body. Out of these calcium, phosphorus and iron are required in large quantities which are not present in many other foods and vegetables are fair suppliers of these minerals required for our bodies.

- ✚ **Calcium:** Required for healthy bone and provides resistance to infection in the body. In its deficiency, children suffer from rickets (softening of bones), irritability, blood clotting, retard growth and teeth becoming bad in appearance. Vegetables are generally a good source of calcium. Green beans, cole crops, carrots, lettuce, onion, spinach, pea and tomato are good suppliers of calcium to the body.
- ✚ **Iron:** It is an essential part of red blood capsules and is also the best carrier of oxygen in the body. Its deficiency causes anemia, fatigue and pale skin, eyes and mouth face. Green leafy vegetables are rich in iron and also present in cabbage, pea, bean, watermelon and tomatoes.

- ✚ **Phosphorus:** It is required for cell multiplication of both bones and soft tissues and also for the maintenance of the proper liquid content of the tissue. It is available in potato, carrot, cauliflower, carrot, tomato, cucumber, palak, onion, garlic and amaranthus.

### Vitamins

- ✚ **Vitamin A:** Vitamin A is necessary for clear vision in dim light and also provides resistance to the infection in respiratory and digestive systems. It is also responsible for roughness, dryness and acne in the skin. It is not present as retinol in vegetables. Orange-yellow pigments in vegetables known as carotenoids are converted into vitamin A in the body.  $\beta$ -carotenes are precursors of Vitamin A and leafy vegetables, carrots, tomato, cabbage, broccoli, sweet potato, muskmelon and pumpkin are good sources of carotene.
- ✚ **Vitamin B(B<sub>1</sub>, Thiamin):** Deficiency causes beriberi disease, loss of appetite, muscular weakness, loss of weight and expansion of the heart. It is essential for growth and reproduction and can be obtained from lettuce, cabbage, green pepper, carrot and onion.
- ✚ **Vitamin (B<sub>2</sub>, Riboflavin):** It is essential for energy production in cells. Its deficiency causes dark red tongue, diarrhea, loss of hair, pellagra (cracking of skin) and loss of weight and appetite. It can be obtained from green leafy and fruit vegetables.
- ✚ **Vitamin(B<sub>6</sub>, Pyridoxine):** This vitamin is needed for the normal metabolism of tryptophane to nicotinic acid and has a role in nervous tissues and also in anemia. Leafy vegetables are high in this vitamin.
- ✚ **Vitamin C:** Its deficiency caused unhealthy gums, tooth decay, scurvy disease(blood disease), poor wound healing, increase susceptibility to the infection of colds, loss of energy, anemia and enlargement and damage to heart vessels. Vegetables are the major source of this vitamin for human nutrition. Tomato has an average of 25 mg of ascorbic acid in 100 g. Other vitamin C vegetables include fenugreek, palak, cauliflower, cabbage, knol-khol, bitter gourd, green pepper and pea. The concentration of vitamin C in vegetables is generally decreased after harvesting.

- ✚ **Vitamin E:** It is the most abundant fat-soluble antioxidant in the body. It is instrumental in preventing oxidative damage. There is also a link between low levels of vitamin E and immune deficiency. It is found in vegetables like parsley, spinach, broccoli and asparagus.

**Dietary fibers:**

The indigestible carbohydrates present in foods are commonly known as dietary fibers. It may include highly insoluble structural fiber comprising cellulose, hemicelluloses and lignin as well as a soluble fiber composed of pectin, plant gums and mucilages. The enzymes of the stomach and small intestine do not digest dietary fibers, whereas most of the carbohydrates like starch and sugars are digested and absorbed. The dietary fibers have the property of holding water and swelling. Thus, these fibers add bulk to the diet and increase transit time in the gut. It is associated with a reduced incidence of coronary heart disease. It binds to bile salts and prevents its re-absorption and reduces cholesterol levels in circulation. Besides, fiber particularly the gums, and pectin when ingested, reduces post-prandial glucose levels in the blood. The gum present in fenugreek seeds is effective in reducing blood glucose and cholesterol levels. Thus these types of dietary fibers are often recommended for the management of certain types of diabetes. A low-fiber diet is associated with colon cancer moreover; vegetables are a rich source of dietary fibre.

**Source of protein:**

The main function of the protein is to serve as the building blocks of the body cells. They are part of the enzymes necessary to carry out the body's function. Peas and beans are important sources of vegetable protein which is digested in the intestinal tract and broken down into amino acids.

**Antioxidants:**

Vegetables contain several compounds that are valuable antioxidants. Carotenoids are one of the main among them. Lycopenes have the greatest antioxidant properties,  $\beta$ -carotene and cryptoxanthin are next in order, then lutein and zeaxanthin. Lutein (dark green leafy vegetables) can also act as an immune stimulant. Lutein also increases the density of muscular pigment in the eyes and may reduce the risk of age-related macular degeneration.  $\beta$ -carotene is a safe source of vitamin A. It does not have toxic effects associated with high levels of vitamin A.  $\beta$ -carotenes are most abundantly found in dark green, yellow, orange and

red vegetables such as spinach, carrots, pumpkin, tomatoes, peppers, broccoli and watermelon. Cruciferous vegetables contain high levels of antioxidants. Minerals have an important role in the effective functioning of antioxidant enzymes. Selenium improves the absorption of vitamin E, and enhanced the beneficial effects of selenium.

#### **Flavonoids:**

Tomatoes contain high levels of flavonols (1.3-22.2  $\mu\text{g/g}$  fresh weight). About 98 percent of it is found in the skin of the fruit. Qualitative analysis of flavonols in tomatoes shows the presence of quercetin and kaempferol, primarily as conjugates. Lettuce, onion, red pepper, broad bean and French bean are having different quantitative distributions of flavonols.

Based on the discussion, it can be concluded that vegetables play a crucial role in addressing hunger and malnutrition. They are highly nutritious and easily digestible, making them ideal for improving the health and well-being of individuals. The potential of vegetables to ensure food and nutritional security for millions of people in our country is immense. One significant advantage of vegetables is their ability to yield high quantities in a short period, leading to economic returns for farmers. This not only benefits the farmers themselves but also creates employment opportunities both on the farm and in related industries. Therefore, the cultivation and production of vegetables can contribute to the overall development of the agricultural sector and the economy as a whole. In terms of human health, consuming fresh vegetables and their processed products enriched with nutrients can enhance immune function.

Vegetables are rich in vitamins, minerals, antioxidants, and other bioactive compounds that are essential for maintaining a strong immune system. This is crucial in protecting the body against diseases and even slowing down the aging process. Furthermore, vegetables add variety and flavor to the diet, making meals more enjoyable and appetizing. The diverse range of vegetables available provides a wide array of nutritional and health benefits. These bioactive compounds present in vegetables contribute to human growth, development, and overall health. In summary, the discussion establishes that vegetables are highly nutritious, easily digestible, and hold a significant position in eradicating hunger and malnutrition. They offer economic benefits to farmers, generate employment opportunities, and contribute to food and nutritional security. Additionally, vegetables contribute to



improved immunity, provide essential vitamins and minerals, and offer a range of health benefits. Including a diverse group of vegetables in our diet can promote human growth, development, and overall well-being.

