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Antioxidant Potential and Nutritional Values of Vegetable Crops

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What is Antioxidants ?

Antioxidants are substances that can prevent or slow damage to cells caused by free radicals, unstable molecules that the body produces as a reaction to environmental and other pressures.

Importance of Antioxidants

The antioxidants contained in vegetables play an important role in the maintenance of health and prevention of disease. A number of vitamins such as A, C, E, as well as carotene are excellent antioxidants, which also contribute to good health through other mechanisms, such as being co-factors for certain enzymes, involvement in oxidation-reduction reactions . It has been estimated that every serving increase in vegetable consumption reduces the risk of cancer by 15%, cardiovascular disease by 30% and mortality by 20%, attributable to antioxidants such as ascorbic acid, vitamin E, carotenoids, lycopenes, polyphenols, and other phytochemicals . A diet rich in fresh vegetables protects from the risk of most common epithelial cancers, including those of the digestive tract, and several non-digestive neoplasms. Selected antioxidants, β-carotene, vitamins C and E showed a significant inverse relation with the risk of oral, pharyngeal, oesophageal and breast cancers. Against colorectal cancer, the most consistent protective effects were provided by carotene, riboflavin and vitamin C, but inverse relations were observed for calcium and vitamin D. Potentially anticarcinogenic agents found in vegetables also include numerous micronutrients, such as selenium, dietary, fiber, glucosinolates and indoles, avonoids, phenols, protease inhibitors and plant sterols.

What are the benefits of antioxidants?

A diet high in antioxidants may reduce the risk of many diseases (including heart disease and certain cancers). Antioxidants scavenge free radicals from the body cells and prevent or reduce the damage caused by oxidation.

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Green Leafy Vegetables:

Spinach and kale are also rich sources of carotenoids and polyphenols. Spinach has an exceptionally high total polyphenol and flavonoid content. The high level of polyphenol acids and flavonoids in spinach leaves influences the high antioxidant activity. Spinach and kale also contain lutein, which is known for its antioxidant activity. Lettuce has an effective antioxidant and other health-promoting properties. Among various types of lettuce commonly grown, leaf-type is most abundant in health-promoting phytochemicals.

Tomato :

Tomatoes, one of the most produced and consumed vegetables worldwide, are a rich source of lycopene, β-carotene, potassium, vitamin C (ascorbic acid), flavonoids, rutin, plastoquinones, phenolics, tocopherol (vitamin E) and xanthophylls. The average values obtained for antioxidant components in three fresh cultivars are ascorbic acid, 276 mg/100 g dry matter; total phenolics, 613 mg gallic acid equivalents/100 g dry matter, and lycopene 38 mg/100 g dry matter. Vitamin C is considered an excellent antioxidant because it donates electrons for enzymes, or other compounds that are oxidants. Tomatoes are relatively low in beta-carotene, but high in lycopene, an active antioxidant agent with no vitamin A activity. Lycopene is an interesting antioxidant because it is fairly stable to storage and cooking, and thus, is present in the cooked tomatoes that are consumed frequently, and account in part for the lower heart disease and cancer risk. In addition, many epidemiological studies have suggested that the regular consumption of tomatoes may lead to a decreased incidence cardiovascular disease incidence and reduced risk of breast, colon, lung, and prostate cancers.

Bulbs and Root crops:

Aerial parts (leaves and stem) of radish, which are usually discarded, possesses potent antioxidant and radical scavenging activity, as measured by standard antioxidant assays. HPLC identification of polyphenolics indicated the presence of catechin, protocatechuic acid, syringic acid, vanillic acid, ferulic acid, sinapic acid, myricetin and quercetin in leaves and stem. Leaves and stem of radish had total polyphenolic content of 86.16 and 78.77 mg/g dry extract, respectively. Often underutilized part of this vegetable thus possesses considerable amount of polyphenolics. Hence, it should be regarded as a potential source of natural

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antioxidants, and could be effectively employed as an ingredient in health, or in functional food.

Carrots are high in fibers, carotenoids, vitamins C and E, and phenolics such as coumaric, chlorogenic and caffeic acids. Water-soluble anthocyanin obtained from the carrot also possesses antioxidant properties. Drinking carrot juice may protect the cardiovascular system by increasing total antioxidant status, and by decreasing lipid peroxidation. Water soluble antioxidant capacities of carrot juices can be increased by thermal treatment and maintained by high pressure treatment.

Chili and Sweet papper:

The nutritive value of chilli is largely determined by ascorbic acid content. The variability of ascorbic acid content in the genotypes suggests that these selected genotypes may be useful as parents in hybridization programmes, to produce fruits with good nutritional values . Ascorbic acid content of sweet pepper also increases with fruit ripening, while decreases during post harvest handling.

Pepper is an important source of nutrients in the human diet, and an excellent source of vitamins A, C and E, as well as neutral and acidic phenolic antioxidants important in plant defense responses. Two fractions of phenolics, flavonoids (with phenolic acids) and capsaicinoids isolated from the pericarp of pepper fruit showed antioxidant activity.

Conclusion:

Vegetables contain significant antioxidants to offer great potential as protective food. They are gaining importance in human diet as anticarcinogenic agents. Consumption of vegetables and their products should be promoted among common people to improve nutrition and derive health benefits.