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Mango:Carotenoids

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Abstract:

Mango also referred to as the king of tropical fruits. Mango is an important fruit crop cultivated in tropical regions. Colour pigments are also termed as Carotenoids which are responsible for the characteristic colour of mango outside colour and pulp. Carotenoids also have a key role in biological functions of animals and plants.

Keyword: Mango Market, Carotenoids, Antioxidants, Stability.

Introduction

Mango also referred to as the king of tropical fruits. Mango is an important fruit crop cultivated in tropical regions. Colour pigments, termed Carotenoids, are responsible for the characteristic colour of mango. Carotenoids have very diverse roles in biological functions of animals and plants including provitamin A activity, antioxidant activity, cell communication, immune function enhancement, UV skin protection, accessory pigments for light harvesting, and protection against photo-oxidative damage. Persons who have low content of carotenoids in blood cause a degenerative disease in some cases. This disease caused by free radicals^[1]. Carotenoids have an antioxidant property due to which it can help in preventing the free radical damage. Thus, carotenoids have been noted as being the most abundant micronutrients found in cancer-preventative foods^[2]. Mango carotenoids are synthesized in mango fruit during ripening. The edible portion turns from

pale yellow to yellow to deep yellow to orange-yellow during ripening due to carotenoid development. Carotenoid pigments are fairly stable within plant cells, but they are labile when fruits are subjected to postharvest handling and processing methods. Mangos are sensitive to oxygen, peroxides, temperature, light and length of storage^[1]. Exposure to any of these elements may cause undesirable alterations in structure and bioactivity of carotenoids (in terms of isomerisation, oxidation, or degradation). These alterations may in turn alter the UV-VIS properties of carotenoids, yet colour appearance to the eye is mostly unaffected. Many different ripening conditions, postharvest treatments, and processing methods are used to prepare mangos for marketing to consumers. Any of these processes can affect the synthesis of mango carotenoids during ripening^[1].

Previous studies have focused on antioxidant activity of carotenoids; yet, no research has been done to quantify changes in antioxidant activity as a result of ripening conditions, postharvest treatments, or processing methods. It is essential to preserve carotenoid structural and functional integrity of mango throughout ripening, handling, postharvest treatment, processing, and storage. Although mangos rank among the top ten fruits in total world production^[1].

II. MANGO CAROTENOIDS:

The characteristic colour of the mango is mostly due to the presence of carotenoids, with the exception of some red anthocyanins present in the skin. The term carotenoid summarizes a class of structurally related 40-carbon compounds made of eight repeating isoprene units. Mangos contain both provitamin A carotenoids (carotenes) such as α -carotene, β -carotene, and γ -carotene; and oxygenated carotenoids (xanthophylls) such as β -cryptoxanthin, lutein, zeaxanthin, violaxanthin, antheraxanthin, auroxanthin, and neoxanthin^[4, 5]. Carotenoids have key role in the biological functioning of living organisms, including provitamin A activity, antioxidant activity, modulation of detoxifying enzymes, regulating gene expression, cell communication, immune function enhancement, UV skin protection, and visible colour^[3].

The diverse functions of carotenoids contribute to their distribution in plants. Carotenoids are among the widest distributed class of pigments. The major functions of carotenoids are accessory pigments for light harvesting and prevention of photo-oxidative damage. Carotenoids are tetraterpenoids with a basic structure consisting of eight isoprenoid residues arranged in two, 20-carbon units formed by head-to-tail condensation^[1]. The carotenoids are symmetrical molecule which has a basic C₄₀ skeleton structure. On the basis of this basic structure, carotenoids may contain various functional groups that distinguish them from one another. Carotenoids composed solely of carbon and hydrogen is termed carotenes. Oxygenated carotenoids have oxygen molecule extra in addition to carbon and hydrogen, are termed xanthophylls. Carotenoids cause a deep yellow, orange, and red colours which are due to the large amounts of conjugated carbon-carbon double bonds, exhibiting absorption maxima in the region of 400 to 500 nm. During early in ripening xanthophylls are predominant. During later in ripening β , α , ζ , and γ -carotenes are predominant^[5].

III. Carotenoids As Antioxidants:

Carotenoids chemical structure shows conjugated double bonds. These double bonds can give functional properties and provides a reactive electron rich system which is susceptible to attack from

electrophilic compounds. Carotenoids having a β -ionone ring in its structure. This structural characteristic contributes largely to carotenoid antioxidant functions^[1].

IV. CAROTENOID STABILITY:

Stability: The colour and antioxidant properties of carotenoids are due to presence of high degree of unsaturation in carotenoid structure. Carotenoids can undergo isomerization, oxidation, and degradation^[6].

Instability: Carotenoids get instable due to presence of conjugated double bonds. Carotenoids are sensitive to oxygen, peroxides, temperature, light, modified atmosphere packaging, and length of storage. Exposure to above elements may cause destruction or isomerization. When carotenoids exposed to light, heat, oxygen cause a *cis*-isomer occurs in more content^[8].

V. CAROTENIDS SHELF LIFE: Thermal pasteurization may be used for reducing the microbial contamination. Mango products are often mixed with vitamin A and/or vitamin E. Both vitamins are antioxidants. Sweeteners are also added for improving taste and wide acceptance^[6]. Fructose is an effective sweetener. Mangos have a Fructose in high concentration. Fructose is a reducing sugar which has a free hydroxyl group that may interact with surrounding molecules^[6].

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