

Carotenoids and derivatives: versatile compounds for Nature and the agro-food industry

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Carotenoids are isoprenoids widely distributed in Nature. They are biosynthesized by all photosynthetic organisms and some fungi, bacteria and arthropods. They appeared early in life history on Earth in cyanobacteria to intervene in photosynthesis and protect them from photooxidation. Curiously, millions of years later some carotenoids are selectively transported to the human macula lutea, the location of the retina receiving the highest intensity of light radiation. In between, carotenoids can be found in many organisms adapted to live in the most diverse environments, where they intervene in different actions. Additionally, carotenoids can be converted enzymatically or non-enzymatically into a myriad of compounds that expand the diversity of actions carotenoids are involved in. Examples of derivatives are retinoids with vitamin A activity. Considering that carotenoids are essential in photosynthesis (the engine of life on Earth), for the pollination and the dispersal of seeds (as they attract pollinators and seed dispersers through their colours and aroma-derived compounds) and for the regulation of key processes in plants (through phytohormones and other signalling molecules) and that plants are essential to feed animals and humans, it can be stated that the importance of carotenoids in food security is undeniable. Beyond these facts, carotenoids are versatile components of foods as they are colorants, precursors of vitamin A and they are involved in health-promoting biological actions. Due to their versatility, carotenoids and their derivatives can be used for different applications for the agro-food and other industries. While there are well-established commercial applications, others are emerging and many more can be envisaged.