

## **Haematococcus pluvialis as a potential source of astaxanthin with diverse applications in industrial sectors: Current research and future directions**

### **ABSTRACT**

Haematococcus pluvialis, a green microalga, appears to be a rich source of valuable bioactive compounds, such as astaxanthin, carotenoids, proteins, lutein, and fatty acids (FAs). Astaxanthin has a variety of health benefits and is used in the nutraceutical and pharmaceutical industries. Astaxanthin, for example, preserves the redox state and functional integrity of mitochondria and shows advantages despite a low dietary intake. Because of its antioxidant capacity, astaxanthin has recently piqued the interest of researchers due to its potential pharmacological effects, which include anti-diabetic, anti-inflammatory, and antioxidant activities, as well as neuro-, cardiovascular-, ocular, and skin-protective properties. Astaxanthin is a popular nutritional ingredient and a significant component in animal and aquaculture feed. Extensive studies over the last two decades have established the mechanism by which persistent oxidative stress leads to chronic inflammation, which then mediates the majority of serious diseases. This mini-review provides an overview of contemporary research that makes use of the astaxanthin pigment. This mini-review provides insight into the potential of H. pluvialis as a potent antioxidant in the industry, as well as the broad range of applications for astaxanthin molecules as a potent antioxidant in the industrial sector.