

Exploiting *Chlorella zofingiensis* for the production of secondary carotenoids

Diana Simionato, Maddalena Salvalaio, Tomas Morosinotto and Nicoletta La Rocca

PARLAB, Dipartimento di Biologia, Università degli Studi di Padova, via U. Bassi
58/B,35121, Padova (nicoletta.larocca@unipd.it)

Microalgae in the last years are receiving increasing attention for their possible biotechnological utilization. In fact, they could be exploited for the production of molecules which can be introduced in the industry at multiple levels. Among the diverse applications, fields of interest are aquaculture, pharmaceuticals, nutraceuticals and cosmetics. These fields share the utilization of molecules such as omega-3 or carotenoids that could be added to human and animal nutrition with already recognized benefits.

In this work we focused the attention on the freshwater *Chlorella zofingiensis*, which could be used in alternative to *Haematococcus pluvialis* for the production of carotenoids.

C. zofingiensis have been exposed to different growth conditions modulating illumination regime and nutrient concentration in order to evaluate which stimuli are responsible for a major accumulation of carotenoids.

In the case of *C. zofingiensis* the interest relies, above all, on the production of secondary carotenoids, in particular astaxanthin. This ketocarotenoid possess a strong antioxidant activity and it already has a profitable market all over the world. Actually, it is synthetically produced or naturally produced from *Haematococcus pluvialis*. The natural astaxanthin is more stable respect with the synthetic one and, in addition, *C. zofingiensis* presents a lot of advantages respect with *H. pluvialis*. For these reasons, it could be considered a valid alternative for the production of astaxanthin. In this work, it was observed that *C. zofingiensis* responds to high light and nitrogen deprivation increasing the production of secondary carotenoids in the expense of primary ones. In particular, when these two stresses are applied to the cultures, the rate of ketocarotenoids production is even speed up. From an industrial point of view, it was found that *C. zofingiensis* can accumulate a concentration of astaxanthin up to 5 mg/g dry weight which is a result in line and in some case even higher with those found in literature.

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