"**Optimization of myxoxanthophyll production in *Synechocystis salina***"

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A growing demand for natural colourants has led to the proposition to exploit microalgae for their production. Among the diverse cyanobacterial strains, *Synechocystis* is one of the most widely studied species. Although much progress has been achieved in the development of *Synechocystis* as a phototrophic cell factory by genetic engineering approaches, the biotechnological application of this cyanobacterium is still significantly lagging behind those like *Chlorella*, *Spirulina* or *Dunaliella*. *Synechocystis* produces a variety of carotenoids, the majors are β-carotene, zeaxanthin, echinenone and monocyclic xanthophyll glycoside myxoxanthophyll. Cyanobacterial myxoxanthophyll and closely related compounds are unusual because they are glycosylated on the 2'-OH rather than on the 1'-OH position of the end of the core molecule compared to the carotenoid glycosides produced by diverse microorganisms. Moreover, this unicellular cyanobacterium demonstrates versatile carbon metabolisms, growing under photoautotrophic, mixotrophic and heterotrophic conditions. The first aim of my thesis is to find optimal conditions of the cell culture factors (temperature, light, salinity or oxidative stress) in order to maximize *Synechocystis* growth and myxoxanthophyll production in autotrophic, mixotrophic and heterotrphic cultures, using statistical tools as experimental design and response surface methodology. The second aim is to develop the efficient extraction and isolation protocol based on counter current chromatography (CCC) to demonstrate myxoxanthophyll potential for application in nutraceutical, cosmetic and pharmaceutical industries. Finally, the third aim is the investigation of the biological properties of the isolated myxoxanthophyll.