

Pros and cons of cyanobacterial and microalgal biotechnology: academic and enterprise experiences

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We will present our experience in the development of algal biotechnology for innovative applications both as members of the Laboratory of Biology of Algae of the University of Rome "Tor Vergata" and as founders of the academic spin off AlgaRes srl. This derives from research carried out for over 20 years into the biology and ecology of cyanobacteria and microalgae. Our activities are dedicated to the selection and production of specific microalgal (cyanobacteria, green algae and diatoms) biomass for bioenergy, nutraceuticals and nanotechnology. We also focus on algal cultivation in wastewaters, integrating biomass production with wastewater remediation. Studies on the removal of nitrogen, phosphorous and heavy metals from aqueous media are carried out using suspended and attached biomass, also non-vital cells. We obtain monospecific cultures of native strains starting from natural mixed communities (aquatic and terrestrial) and all species put into culture are maintained as an 'algal library' for possible future applications. We have a large empirical experience in the growing of planktonic and benthic microalgae (biofilm) across an array of scales from the bench to photobioreactor (140 L) level. Advances have been achieved in sequential extraction of different products (exopolymeric substances, pigments and lipids) from the same biomass, as a possible valorisation process. Our experience indicates that intermediates and sub-products usage and microalgal growth in wastewater can represent optimization strategies in algal biomass technology. Due to its intrinsic multidisciplinary nature, we believe that effort is still needed in the interaction with project planners and engineers, investors and the industry.