ABSTRACT

The seed cells of oil crops and many strains of unicellular microalgae produce substantial amounts of lipids. These lipids are synthesized and accumulated mainly in the form of triacylglycerols (TAGs) and contribute to the major source of plant oils at a global scale as they are used as important compound of human and animal food as well as for biofuel production. However, to meet the global demand for plant oils it is necessary to increase their productivity in microalgae and oil crops. Nevertheless, the mechanisms governing the interplay between synthesis and degradation of TAGs in these organisms still remain not fully understood. Thus, the major aim of the proposed project is to identify and understand the molecular mechanisms governing the TAG homeostasis in two, evolutionary diverse, experimental models – oleaginous microalga *Nannochloropsis oceanica* and model land plant – *Arabidopsis thaliana*. This knowledge is essential to develop novel strategies of genetic engineering oriented towards boosting the lipid-rich biomass production from microalgae and oil crops. These studies are the first focused on identification and characteristics of yet unknown molecular mediators between the TAG synthesis/degradation cycles and developmental programs in microalgal and plant cells. Consequently, this project has a key meaning for our understanding of storage lipid metabolism in organisms with a high feedstock potential for biofuel and plant oil production.