

## CULTURE MEDIUM OPTIMIZATION AND LIPID PROFILING OF *CYLINDROTHECA*, A LIPID- AND POLYUNSATURATED FATTY ACID-RICH PENNATE DIATOM AND POTENTIAL SOURCE OF EICOSAPENTAENOIC ACID

Thomas M. Kiran<sup>1,2</sup>, M.V. Bhaskar<sup>1</sup> & K. Umadevi<sup>2</sup>

<sup>1</sup>Kadambari consultants Pvt Ltd

<sup>2</sup>Department of Botany, Andhra University

*Cylindrotheca*, an epipelic benthic pennate diatom, holds promise as a nutraceutical source and may be useful for aquaculture. Experiments were done on two *Cylindrotheca* species, *Cylindrotheca fusiformis* (UTEX 2084) and *C. closterium*, which was isolated from seawater collected offshore from Visakhapatnam, India. *C. closterium* was identified through microscopy and rDNA typing. Type and concentration of nutrient components in the culture medium that promoted best growth and highest lipid accumulation were identified. Lipid content was gravimetrically estimated. For relative comparison of the effects of different culture media on lipid content, we made estimations through rapid *in situ* screening method using Nile red staining and spectrofluorimetry. The fatty acid profile of lipid was obtained through gas chromatography-mass spectroscopy. Nualgi, a commercially available micronutrient ready-mix with elements adsorbed as nanoparticles on a modified silica sol, was found to significantly boost growth in both *Cylindrotheca* species when used *in lieu* of a conventional micronutrient mix prepared from eight compounds. Among the three nitrogen sources tested – sodium nitrate ( $\text{NaNO}_3$ ), urea, and ammonium chloride ( $\text{NH}_4\text{Cl}$ ) – best growth of *C. fusiformis* occurred on nitrate and urea, while  $\text{NH}_4\text{Cl}$  was best for *C. closterium*. Lipid productivity was much higher in cultures supplied with  $\text{NH}_4\text{Cl}$  for both *Cylindrotheca* species and compensated for lower biomass in *C. fusiformis*. Mixotrophy with glycerol or sodium acetate resulted in no significant increase in growth over photoautotrophy. Both *Cylindrotheca* species were lipid rich; lipid constituted 18–27% of dry biomass in the medium with  $\text{NaNO}_3$ . Among total fatty acids, polyunsaturated fatty acids constituted <40%, eicosapentaenoic acid 25%, and arachidonic acid ~8% and ~4% in *C. fusiformis* and *C. closterium*, respectively.  $\text{NH}_4\text{Cl}$ , phosphate, and Nualgi micronutrient ready-mix in concentrations optimal for each strain contribute to a good culture medium for *Cylindrotheca*.