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REVIEWS IN Aquaculture

REVIEW

An appraisal of the variable response of microalgal lipids to culture salinity

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Abstract

Salinity is a basic factor in microalgal aquaculture production that is easier to manage than other external factors. Optimized use of salinity is key to achieving widespread microalgal production that is more sustainable by avoiding freshwater inputs. Since salinity influences the content of many high-value lipid compounds in microalgae, assessing how the diverse plasticity of salt metabolism in numerous marine and freshwater microalgae is reflected in their broad lipid repertoire is an important issue that has yet to be addressed. Current studies indicate that a low phylogenetic diversity has been covered, as well as a high variability in the effects of salinity on some specific lipid types. In cultured marine microalgae, hypersalinity affects lipid profiles more than hyposalinity. Growth restriction due to salt stress represents an important interaction that reduces productivity and often masks the direct effects of salinity on total lipid and triglyceride contents. Sulpholipids and phosphatidylglycerol are the lipid classes whose changes are most related to salinity, while knowledge about the response of phospholipids, betaine lipids and sterols is incipient. Among saturated fatty acids, salinity induces greater interspecific variability in 14:0 in comparison with 16:0 and 18:0. Monounsaturated fatty acids change the most with salinity. 18-C polyunsaturated fatty acids tend to increase with salinity in marine microalgae and to decrease in freshwater species. Growing euryhaline microalgae in brackish water is a sustainable and favourable option to produce a variety of lipids of interest, including 20-C and 22-C polyunsaturated fatty acids with maximum nutritional value.

KEYWORDS
culture, fatty acid, lipid class, microalgae, salinity

1 | INTRODUCTION

Salinity is an important factor in microalgal mass production that has been less studied than other external factors such as temperature and irradiance. The greater attention paid to the effects of these two factors reflects the important influence that both exert on growth and production of microalgae.[1] However, the ability to control the effects of temperature and irradiance on microalgal production is inversely proportional to the size of the culture system. This especially affects outdoor mass production systems, under which conditions the options for regulating the effects of temperature and irradiance are very limited. Therefore, lower-cost outdoor open production systems are highly dependent on how environmental factors change. In this type of system, salinity takes on a key role as an easier factor to handle to optimize production. Production of freshwater microalgae at higher salinity is possible thanks to the availability of several salt-tolerant species.[2-5] Microalgal production in environments of variable salinity may be even more feasible if not only estuarine species

