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Determination of PUFA content in microalgae through Nile red fluorescence method

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Polyunsaturated Fatty Acids (PUFA's) are essential in children development and healthy diets. Among them Docosahexaenoic Acid (DHA) is linked to brain/eye development in children along heart disease prevention. DHA is usually obtained from fish-capture oil. But, due to depletion of its natural sources, seasonal variability in its composition, and potential chemical contamination alternative sources are becoming more relevant. Microalgae are some of the most suitable candidates to supply PUFA's. One problem is quantifying the amount of oils after fermentation. Currently, from the methods to measure PUFA's within microalgae cultures, the most popular are gravimetric and dying methods., Gravimetric methods are time-consuming, require larger samples, several steps, and solvents, therefore, they become impractical. On the contrary, dying methods, though more complex analysis-wise, are a good option when the samples are small and frequent. Nile Red Fluorescence (NRF) have proven to be successful to determine the content of PUFA's in microalgae, though it is not effective for microalgae with thick, rigid cell wall. NRF is a lipophilic dye, which properties are determined by the polarity of the surroundings. The method is based on dying the cell in the presence of a transporting carrier to make the membrane permeable to the Nile Red molecules. Dimethyl-Sulfoxide (DMSO) was our carrier. A spectrophotometer with the capacity to read microplates allowed the development of the protocols with an enhanced performance towards the qualitative analysis of lipid content. Excitation and emission wave lengths were measured as 535 nm, 660 nm respectively. After defining the excitation and emission characteristics, we built a calibration curve for determining lipids. The results were validated by comparing results from Bligh and Dyer method. NRF is a viable way to determine the content of lipid after the microalgae has reach the maximum oil production, this way quantifying PUFA yield will not be so time-consuming

Biography

Ruben Darío Múnera-Soto is a Chemical Engineer graduated from Universidad de Antioquia, the education field has been his passion ever since he has been graduated from college and he has worked with several Universities in his country in the areas of engineering and basic sciences. Currently, he is a student in the Chemical Engineering Master's Program at Universidad de Antioquia as in the field Biotechnology as a Member of the Bioprocess Research Group in the same university. As part of his forming activities he has been participated in a project aiming to solve malnutrition issues in Colombian children, and improve dietary problems in the population at large.

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Notes:

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