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Creation of synthetic mutualism to improve understanding of the relationships between microalgae and bacteria in fresh water

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A simple, quantitative synthetic mutualism model, offering a convenient and basic approach to studies of plant-bacterium interactions was developed and tested. This model involves immobilizing a unicellular, freshwater microalga, a species of *Chlorella* that serves as the plant and a plant growth-promoting bacterium (PGPB), a strain of a species of *Azospirillum* of agricultural origin. The two micro-organisms are immobilized together in small alginate beads to allow close initial interaction and avoid external interference from bacterial contaminants. Indole-3-acetic acid (IAA) that is produced by the bacteria has demonstrated its role in enhancing growth rates and population size of the microalga. The microalgae produce and exude tryptophan and thiamine, which are the precursors of IAA formation. Carbon and nitrogen molecules are exchanged between the two partners in this synthetic mutualism. This close interaction positively affects nitrogen, phosphorus, carbohydrates, lipids and photosynthesis metabolisms. All these significant metabolic changes during co-immobilization of the two micro-organisms are interlinked and offer several biotechnological applications. These include waste water treatment, carbohydrate and lipid production, photosynthetic pigments and food for human and animals. This synthetic mutualism model is also a simple and easy way to study fundamental physiological and molecular studies.

Biography

Luz E de-Bashan is the Vice-President of The Bashan Institute of Science, Alabama, USA and an Associate Professor at CIBNOR in Mexico. She has received her PhD from Laval University in Canada and Postdoctoral studies at the University of Arizona. She has published 113 scientific works, of which 58 were published in peer-review journals with high impact factors. She also serves as an Editorial Board Member of 3 scientific journals, ad hoc Reviewer of an additional 44 scientific journals in 12 countries and 4 funding agencies. Her studies were cited over 5700 times and her H-index is 34.

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