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Science, Technology, Research and Innovation for Development (STRIDE)

UPLBFI

Functional Genome Analysis of Gold Nanoparticle-Producing Plant Growth Promoting Bacteria Isolated from Philippine Soil

GRANTEE: University of the Philippines Los Baños Foundation, Inc. (UPLBFI)

PRINCIPAL INVESTIGATOR: Dr. Lilia M. Fernando

US UNIVERSITY PARTNER: Southern Illinois University-Carbondale (SIUC)

COLLABORATING PARTNER: Batangas State University (BatSU)

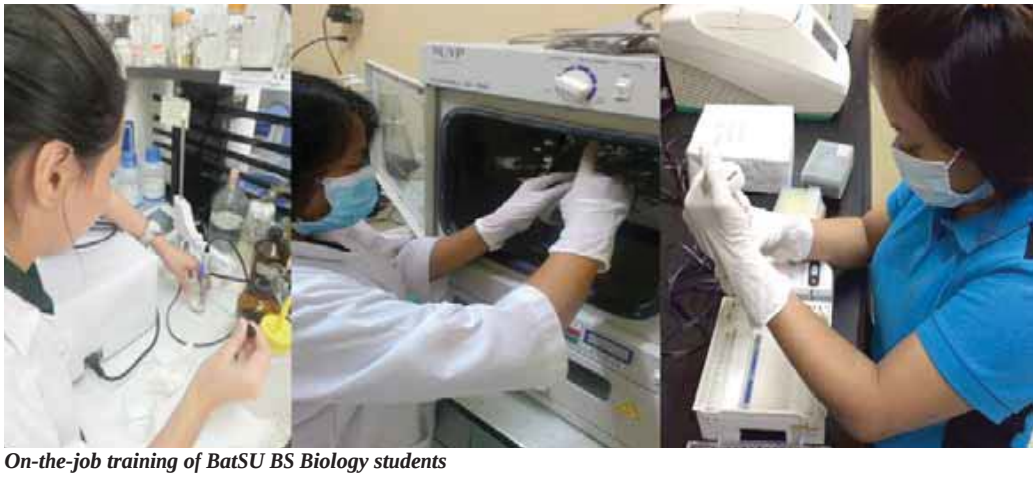
GRANT PERIOD: October 1, 2015 to February 28, 2017

CONTRACT AMOUNT: Php3,992,754 (approximately USD85,000)

Utilizing plant bacteria in nanotechnology

Nanotechnology is emerging as the platform for the next wave of development and transformation in most countries thanks to the wide application of gold nanoparticles in agriculture and medicine in drug delivery, imaging and diagnostics, and sensing. However, the conventional route for the synthesis of gold nanoparticles utilizes chemicals that often pose severe environmental and biological risks. Hence, there is a need to develop "eco-friendly" processes for the production of gold nanoparticles.

In response, UPLB, with support from USAID STRIDE and in collaboration with SIUC and BatSU, initiated a study that aims to determine the gene(s) responsible for the formation of gold nanoparticles by plant growth promoting bacteria from Philippine soil. This study complements and advances the research team's successful production of gold nanoparticles using bacteria, creating a bionanofactory.



On-the-job training of BatSU BS Biology students

Milestones

To date, the milestones of the project are as follows:

A member of the research team performs laboratory work at SIUC

- Training of research team members in transposon mutagenesis at SIUC paved the way for the establishment of a nanobiotechnology and molecular genetics/biology research laboratory at BatSU;
- Training in nanobiotechnology for two undergraduate students from BatSU at Biotech-UPLB capacitated the students to conduct experiments aimed at production of gold nanoparticles;
- Completion of dissertations on gold nanoparticles for two PhD students from UPLB at SIUC; and
- Training on transposon mutagenesis at SIUC, under the supervision of Dr. Kelly S. Bender, aided the investigation of the gene(s) responsible for biogenic synthesis of gold nanoparticles through the isolation of selected bacterial strains capable of mutating to produce the gold nanoparticles.

The study confirms that alternative biosynthetic approaches using microorganisms that are non-pathogenic to humans as bionanofactories to produce metal nanoparticles does not require special biosafety facilities. Some of these biosynthetic procedures led to the production of extracellular, homogeneous, monodispersed and water-soluble gold nanoparticles, which represent a non-toxic and environment-friendly "green" alternative to the commonly used chemical synthesis.