



USAID
FROM THE AMERICAN PEOPLE



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



Establishing A Registry of Philippine Coffee Varieties and Developing SNPs Markers for Increased Production

GRANTEE: De La Salle University (DLSU)

PRINCIPAL INVESTIGATOR: Dr. Ma. Carmen Ablan-Lagman

US UNIVERSITY PARTNER: New York University (NYU)

COLLABORATING PARTNERS: Cavite State University (CvSU)

GRANT PERIOD: October 1, 2014 to September 30, 2015

CONTRACT AMOUNT: Php 3,440,291 (approximately USD73,200)

Reviving the Philippine coffee industry

The Philippines used to command 4% of the global coffee market in the 1980s. Nevertheless, in 2011, it became a net importer, spending USD55.9 million on coffee from Vietnam, Indonesia, Malaysia, Thailand, and South Korea (UN Trade Statistics, 2012). Several factors contributed to this steady decline; plantations with coffee trees that are 20 years and older or past their prime for production; the occurrence of coffee rust; shifting land use patterns; and farmers' crops preference all affect the Philippine coffee supply and local market, as well as increase demands for imports.



Dr. David Hall, STRIDE Program Chief of Party and members research team led the ribbon cutting during the Inauguration of the Coffee Museum at the Cavite State University, Indang, Cavite

In 2009, a partnership between the Philippine government and private sector was established to revitalize the waning coffee industry and to address coffee shortage in the local market by replacing senescent trees, introducing innovative farming and processing technologies as well as disease resistant and higher yielding varieties. Although, the presence of all four traded coffee species in the Philippines is a favorable factor, it is unfortunate that there is no registry of coffee varieties in the Philippines to guide and assist nurseries in propagation of seedlings, rehabilitation of plantations, and identification of suitable growing areas.



The four high value species found to be commercially traded in the Philippines

In the effort to revive the coffee industry, DLSU, in collaboration with the National Coffee Research Development and Extension Center and NYU, and with support from USAID STRIDE, initiated the establishment of the registry of Philippine coffee varieties and development of single nucleotide polymorphism (SNP) markers for increased production.

The research provided opportunity to: a) determine varieties available in the market; b) know the preferences and practices of farmers for local production; c) gather information on prevailing market demands and trends; and d) discover SNP markers from DNA, which are valuable in genome-wide association studies for breeding programs and tissue culture.

Local coffee varieties

The four high value species found to be commercially traded in the Philippines are *Coffea arabica* (Arabica), *Coffea canephora* (Robusta), *Coffea liberica* (Liberica), and *Coffea cartimor*.

- **Arabica.** Self-pollinating and stable, but with spontaneous mutations and cross-breeding by coffee farmers, it has formed desirable characteristics. It is prone to insect infestation. It is grown mostly in the highlands of Benguet and Mindanao, which account for 60% of the Philippines' globally exported coffee.
- **Robusta.** Self-sterile that produces many different forms and varieties. It is the most abundantly produced in the Philippines because it thrives well in drained lowlands such as Cavite, Batangas, Bukidnon, Mindoro, and Davao.
- **Liberica.** Known as *kapeng barako* and *Excelsa*; the least produced variety. It is grown in Batangas and Cavite.
- **Cartimor.** A hybrid variety of Arabica and Robusta. It is a result of cross-breeding between the *Hibrido de Timor*, a naturally occurring Arabica-Robusta hybrid, and *Caturra*, a variety of Arabica cultivated in South Africa and East Africa.

Milestones

These species thrive best when propagated in their respective suitable environments, which also determines quality and quantity of production. Coffee varieties may be a result of natural processes or they may be created by human-mediated selection. The research has produced a registry of coffee cultivar varieties beneficial for coffee propagation among farmers and nurseries, to reduce farmers' dependence on what is readily or expediently available. The development of genetic markers for cultivars will likewise help in designing efficient breeding programs. Gene association studies in which performance traits may be correlated with known genotypes are very helpful, since the phenotype of coffee berries are observed after 4–5 years.

The successful implementation of the project resulted in identifying and documenting the various coffee varieties, mapping and SNP tagging of various cultivars, helping improve coffee production in coffee farming areas, and assisting the rehabilitation of coffee plantations.

The research team has started forging partnerships with the Philippine Department of Science and Technology (DOST) and *Gawad Kalinga*, a Philippine poverty alleviation and nation-building movement. DOST is interested in the mapping technology and the development of a less technical online platform for general use, and a manual of instructions for validation with online videos for training. DOST has also committed to organizing meetings of other coffee researchers from state colleges and universities. The team is likewise pursuing the "do-it-yourself" technologies and certification scheme for coffee beans, nurseries, farms, and farming systems with *Gawad Kalinga*, at the Enchanted Farm in Bulacan.