Agricultural genetics: A science tool to explore in Puerto Rico’s new age of agriculture [1]

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Picture from the cover of the Proceedings of the National Academy of Sciences of the United States of America. PNAS April 29, 2014, vol. 111, no. 17, 6117-6528

For around 10,000 years since the origin of agriculture in the Neolithic, modern humans had been using artificial selection for the improvement of crops and livestock. Previous to that period of time, humans had to live on what they found in the wild by hunting, fishing, and collecting seeds and roots to eat. In this context, Neolithic represents to human history the shift from a hunting-gathering economy to the direct production of food.

An important step for the initial development of agriculture was the domestication of cattle and plants, which includes domestication of cows, goats, pigs and rice, among other animal and plant species. According to a dictionary definition domestication can be defined as the *selective breeding of a species to make it more useful to humans*. By carefully selecting the best crops and

animals, it was possible to improve their quality and productivity, which significantly increased their economic value and usefulness in society. Domestication of these plant and animal species occurred in different geographic locations as prehistoric agriculture was spreading through the world.

Three main locations around the world have been identified as starting points of agriculture. The oldest one occurred at the “Fertile Crescent” in the Near East and evidence tells they were responsible for the domestication of cow, sheep, goat, wheat and barley around 10,000 years ago. A second location was China, where they domesticated pigs, dogs, rice and millet around 8,000 to 7,000 years ago. The third major agricultural center was Mesoamerica and they domesticated turkeys, tomatoes, beans and maize around 5,000 years ago. Crop cultivation facilitated the settlement of nomad peoples to produce, harvest and store food. Worldwide demographic expansions were experienced after agriculture.

The take home message of this story is that genetics has been a tool to improve biological species of economic value in agriculture. With the advent of today’s genetic technology the genomes of a number of plants and animals species that are valuable to agriculture had been sequenced. In Puerto Rico, a group of scientists are using these genetic tools to study naturalized cacao, cassava, and sweet potato to improve local crop productivity and consumability. On the other hand, livestock improvement in Puerto Rico had been mainly focused on beef and milk productivity by selective breeding of Senepol and Holstein breeds.

Puerto Rico’s new age of agriculture is based on solid science and technology. Crop and livestock improvement is of high importance to prepare Puerto Rico for self-sufficiency in food production. As the current world population continues to grow, food supplies are going to be more limited in the near future. Lets make a shift by engaging Puerto Rico to this new age of agriculture and science.

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