Cactus genes connect modern Mexico to its prehistoric past(2)

In prehistoric times farmers across the world domesticated wild plants to create an agricultural revolution. As a result the ancestral plants have been lost, causing problems for anyone studying the domestication process of modern-day varieties, but that might change. A team led by Fabiola Parra at the Universidad Nacional AutÃ³noma de México (UNAM) has managed to trace a domesticated cactus, the Gray Ghost Organ Pipe (Stenocereus pruinosus) to its living ancestor that can still be found in the TehuacÃin Valley in Mexico. The research is published in the September 2010 edition of the *Annals of Botany* at http://aob.oxfordjournals.org/cgi/content/abstract/106/3/483 [1]

Cacti were domesticated in prehistoric times for their fruit, pitaya. They're eaten around the world, but it's the pitaya of the Gray Ghost Organ Pipe that are most prized for their quality. Parra's team went to the TehuacÃin valley to examine the cacti and how they grew both in gardens and forests managed by the local people and in the wild.

Dr. Alejandro Casas, an ethnobotanist on the project, said: "What we found is that the people of the TehuacÃin Valley are carefully selecting and cultivating cacti to produce the pitaya they want. They're not attempting to produce one type of pitayo. They have a rich understanding of the cacti and are able to produce fruits with a variety of colours and tastes."

Genetic analysis revealed the garden cacti were more likely to carry duplicate copies of alleles (gene variants) in their chromosomes than their wild counterparts. It shows that evidence of artificial selection has left its mark in the cactus DNA. However, the genes from cacti grown using traditional methods in managed forests showed that domestication is not a simple process.

Casas added: "We found that the forest cacti showed more diversity in their genes than expected. It is not a case of finding a simple transition from wild to domesticated plants. The methods of propagation of cacti by the traditional farmers, including the production of a variety of fruits, help increase the genetic diversity of the cacti. This is a crucial strategy in conserving the genetic resources of Mesoamerica. In contrast agriculture in the industrialised world aims for mass-produced conformity in fruit."

Dr. Mark Olson, a biologist at UNAM who did not participate in the project, believes the research has significant implications for the future: "Mesoamerica is a real laboratory for the study of evolution and domestication is one of the most important ways available for studying the evolutionary process. It is a rare luxury to be able to study not only the descendants of selection but also to be able to examine a true

living ancestor.

"Perhaps more than any other region on earth, Mesoamerica has a range of grades of domestication, from the highly modified, such as maize, to plants only casually managed and in stages of 'incipient domestication'. Understanding this process will be important as Mexico becomes inundated with commercial varieties of corn, beans and other plants, all growing next to their wild ancestors."

Whether or not the future includes a domesticated Gray Ghost Organ Pipe remains to be seen. Parra notes that even cacti are struggling with the diminishing rainfall. This, and economic pressures, means that the traditional farming methods are in decline and may be lost in the future.

SOURCE [2]

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