Cocoa Genetics and Breeding

Thanks to modern genetic tools, the next two decades will witness changes in cocoa growing that were once only dreamed about.

Edward S. Seguine
Mars Chocolate North America

Mankind has enjoyed the fruits of the cacao tree for more than three millennia. While early inhabitants of the Americas probably did some of their own selections, the notion of breeding for this crop is new. Interest in collecting and then breeding spread to a number of cocoa research centers around the world in the early 1900s when they were formed. Breeding began in earnest in the 1940s. As we look back on the notion of breeding for cacao, however, only modest progress has been made in most areas of concern—disease resistance and productivity in particular—with only a few exceptions. Our original breeding approaches were based on the commonly understood structure of “criollo, forastero, trinitario” populations. Recent genetic approaches have revealed a totally different understanding of the underlying genome—driving a new opportunity for classical cocoa breeding in the future.

ORIGINS AND HISTORICAL SPREAD

With the release of the cocoa genome sequence into the public domain, cocoa has taken the first steps away from its historical orphan-crop status. Now current best-practice scientific tools are applied to leverage classical breeding of the crop. In order to understand the transformation that has occurred, it is necessary to review the origins and history of the spread of the crop from Mesoamerica and South America to today’s growing regions of the world, and the history and limitations of breeding that the crop has faced over the decades.

The origins of this ancient crop extend back into the early paleohistory of South America. Recent studies on the diversity of the genetic structure of the crop suggest that the locus of its origin occurred somewhere on the eastern side of the Andes in the upper Amazon forests behind Peru, Ecuador, Colombia and Venezuela (Figure 1). Today this is the center of the species’ greatest genetic diversity and the location of both historical and current collecting expeditions to acquire additional germplasm.

Paleohistoric Origins of Cacao

Edward Seguine is a chocolate research fellow at Mars Chocolate North America. From 1983 to January 2009 he worked at Guittard Chocolate and prior to that he spent 15 years at Procter & Gamble.