

Genome hints at markers for higher-producing, better-tasting chocolate

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The freshly sequenced genome of the most commonly cultivated *cacao* plant in the world is revealed in the open access journal *Genome Biology* this week. Researchers have utilised high quality DNA sequences to demonstrate the usefulness and quality of the sequence to identify genetic markers that can lead to higher yielding cocoa plants that still produce better tasting cocoa.

There are many varieties of the *cacao* tree (*Theobroma cacao* L.), but the green podded Costa Rican Matina or Amelonado variety is the most popular because of its high yield and pleasant flavor. In Ecuador, a red podded high yielding variety, CCN 51, is blended with a green podded, better tasting but lower yielding variety. But the adulteration reduces the overall quality of the chocolate, so *cacao* growers are keen to improve the quality of *cacao* beans exported from Ecuador.

Juan C Motamayor from Mars Incorporated, and colleagues sequenced the genome of the Matina *cacao* variety, then used [genetic analyses](#) and comparisons with other varieties, to highlight a gene involved in pod [colour variation](#). Zooming further in on the [gene sequence](#), they then identified a single DNA letter change that affected levels of the gene's expression, and so the colour of the pod.

Cacao plant breeders trying to produce a delicious high-yield strain through cross breeding have met with limited success. So the genetic marker could, in theory, be used to screen young seedlings, and highlight desirable plants long before they reach maturity. This would avoid the

expense and labour of growing up potential duds, ultimately improving the quality of *cacao* plants and the chocolate made from them.

Although the [genome sequence](#) of the Criollo *cacao* variety was reported two years ago, it's genetically quite distinct and so a poor representative of the *cacao* types cultivated worldwide.

Since the publication of the genome sequence, researchers have been working to identify [genetic markers](#) that can produce more productive cocoa plants for farmers while still providing consumers with high quality and superior taste. The genome sequence research is a part of an overall effort to use traditional breeding techniques to develop planting materials that farmers can use to be more productive.

Cacao trees are grown throughout the humid tropics in more than 50 countries, and *cacao* beans, harvested from the plants' pods, are used to produce chocolate as well as in the confectionary and cosmetic industries. *Cacao* production is essential to the livelihoods of around 45 million people worldwide, and to the happiness and well-being of millions and millions more.

More information: The genome sequence of the most widely cultivated cacao type and its use to identify candidate genes regulating pod color, Juan C Motamayor, Keithanne Mockaitis, Jeremy Schmutz, Niina Haiminen, Donald Livingstone III, Omar Cornejo, Seth Findley, Ping Zheng, Filippo Utro, Stefan Royaert, Christopher Saski, Jerry Jenkins, Ram Podicheti, Meixia Zhao, Brian Scheffler, Joseph C Stack, Alex Feltus, Guiliana Mustiga, Freddy Amores, Wilbert Phillips, Jean Philippe Marelli, Gregory D May, Howard Shapiro, Jianxin Ma, Carlos D Bustamante, Raymond J Schnell, Dorrie Main, Don Gilbert, Laxmi Parida and David N Kuhn, *Genome Biology* 2013, 14:R53, [doi:10.1186/gb-2013-14-6-r53](https://doi.org/10.1186/gb-2013-14-6-r53)

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