

Origin and dispersion pathways of guava in the Galapagos Islands inferred through genetics and historical records

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Abstract

Guava (*Psidium guajava*) is one of the most aggressive invasive plants in the Galapagos Islands. Determining its provenance and genetic diversity could provide valuable information for its control. With this purpose, we analyzed 11 SSR markers in guava individuals collected from Isabela, Santa Cruz, San Cristobal and Floreana islands in the Galapagos, as well as from mainland Ecuador. The mainland guava population appeared genetically differentiated from the Galapagos populations, with higher genetic diversity levels found in the former. By using different approaches for data analysis, we consistently found that the Central Highlands region of mainland Ecuador is one of the most likely origins of the Galapagos populations. Moreover, the guavas from Isabela and Floreana show a potential genetic input from southern mainland Ecuador, while the population from San Cristobal would be linked to the coastal mainland regions. Interestingly, the proposed origins for the Galapagos guava coincide with the first human settlements of the archipelago. By employing Approximate Bayesian Computation, we propose a model where San Cristobal was the first island to be colonized by guava from the mainland, from which it would have spread to Floreana and finally to Santa Cruz; Isabela would have been seeded from Floreana. An independent trajectory could also have contributed in the invasion of Floreana and Isabela. The pathway shown in our model agrees with the human colonization history of the different islands in the Galapagos. Our model, in conjunction with the clustering patterns of the guava individuals (based on genetic distances), suggests that guava introduction history in the Galapagos archipelago was driven predominantly by a single event (or events in rapid succession) instead of several independent introductions. We thus show that genetic analyses supported by historical sources can be used to answer questions on the variability and history of guava in the Galapagos Islands.

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