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The Human History of Chilli Peppers Told by 10,000 Genebank Samples

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The Human History of Chilli Peppers Told by 10,000 Genebank Samples

Sunday, January 9, 2022
7:30 PM - 7:50 PM

- *Palm 5-6*

Abstract

From vindaloo to ratatouille, kung pao to Tex-Mex, chilli peppers and capsicums (*Capsicum* spp.) are valued staples in cuisines across the globe, prized for their garish aesthetics, diverse flavours, and pungency. First domesticated in South- and Mesoamerica, the Age of Discovery began a dynamic global trade in peppers, resulting in a highly intermixed distribution of pepper varieties across regions of the globe. This high degree of inter-region overlap makes genetic inference on pepper's history a unique challenge, especially with limited sample numbers. Fortunately, genebanks across the globe preserve an excellent representation of pepper diversity in different regions, and the G2P-Sol project (EU) recently completed the GBS sequencing of over 10,000 such accessions. Leveraging this vast dataset, we developed the novel method ReMIXTURE ("Regional Mixture") to complement traditional methods and allow insight into how the kinds of peppers cultivated in various regions overlap with those from various other regions. Despite low genetic differentiation, we were able to detect the signatures of transatlantic maritime trade routes, overland trade in the Americas and Eurasia, and the role of Africa as an important node joining the Americas to the East. The varying degrees of uniqueness of peppers found in each region were quantified, revealing hotspots of potential diversity (Mesoamerica, Southeast Asia, and Africa in particular) exploitable by breeders with an interest in introducing novel genetic variants and phenotypes to breeding efforts. The study also allowed us to assess aspects of genebank management such as duplicate detection, and to identify the influence of recent selective pressures on genes affecting fruit pungency and other qualities.

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