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Crossbreeding and parental lineage influences the diversity and community structure of rice seed endophytes

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Abstract

Seed endophytes are very remarkable groups of bacteria for their unique abilities of being vertically transmitted and conserved. As plants attain hybrid vigor and heterosis in the process of crossbreeding, this might also lead to the changes in the community structure and diversity of plant endophytes in the hybrid plants ultimately affecting the endophytes of the seeds. It would be interesting to characterize how seed endophyte composition change over time. The objective of this study is to gain insights into the influence of natural crossbreeding and parental lineage in the seed bacterial endophytic communities of two pure inbred lines exploring contributions of the two most important sources of plant endophytes – colonization from external sources and vertical transmission via seeds. Total genomic DNA was isolated from rice seeds and bacterial DNA was selectively amplified by PCR. The diversity of endophytic bacteria was studied through Terminal-Restriction Fragment Length Polymorphism (T-RFLP) analysis. Diversity between the original parents and the pure inbred line may show significant differences in terms of richness, evenness and diversity indices. Heat maps reveal astonishing contributions of both or either parents (IR29 x Pokkali and AT401 x IR31868) in the shaping of the bacterial seed endophytes of the hybrid, FL478 and IC32, respectively. Most of the T-RFs of the subsequent pure inbred line could be traced to any or both of the parents. Comparison of common and genotype-specific T-RFs of parents and their offspring reveals that majority of the T-RFs are shared suggesting higher transmission of bacterial communities common to both parents. The parents influence the bacterial community of their offspring. Unique T-RFs of the offspring also suggest external sources of colonization particularly as the seeds are cultivated in different ecogeographical locations. This study showed that host parental lines contributed greatly in the shaping of bacterial seed endophytes of their offspring. It also revealed transmission and potential conservation of core seed bacterial endophytes that generally become the dominant microbiota in the succeeding generations of plant hosts.

Keywords: Crossbreeding, Rice seeds, Endophytic bacteria, T-RFLP analysis, Salt tolerant and sensitive cultivars

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