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Great genetic diversity but high selfing rates and short-distance gene flow characterize populations of a tree (Foetidia; Lecythidaceae) in the fragmented tropical dry forest of the Mascarene islands

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Following the global trend of deforestation and degradation, tropical dry forests in the Mascarenes archipelago on Reunion has undergone harsh reduction and fragmentation within 3 centuries of human occupation. We investigated the genetic diversity, mating system, and gene flow in fragmented populations of the native tree Foetidia mauritiana (Lecythidaceae) on Reunion, using microsatellite genotyping of adults (in- and ex situ) and seed progenies (in situ only). To test genetic isolation between the Mascarene islands, we also genotyped conspecific adults on Mauritius, and trees of Foetidia rodriguesiana on Rodrigues. We found a high genetic diversity among the trees on Reunion, but no population structure (G’S'T: 0.039–0.090), and an increase of the fixation index (FIS) from adults to progenies. A subsequent analysis of mating systems from progeny arrays revealed selfing rates >50% in fragmented populations and close to 100% in lone trees. A paternity analysis revealed pollen flow ranging from 15.6 to 296.1 m within fragments. At broader scale, the populations of F. mauritiana on Reunion and Mauritius are genetically differentiated. The morphologically allied taxa F. rodriguesiana and F. mauritiana are clearly isolated. Therefore, this case study shows that genetic diversity may persist after deforestation, especially in long-lived tree species, but the reproductive features may be deeply altered during this process. This would explain the low seed production and the absence of recruitment in F. mauritiana. Restoration programs should take into account these features, as well as the importance that trees ex situ represent in restoring and conserving diversity.

Keywords: genetic erosion, habitat fragmentation, island biota, mating systems, pollen dispersal, tropical dry forests

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