Comparison of genetic structure of commercially important precious corals *Carallium japanicum* and *Pleurocorallium konojoi* using genome wide SNPs

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Abstract

Deep sea corals used for jewelry are often refer to as "precious coral" and are often harvested in Mediterranean Sea, Japan, Taiwan, Midway, and Hawaii. They are normally found at a depth of 100 m or deeper with low density except for Mediterranean Sea where the species can be found much shallower depth (e.g. 40 m). Precious corals are not only commercially important but also essential as a foundation species in the deep sea environment. Currently precious coral species populations are highly threatened by overfishing and illegal fishing. Although sessile and the larval duration of precious coral are unknown, they appeared to have larval dispersal period before settlement. Thus, to conserve precious corals, it is important to know how their populations are genetically connected via larval dispersal in each species. In this study, we examined population genetic structure and genetic diversity of two precious coral species in Japan (*Corallium japanicum* and *Pleurocorallium konojoi*). We collected in total 118 colonies from two populations separated by 40 km for the two species around south western Shikoku. Nuclear genome-wide SNPs were obtained and analyzed using Multiplexed ISSR genotyping by sequencing (MIG-seq). Based on 478 SNPs that are obtained from *C. japanicum* and *P. konojoi* in common, the genetic differentiation coefficients, global FST indicated significant genetic structure in *C. japanicum* (F_{ST} =0.097, P=0.002), while no significant genetic structure in *P. konojoi* (F_{ST} =-0.016, P=0.943). These data suggest higher level of larval dispersal in *P. konojoi* than that in *C. japanicum*. This data suggests recovery of damaged *C. japanicum* population via larval dispersal from other population would be more limited and more difficult than *P. konojoi* population. The data highlighted the importance to avoid local extinction of *C. japanicum* populations by decreasing fishing pressure, given that *C. japanicum* is the most expensive and the most intensively fished precious coral in Japan. On the other hand, genetic diversities (expected heterozygosity He) of *C. japanicum* (0.087-0.104) were higher than that of *P. konojoi* (0.026-0.032). Because genetic diversity is an indicator of population persistence through environmental changes, *P. konojoi* would be more vulnerable to environmental changes including anthropogenic environmental stress and climate change than *C. japanicum*.