

Abstract

Species that build the physical structure of ecosystems often reproduce clonally, both in terrestrial (e.g. grasses and temperate trees) and marine (e.g. corals, seagrasses) environments. The degree of clonality may vary over a species' range in accordance with the relative success of sexual and asexual recruitment. High genotypic (clonal) diversity of structural species may promote the species diversity and resilience of ecosystems in the face of environmental extremes. Conversely, low genotypic diversity may indicate an asexual strategy to maintain resources and genetic variation during population decline. Here, we use microsatellite markers to assess geographic variation in clonal population structure in the coral *Acropora palmata* sampled from 26 reefs in 8 regions spanning its tropical western Atlantic range ($n = 751$). Caribbean-wide, the ratio (± 1 standard deviation) of genets (N_g) to sampled ramets (N) was 0.51 ± 0.28 . Within reefs (30 - 70 m) and among reefs (10 - 100 km) within regions, clonal structure varied from being predominantly asexual (N_g/N approaching 0) to purely sexual ($N_g/N = 1$). However, two genetically isolated regions (the western and eastern Caribbean) differed in clonal structure: genotypically depauperate populations ($N_g/N = 0.43 \pm 0.31$ SD) with lower colony densities (0.13 ± 0.08 SD colonies m^{-2}) characterized the western region, while denser (0.30 ± 0.21 SD colonies m^{-2}), genotypically rich stands ($N_g/N = 0.64 \pm 0.17$ SD) typified the eastern Caribbean. Genotypic richness (standardized to sample size; N_g/N) and genotypic diversity (G_o/G_e) were negatively related to colony density within each province (r^2 from 0.49 - 0.66, $p < 0.001$), indicating that dense stands have higher rates of asexual recruitment than less dense populations. Asexual recruitment was not correlated with large-scale disturbance history or abundance of large colonies (potential fragment sources), but was negatively correlated with shelf area in both provinces ($r^2 = 0.57$, $p < 0.01$). We argue that sexual recruitment is more prevalent in the eastern range of *A. palmata* than the west, and that these geographic differences in the contribution of reproductive modes to population structure may be related to habitat characteristics. Our results suggest that the two populations of the threatened *A. palmata* differ fundamentally in reproductive character and may respond differently to environmental change.