

Genetic structure of common wild rice (*Oryza nivara*) populations from Sri Lanka

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Abstract

Oryza nivara, known as the ancestor of Asian cultivated rice (*Oryza sativa* L.), is the most important germplasm for rice improvement. Genetic diversity and population genetic structure of natural *Oryza nivara* populations in Sri Lanka were studied based on 33 SSR microsatellite loci. using 183 individuals of 6 populations (Maradankadawala, Vavuniya, Kilinochchi, Mannar, Batticaloa and Lahugala) collected from the dry zone. All 33 loci displayed polymorphism among the 6 populations with a total of 172 alleles identified. The most variable locus RM426 had 30 alleles, while RM457 showed only three alleles across the populations, with an average of 11.66 alleles per population. As measured by expected heterozygosity, Kilinochchi and Batticaloa population maintained the highest ($H_E = 0.403$) and the lowest ($H_E = 0.268$) diversity, respectively. The results revealed among population variance (46.98%) and within population (48.12%) variance. Partial Mantel tests ($r^2 = 0.114$; p-value = 0.127) showed that population divergence of Sri Lankan *O. nivara* based on isolation by distance was statistically not significant. The UPGMA tree illustrated that, all 6 populations were genetically structured into three well-separated major groups and further divided to populations. Conclusively, these results indicated that high level of within population variance than among population variance in Sri Lankan *O. nivara* species. *O. nivara* is normally grown under disturbed habitat conditions. Therefore, considerable gene flow from cultivated rice to wild rice may change the genetic structure of natural populations of *O. nivara* and eventually lead to its genetic erosion. The relatively high genetic diversity of populations of *O. nivara* in Sri Lanka suggests that there is great value for conservation to use as genetic resource for crop improvement programs.

Keywords: Conservation, Genetic diversity, Isolation by distance, *Oryza nivara*

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