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Assessment of Genetic Diversity in *Schizothorax richardsonii* across Nepal Using RAPD Markers: Insights into Allelic Variation and Polymorphism

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A total of 125 *Schizothorax richardsonii* fish samples collected from 5 distinct regions of Nepal: Kutung Khola, Nuwakot (KKN), Mewa Khola, Taplejung (MKT), Siddhi Khola, Ilam(SKI), Tila Nadi, Jumla (TNJ) and Tamur River, Panchthar (TRP) were analyzed in this study to estimate the Morphometric variation through truss network analysis and genetic variations using 10 different Random Amplified Polymorphic DNA (RAPD) markers. Obtained Truss network data and banding patterns were analyzed via PAST version 4.03 and POPGENE version 1.32 respectively.

The discriminant function analysis (DFA) indicates significant morphometric variation among the Five populations in Nepal. The first discriminant function (64.29%) separates populations, with Tila Nadi being the most divergent while more subtle differences found in Tamur River and Mewa Khola populations. Results revealed considerable genetic diversity, with the highest Nei's gene diversity ($D=0.2608$) and highest Shannon information index ($I=0.3949$) being found in Siddhi Khola and lowest for Kutung Khola ($D=0.1731$; $I=0.2839$). The greatest percentage of polymorphism was found in the Mewa Khola (94.81%) and the lowest belonged to Kutung Khola (84.42%). In terms of allelic variation, observed number of alleles (N_a) range from 1.8442 to 1.9481 which is higher than Effective number of alleles (N_e) 1.2652 to 1.4489 indicating genetic diversity and unevenly distributed allelic frequency. Populations like Siddhi Khola ($N_e=1.4489$) might be more resistant while Population such as Tila nadi ($N_e=1.2652$) can be more susceptible to changes in their surroundings.

These results provide significant information about the genetic structure and diversity of *Schizothorax* fish spp. from Nepal and will be useful for conservation as well as management purposes.

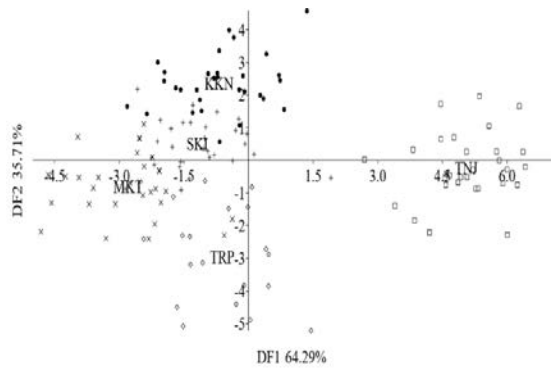


Figure 1: Discriminant function (DF) analysis score of conventional morphometric characters of *Schizothorax richardsonii*

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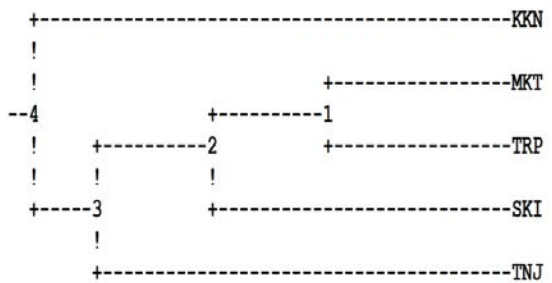


Figure 2: UPGMA dendrogram based on Nei's (1978) genetic distance.