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Insights from genetic population structure of Clarias liocephalus, of Lake Victoria basin, Kenya, for sustainable utilization

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Poor survival of larval Clarias gariepinus constrains expansion of Clarias aquaculture in East Africa for food and incomes. Using a different Clariid species may help increase catfish seeds supply through higher survival of larvae. We used 389 bp DNA sequences of D-loop region of Clarias liocephalus collected from Lakes Victoria (LVC) and Kanyaboli (LKL) and University of Eldoret reservoir (UoE), Kenya, to infer genetic diversity and population structure. A total of 22 haplotypes was reported. LVC had 7 (31.8%) haplotypes, while LKL and UoE had 14 (63.6%) and 1 (4.6%) haplotypes respectively. Haplotype diversity was higher in LKL with 0.891 compared to LVC with 0.693 and UoE with 0.00. Similarly, LKL had a higher nucleotide diversity than LVC and UoE. A total of 15 haplotypes (68.2%) were singletons, with LVC having 3 (20%), while LKL had 12 (80%). The three populations formed three clades, while FST values were 0.822 between LVC and LKL, 0.825 between LVC and UoE and 0.933 between LKL and UoE, with all comparisons significantly different ($p < 0.05$). Results suggest LVC population, which should be larger than LKL suffered a population bottleneck, possibly by predation by exotic Nile perch. Higher indices in LKL possibly mirror LVC population in pre-Nile perch era and presence of dense papyrus of Yala swamp prevents entry of Nile perch into Lake Kanyaboli from Lake Victoria, conserving LKL population. The UoE population is severely bottlenecked, possibly due to very small size and annual desiccation, with predation by birds increasing fish mortality. Use of species in artificial propagation may increase survival of larvae and conservation of haplotypes.

Biography

James Barasa has a PhD in Aquaculture and Genetics from the University of Eldoret, Kenya. His research interest is the molecular characterization of aquaculture species for identification of suitable populations for aquaculture. He applies genotypic and phenotypic approaches to determine correlations between heterozygosity and fitness traits in aquaculture species. He is currently undertaking the DNA barcoding of small-sized clariid catfishes of the Lake Victoria basin of Kenya, for accurate identification, to enable the study of life-history traits of each species. He teaches Genetics and aquaculture courses at the University of Eldoret, Kenya. He has reviewed manuscripts for several International journals.

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