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Assessment of genetic variation in wild flora and fauna-A review

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ABSTRACT

Genetic variations are major reason of adaptation and evolution; if population of a species has same genes than evolution would be stop; these individuals do not resist to environment change; and as a final point species could not adapt to environmental changes. While species has genetic variation, may adapt to new habitat and in new environment slight changes may occur in the genetic composition. Although many genetic variations may be beneficial while others variation may be harmful for the population e.g. population has adopted in the polluted environment. When the metapopulation of a species are adapted to different habitats and this is showed in physiology, behavior and/or morphology; than these changes can be seen in genetic. For the conservation of wildlife; all countries are agreed to sustain and conserve biological diversity. "Convention of Biological Diversity" has the responsibility to sustain and conserve animal and plant diversity; which are documented by the convention. It is concluded that genetic diversity is beneficial for human being; and can be utilized in breeding plans to make organisms with specific characteristics, e.g. resist against new diseases, suitable for the new habitats and/or situations. The genetic diversity is beneficial for human being; the genetic diversity can be utilized in breeding plans to make organisms with definite characteristics, new diseases suitable, for the new environments or situations.

Key words: Diversity, Convention, Genetic, Adaptation,

INTRODUCTION

The genetic variation level in a species shows a balance among drift (Allendorf, 1986), natural selection (Akey *et al.*, 2004) and mutation (Turelli, 1984). Genetic variation is produced by mutation and is lost from the specific populations by the genetic drift due to limited population size (Frankham, 1996). Natural selection may either gradually remove the genetic variation by leading to fixation of alleles or promote its maintenance as a result of diversifying or balancing selection (Endler, 1986; Williams, 2018). Neutral genetic variation loss due to limited population size in the short to medium term almost an exponential decay process, described as;

$$H_t/H_o = [1 - 1/2N_e]^t \sim e^{-t/2Ne}$$

Where, H_t = the heterozygosity at time t, H_o = the original heterozygosity, N_e = the effective population size, and t = the number of generations (Crow and Kimura, 1970).

IMPORTANCE OF GENETIC VARIATION

Genetic variations are the main cause of adaptation and evolution (Orr, 2005); if all individual of species have same genes than evolution would be stop; these individuals do not resist to environment change; and finally species could not adapt to environmental changes (Frankham, 2005; Orr, 2005). Environmental changes may be due to anthropogenic impact (i.e. deforestation, urbanization, agricultural intensification, industrialization and pollution) (Altaf *et al.*, 2013; Altaf, 2016) and natural hazards (i.e. flood, earthquake and storm) (Lundqvist *et al.*, 2008).

BENEFITS AND LOSS OF GENETIC VARIATION

Genetic variations are the main cause of evolutionary change of the species and lineages (Orr, 2005). Species change directly correlated with natural selection (Darwin, 1859, 2004); and also slightly changes are occurred in genetic composition(Darwin, 2004). Species may evolve due to

genetic drift (Lande, 1976); this will change the frequency of alleles (Hartl and Clark, 1997); some alleles may decrease and other decrease and these changes may incorporate in gametes; however, random genetic drift usually is a weak force and evolution through this procedure will not change a population to any large extent. This will need a directed force i.e. natural selection (Lundqvist *et al.*, 2008).

To calculate genetic change and affiliate it to ecological function and evolutionary change in wild populations is difficult. First, the individuals' genotypes in the populations under research must be identified. Second, an environmental change impacts the success of the researched alleles must present (Lundqvist *et al.*, 2008).

All the genetic variations may not be beneficial; some variation may be harmful for the population e.g. population has adopted in the polluted environment; having heavy metals (Lundqvist *et al.*, 2008). During the experiment noted that genetic and variability has positive correlation with one another. Habitat fragmentation may also impact on the genetic diversity (Lowe *et al.*, 2005; Leimu *et al.*, 2006).

The effect of genetic drift can be explained in the small population and small time period easily. If the small population has 88% allele diversity; after reduction in the population size than allele diversity also decrease. A high bottleneck, because one diploid individual can only pass on at the majority 2 different alleles at each locus to the next generation. It is the rare alleles that will be lost in bottlenecks (Nei *et al.*, 1975).

ANTHROPOGENIC IMPACTS ON GENETIC DIVERSITY

Anthropogenic impacts on fauna and flora for captive breeding to fulfill the need of hunting and fishing; may lead to genetic variation. These procedures can have both indirect and direct impacts on the genetic diversity of populations (Koljonen *et al.*, 2002; Lundqvist *et al.*, 2008).

Every species can have adaptations to manage drought, survive in water or to use food. When the metapopulation of a species are adapted to different habitats and this is showed in physiology, behavior and/or morphology; these changes present in genetic. Individuals can also be migrated in each direction among populations. In these ways; easy to study how large a part of the morphological variation among individuals is based on genetic variation. As a result, local adaptation is a genetic variation that allows success in the common habitat in contrast to the other habitats (Lundqvist *et al.*, 2008).

GENETIC MONITORING

All countries are agree to sustain and conserve biological diversity, "Convention of Biological Diversity" have the responsibility to sustain and conserve biological diversity; which are documented by the convention (Solidarity, 1992). They will conserve and sustain genetic variation of wild flora and fauna. Centrally organized genetic researches are completed in a lot of countries, occasionally even frequently (Lundqvist *et al.*, 2008).

Conclusion: The genetic diversity is beneficial for human being; the genetic diversity can be utilized in breeding plans to make organisms with definite characteristics, new diseases suitable, for the new environments or situations. Similarly, populations need genetic diversity to adapt to new environments and situations; e.g. the world climate change, but it is not known how this genetic variation is controlled among the populations.

Availability of data: We have included all relevant data in the manuscript that were collected during the field survey.

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