

*Short Communication*

## Measurement of alpha diversity using Simpson index ( $1/\lambda$ ): the jeopardy

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### Abstract

Simpson index, in the form of  $D=1/\lambda$ , is frequently cited in ecological literatures. In present study we proposed that  $1-\lambda$ , instead of  $1/\lambda$ , for the measurement of alpha diversity could be a better and justified approach.

**Keywords** Simpson index; alpha diversity; revision.

Shannon-Wiener (Shannon and Weaver, 1949) and Simpson (Simpson, 1949) indices are the simple mathematical equations, widely used for the calculation of alpha diversity. Shannon-Wiener index ( $H' = -\sum_{i=1}^s p_i \ln p_i$ , where,  $p_i$  is the proportion of abundances belonging to species 'i') measures the species diversity within the community of an ecosystem. It will be zero if the sample in consideration has only one species and would be maximal when all species of the sample in consideration have even abundances (Sagar and Singh, 1999). Opposite to this, Simpson index measures the strength of dominance ( $\lambda = \sum_{i=1}^s p_i^2$ ), because it weights towards the abundance of the most common species and varies inversely with species diversity) (Whittaker, 1972). A value of this index ranges from 0-1; zero represents no dominance and 1, for maximum dominance; viz: only one species in the sample (Greenberg, 1956; Berger and Parker, 1970). For representing diversity ( $D$ ), Simpson index is subtracted from its maximum value of 1; i.e.  $1 - \lambda$  (Pielou, 1969), thus, the species diversity ( $D$ ) according to Simpson index, also varies from 0-1; where, zero represents no diversity and 1, for maximum diversity. This logic is clear and bears no dispute, but alpha diversity calculation, by using the inverse of Simpson index ( $D=1/\lambda$ ) which is frequently cited in ecological literatures (James and Rathbun, 1981, Biodiversity Pro, 1997; Moranta et al., 2000) bears logical problem. According to this equation, if the  $\lambda$  is 1 in a situation, then diversity ( $D$ ) would also be 1, which is confusing and inappropriate. Further, in the case, where only one species is present, fundamentally, there would be no question of diversity. Thus, in this case, calculation based on this equation could not discriminate diversity and dominance. Therefore, use of equation,  $D=1/\lambda$ , for the calculation of species diversity and other indices (Hill's  $N_2$  and Hill's ratio) (Magurran, 1988) by scientific communities need to be realized and use of  $1-\lambda$  instead of  $1/\lambda$  for the measurement of alpha diversity could be a better and justified approach.

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