Sampling scale dependence: do Taylor's Power Law coefficients change significantly?

ABSTRACT

Taylorøs Power Law is a widely used variance-mean relationship in describing the dispersion patterns of organisms, in developing sampling protocols and in normalizing numerical data. However, although values of Taylorøs b coefficient are regarded as species-specific, this study and others found b values to be variable. Sampling scale was developed by increasing the size of sampling unit (sample) with 2, 5, 10 and 25 unit samples (sample unit increment), from each of which a total of 10 samples were used to calculate its mean and variance during simulation. Consequently, sampling unit was adopted as unit samples chosen towards sampling scale enlargement multiplied by 10. As sampling unit and sampling scale increased, the percentage of b values larger than 2 increased but the percentage that was significantly different from 1 and 2 decreased. There is a relatively small change in b as sample size increased. It is inferred that there would be more b values larger than 2 in heterogeneous populations with high densities. This study concludes that Taylorøs a and b values varied with locations, occasions and scales of sampling unit. Integrated pest management strategies which use Taylorøs Power Law need to heed these findings.

Keyword: Pest; Rice; Sample plan; VIS; Bootstrap; Taylor's coefficient; Simulation; Malaysia