PHENOGENETIC INDICATION AS METHOD OF ASSAY OF URBAN AREA ECOLOGICAL STATE

VALENTIN B. SAPUNOV

Russian State Hydrometeorological University
St. Petersburg, Russia

Modern agriculture, field management and control for urban pests distribution needs regular monitoring. The cheapest method of monitoring is biological one. The most effective variant of biomonitoring is phenogenetic one. The question within which limits of accuracy it is possible to estimate the future fate of urban ecological system using a few number of samples would be considered. Pest proliferation may take place under ecological destabilization and destruction of area. These processes may be predicted by regular monitoring. A mathematical device letting to analysis the state of population using easily measured characters: quantity, sex correlation, the variability of morphological characters, the level of morphological asymmetry, sexual dimorphism. The quota (part) of males (P_m) under normal condition must be $0.5 - 0.55$. The mean $0.55 - 0.65$ suggests on genetic instability of population. Under P_m more than 0.65 the adaptive possibilities of species are over. Population stress may be measured by variation coefficient $CV = \sigma / \mu$, where σ is square deviation, μ – the mode. Under normal ecological conditions CV is between 0.05 and 0.1. The mean equal to $0.1 - 0.2$ suggests to unstable state of population. Under CV overtaking 0.2 adaptive possibilities of population are over. Under solid state wild population has about 5% of abnormal specimens. The fact is accorded to use of significant probability 0.05 (0.95) within biological statistics. That is 95% of organisms are normal under control state. Increase of mean to $0.1 - 0.2$ suggests that population is toward suffocation because of pests pressure or bad ecological state. Mutagenic pollution of ecological system may be checked by float asymmetry: $Sd2 = \Sigma(ari - ali) \, 2 / N-1$; Where ari and ali are means of symmetrical characters at right and left sides of organisms. The overtaking of standard data for species suggests that species is under high ecological press. Important mean has sexual dimorphism. The low dimorphism suggests on stability of population. High dimorphism suggests on quick adaptation for environment change. The use of mathematical models described in previous works is a way toward prediction of fate of any populations having both agriculture and indication mean and agrocenosis as whole. The short time phenogenic indication of pattern of species may predict and control direction of ecological process within agricultural region.

Key Words Urban biocenosis, biological indication