INTRODUCING A NEW METHOD BY APPLYING MOLECULAR BIOLOGY TO THE ECOSYSTEM DAMAGE ASSESSMENT OF THE NATURAL TROPICAL FOREST OF SOUTH OF IRAN

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Persian Gulf War was occurred between Kuwait and Iraq since 1991. The environmental consequences of the war affected the ecosystem of many Asian and European countries. The current research is a part of the united Nation's project number 5000427 which started to implement 7 years after the occurrence of the Persian Gulf regarding the request of the United Nations Compensation Commission (UNCC) to trace the impacts of pollution resulted from the war. Studying areas were mainly located in tropical coastal zones of the Persian Gulf and Oman Sea which are covered by four broad provinces of Sistan o- Baluchistan, Hormozgan, Boushehr and Khouzestan (approximately 30% of Iran's area). This research was conducted mainly on four tree species of *Avicenna marina*, *Rhizophora mucronata*, *Ziziphus spina-christi* and *Prosopis cineraria*. 230 individual trees were sampled in total. After the preliminary studies, the cross sections of branches were separated for enzyme analysis. There cross sections included a few years before starting the war (as the control years), the war period (to determine entrance of the stress) and several years after the ceasefire (to reveal the denaturation and recovery period). The current study was conducted applying Bio monitoring and phytoremediation techniques using Peroxidase and Amylase enzymes. The result of the study indicates that Peroxidase and Amylase of the studies stands reacted to the environmental stresses at the time of war and were denaturized. In other words, it has taken some years until the enzymatic patterns of the above mentioned enzymes returned to the normal condition. These changes vary according to the species type and the intra- species sensitivities. To make the analysis more precise, the experiments were repeated on at least 10 individual stand of each species in 10 sites of the studied regions. Through the analysis of the Peroxidase and Amylase patterns, the damages to the forest ecosystem of south of Iran were evaluated. Additionally, the results of the study proved that we are able to determine the time of pollution entrance, the duration of environmental stress on the ecosystem and the recovery time of the ecosystem. The obtained results and the complementary studies of this research and the methods applied to determine the ecosystem stresses, received the certificate for the assessment of environmental damages.

Merian Award Applicant

CHANGE OF GENETIC DIVERSITY OF DOMINANT PLANT SPECIES COMMUNITIES IN TROPICAL LOWLAND RAINFOREST TRANSFORMATION SYSTEMS IN SUMATRA (INDONESIA)

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Indonesian tropical lowland rainforests are transformed to other types of land use systems due to the expansion of agriculture throughout the globe. The largest Indonesian island Sumatra experienced a transformation of about 70% of its forest cover until the year 2010 (Margono et. al. 2012). A common result of natural ecosystems conversion to managed systems is a loss of species diversity. In Jambi Province, Sumatra, tropical lowland rainforests are transformed into oil palm plantations, rubber plantations and an agroforest system called 'jungle rubber'. In this study, changes on the genetic diversity of plants caused by the different species composition and land-use system were analyzed.
Therefore, in 32 plots (50m x 50m) of these different ecosystems, 10 individuals of 10 dominant species were sampled and analyzed using anonymous AFLP markers.
Genetic diversity (Shannon Index) calculated for all species per plot, showed the highest values for the two tree-dominated systems forest and jungle rubber and lowest for oil palm plantations. The within plot variability was too high in order to detect significant differences among the land-use systems. By using a standardized method of calculating genetic distance within and among land-use systems the high variability within each plot was reduced. The standardized genetic distance differed significantly for all land-use systems at three spatial scales: among plots, among each land-use system within each region, but not among regions.
The low differentiation of forest species and the similar values to the plantation systems suggests a low genetic health status of the analyzed forest remnant plots. Agroforest systems are assumed to be able to restore biological and ecological processes and conserve biodiversity (Michon & de Foresta 1995) which was confirmed by these results of genetic diversity of dominant plant species. Our results on intraspecific variation will contribute to a comprehensive quantitative assessment of biodiversity concerning the impacts of tropical forest conversion to other land-use systems.