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Changes in the community structure and growth of fresh water microalgae as a consequence of diuron exposures

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Abstract : The extensive use of pesticides, particularly herbicides may affect the growth of algal populations, in turn disturbing the balance of the aquatic ecosystem. In this study, the Nile River water microalgae were exposed to different concentrations of diuron (ranging from 0.01 to 0.16 mg/L), to assess its impact on algal growth (including, cell number, community structure, species diversity, redundancy, half-maximal effect concentration (EC_{50}), and growth rate) and photosynthetic pigment contents (chlorophyll (a) and carotenoids). While diuron at low concentration levels of 0.01 and 0.02 mg/L cause slight inhibition on the Nile River water algal growth demonstrated by chlorophyll (a) and carotenoids contents, it drastically decreased the photosynthetic pigments at higher concentration ranges (0.04 to 0.16 mg/L). The EC_{50} value decreased from 56 to 34.7 µg/L with increasing the exposure time from 3 to 7 days, suggesting an acute toxicity in microalgae, induced by low diuron concentration. Furthermore, the growth rate derived from chlorophyll (a) content in the presence of diuron was higher than the corresponding values derived from the total algal counts at the same time intervals. As a consequence of diuron exposure, the phytoplankton composition (Bacillariophyta, Chlorophyta, and Cyanophyta with % composition of 55, 9.5, and 35.5, respectively) was changed, due to the replacement of susceptible algae by more resistance ones. Moreover, the number of taxa and evenness with which individuals are distributed within are reduced and the decline in diversity was observed.

Keywords : Diuron, Toxicity, Nile River water algae, Growth, Pigments, Species sensitivity.

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