

## Duckweed as heavy metal accumulator and pollution indicator in industrial wastewater ponds

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### ABSTRACT

Bioaccumulations of the four heavy metals Cr, Cu, Pb and Zn in *Lemna gibba* (duckweed) as an environmental indicator of contaminated industrial wastewater were detected. Plant pigment content (chlorophyll and carotenoids) were estimated. During the study, heavy metals were ranked according to the preference for bioaccumulation by *L. gibba*, Zn came in the first place followed by Cr, Pb and Cu with bioaccumulation factors 13.9, 6.3, 5.5 and 2.5 respectively. The chlorophyll and carotenoid content in *L. gibba* fronds were altered by the bioaccumulation of heavy metals showing a substantial change in colour from green (lowest degree of bioaccumulation) to pale green (high bioaccumulation) and then degreened (maximum bioaccumulation) fronds. As the bioaccumulation of heavy metals increased in fronds, chlorophyll a content decreased, chlorophyll b content increased and the carotenoids became greater than chlorophyll (a + b) content especially in the pale green fronds. Zinc content in fronds showed greater negative correlations with chlorophyll a, chlorophyll b and total chlorophyll followed by Cu, Pb and Cr. Alternatively, Cr and Cu contents were mostly positively correlated with carotenoid content in *L. gibba* fronds. The accumulation of higher contents of heavy metal content in *L. gibba* than in wastewater samples indicates its phytoremediation potentialities. The visual change in colour of fronds from green to pale green and the degreening accompanied by the increase in heavy metal pollution nominate the species as heavy metal accumulator and pollution indicator.

**Keywords:** Pigments, Chlorophyll, Carotenoids, Degreening, Phytoremediation, Arid regions

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