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## EFFECT OF THE INTERACTION OF EARTHWORMS AND SUBSTRATES ON PHOTOSYNTHETIC CHARACTERISTICS, NITROGEN AND PHOSPHORUS UPTAKE BY *Iris pseudacorus* IN CONSTRUCTED WETLAND SYSTEM

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### Abstract

This study investigates the effects of earthworms and a variety of substrates on photosynthetic characteristics and rate of uptake of nitrogen (N) and phosphorus (P) by *Iris pseudacorus* L. (Iridaceae) in a constructed wetland system under greenhouse conditions. The study seeks to identify those factors that maximize the efficient removal of N and P. Four substrates were tested: pure sand, sand and soil, sand and organic matter, and a mixture of sand, soil and organic matter. The photosynthetic characteristics and uptake of N and P by *I. pseudacorus* were influenced by the presence of earthworms and the type of substrate. The addition of organic matter enhanced the photosynthetic rate ( $P_n$ ), transpiration rate ( $T_r$ ), stomatal conductance ( $C_{ond}$ ), root and shoot weight. The addition of earthworms increased the pod production and dry weight of *I. pseudacorus*, especially on the sand and soil, and sand and organic matter substrates. It also increased  $P_n$ ,  $T_r$  and  $C_{ond}$ , and resulted in an increase in the root and above-ground weight, and root and above-ground N and P uptake. A correlation analysis showed that  $P_n$  were significantly positively correlated with root and shoot weight, root N and P uptake, and above-ground N and P uptake ( $P < 0.05$ ). The addition of earthworms into a constructed wetland could increase the photosynthetic characteristics and biomass of *Iris pseudacorus*, resulting in increased uptake of N and P.

**Key words:** *Eisenia foetida*, *I. pseudacorus*, nitrogen, phosphorus, substrate

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