

研究论文

秋茄 (*Kandelia candel*) 幼苗对多氯联苯污染的生理生态响应

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摘要 通过盆栽实验, 研究了4种不同浓度(180、900、1800和2700 $\mu\text{g kg}^{-1}$)的多氯联苯(PCBs)对红树植物秋茄幼苗的茎高、茎径、生物量、相对生长速率以及叶片的叶绿素含量、水势、丙二醛含量和游离脯氨酸含量等生理生态指标的影响, 结果表明: (1) 在所设PCBs浓度范围内, PCBs对秋茄幼苗的茎高、茎径、生物量和相对生长速率等生长指标的生长没有产生不利的影响, 相反具有促进作用, 红树植物秋茄在PCBs污染情况下能旺盛生长; (2) 在所设PCBs浓度范围内, 秋茄幼苗叶片能保持相对正常的叶绿素水平和相对稳定的叶绿素a/b值, 叶绿素a、叶绿素b和叶绿素a+b的含量虽然有所降低, 但均为对照的70%以上; 叶绿素a/b值有所升高, 但均未超过对照的15%。(3) 随着PCBs浓度的升高, 秋茄幼苗叶片水势呈上升趋势, 而游离脯氨酸含量和膜质过氧化产物MDA含量均有一定的增加, 说明PCBs对秋茄幼苗产生了一定的影响。总体来看, 秋茄幼苗能在所设浓度的PCBs范围内正常生长, 对PCBs有较强的耐受性和适应性, 对PCBs污染的沉积物进行修复是可行的。

关键词 [红树植物](#); [秋茄](#); [多氯联苯](#); [生理生态](#); [响应](#)

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Eco-physiological responses of *Kandelia candel* seedlings to polychlorinated biphenylw(PCBs) treatment

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Abstract Mangroves are diverse plant communities consisting of tropical to subtropical trees and shrubs growing in intertidal coastal zones. Mangrove, eco-physiology and growth characteristics as effected by nutrient, salinity, metals, PHA and other pollutants including phytoremediation have been previously investigated. However, the phytoremediation of polychlorinated biphenyls (PCBs)-contaminated sediments by mangrove is a largely untouched area of research. This study was conducted to determine if mangrove specie *Kandelia candel* could be used for phytoremediation of PCBs-contaminated sediments. In this study, *Kandelia candel* seedlings were grown in PCB contaminated sediment for determining the eco-physiological responses of mangrove species *Kandelia candel* to PCBs phytotoxicity. The influence of increasing concentrations of PCBs (0, 180, 900, 1800 and 2700 $\mu\text{g kg}^{-1}$) on stem height, basal stem diameter, total biomass, growth rate, chlorophyll content, chlorophyll a/b ratio, water potential, free proline content and MDA contents were measured. Results were as follows: (1) After 6 months of exposure to PCBs, the growth of stem height, basal stem diameter, total biomass and the relative growth rate were equal or higher than the control which indicated that PCBs did not inhibit the growth of *Kandelia candel*; (2) The chlorophyll a, chlorophyll b and chlorophyll a+b content in the leaves of *Kandelia candel* decreased moderately and the chlorophyll a/b ratio increased moderately with increase in PCB concentration in the sediment. However, the chlorophyll content was never less than 70% and the chlorophyll a/b ratio never more than 15% of PCBs-free control plants. The plants, even though exposed to PCBs, were still able to maintain relatively normal levels of photosynthetic pigment

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s and a constant chlorophyll a/b ratio. (3) The water potential, free proline content and MDA in leaves of PCBs-stressed *Kandelia candel* seedlings were stimulated significantly in comparison to control, with an increase in PCBs concentration in the sediment. The study clearly demonstrated growth and physiological function of mangrove species *Kandelia candel* was not adversely impacted by PCBs contaminated sediment and thus could be used in phytoremediation of PCB contaminated sediment.

Key words [mangrove](#) _ [Kandelia candel](#) _ [PCBs](#) _ [eco-physiology](#) _ [responses](#)

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