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磷与四价硒的共存对小白菜磷、硒吸收及转运的影响

Combined effects of phosphate and selenite on the uptake and translocation of phosphorus and selenium in pakchoi

关键词: [磷酸盐](#) [亚硒酸盐](#) [生长](#) [吸收](#) [转运](#)

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摘要: 采用土培盆栽试验和化学分析相结合的方法,研究了不同浓度磷酸盐与四价硒共存对小白菜生长、磷和硒吸收及转运的影响,旨在为安全有效地进行补硒和硒污染土壤的植物修复提供理论依据.结果表明,在供试硒浓度范围内($\leq 5.0 \text{ mg} \cdot \text{kg}^{-1}$),施磷均显著促进了小白菜的生长,表现为地上、地下部生物量的增大($p < 0.01$).与单施磷相比,硒与磷共存能抑制小白菜根系生长,且抑制其对磷的吸收.磷对小白菜硒吸收的影响与硒、磷浓度有关,表现为促进作用和抑制作用并存,当硒浓度较高时($\geq 2.5 \text{ mg} \cdot \text{kg}^{-1}$),与无磷对照相比施磷可促进小白菜根系对硒的吸收;但高磷处理却导致小白菜地下部硒浓度较低磷处理显著下降.小白菜对磷酸盐的选择性吸收要强于亚硒酸盐,且高浓度磷能抑制硒由小白菜地下部向上部的转运.故在进行补硒或硒污染土壤修复时,应特别注意合理施磷,以免过量施磷对作物硒吸收和转运的影响.

Abstract: Pot experiments combined with chemical analysis were carried out to study the combined effects of phosphate and selenite on the growth, absorption and translocation of phosphorus and selenium in pakchoi with the aim to providing theoretical basis for safe selenium supplement and phytoremediation in selenium-contaminated soils. The results showed that under the selenium concentration ($5.0 \text{ mg} \cdot \text{kg}^{-1}$) used in the present study, phosphate can promote the growth of pakchoi significantly and result in the increase of shoot and root biomass ($p < 0.01$). When selenite and phosphate co-exist, selenite can suppress the uptake of phosphate and the growth of root. The promotion and suppression are coexistent in the effect of phosphate on the uptake of selenium. At a high amount of selenite ($\geq 2.5 \text{ mg} \cdot \text{kg}^{-1}$), phosphate can promote the uptake of selenite compared with the no phosphate treatment, but the high amount of phosphate can reduce the root concentration of selenium in pakchoi significantly. Pakchoi has a greater preference for phosphate than selenite, and phosphate can suppress the transfer of selenium from the root to shoot. Our findings suggest that reasonable phosphate application may be an important strategy for avoiding the effect of phosphate on the uptake and translocation by plants. Appropriate phosphate application may be an important strategy for avoiding the effect of phosphate on the uptake and translocation by plants during selenium supplement or selenium contaminated soil remediation.

Key words: [phosphate](#) [selenite](#) [growth](#) [uptake](#) [translocation](#)

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