

前植物生产层

假俭草和海滨雀稗对土壤铅污染胁迫的生理反应

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摘要:

通过盆栽试验研究了假俭草*Eremochloa ophiuroides*和海滨雀稗*Paspalum vaginatum* 2种草坪植物在3 000和6 000 mg/kg铅浓度胁迫下的生理变化。结果表明, 2种草坪植物在不同铅浓度胁迫下呈现明显的差异。在3 000 mg/kg铅浓度胁迫下, 假俭草的叶片叶绿素含量、光化学效率和渗透势均未出现显著($P<0.05$)变化; 处理后12 d叶片电导率显著上升, 24 d叶片相对含水量显著下降; 目测质量虽然在4 d时即开始显著下降, 但在整个试验期间仍维持在可接受草坪质量(6.0)之上。在6 000 mg/kg铅浓度胁迫下, 假俭草的所有生理指标在4 d即出现显著变化, 12 d植物完全枯死。在3 000 mg/kg铅浓度胁迫下, 海滨雀稗的叶片光化学效率、渗透势、叶绿素含量不仅没有下降, 反而分别于12、16和24 d显著高于对照; 电导率和草坪目测质量则与对照无显著差异($P>0.05$); 叶片相对含水量虽然在12 d时出现显著下降, 但在24 d时又恢复到了对照水平。在6 000 mg/kg铅浓度胁迫下, 海滨雀稗的叶绿素含量未出现显著下降; 叶片电导率在4 d即开始显著上升, 渗透势、相对含水量和光化学效率在4 d显著下降, 但分别于12、16、20和24 d恢复到对照水平; 草坪目测质量虽然低于对照, 但仍维持在可接受草坪质量之上。上述结果说明海滨雀稗在6 000 mg/kg浓度的土壤铅污染下仍能修复铅污染带来的伤害, 其耐铅性要显著高于假俭草。

关键词: 海滨雀稗; 假俭草; 土壤; 铅胁迫

Physiological responses of seashore paspalum and centipedegrass to soil lead contamination stresses

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Abstract:

The physiological responses to soil lead contamination stresses at 3 000 mg/kg and 6 000 mg/kg were studied in a pot experiment for two turfgrasses species centipedegrass (*Eremochloa ophiuroides*) and seashore paspalum (*Paspalum vaginatum*). The results showed that there were significant differences between two turfgrass species under the two lead stress regimes. Under 3 000 mg/kg Pb²⁺ stress, the leaf chlorophyll content, Fv/Fm and osmotic potential in centipedegrass did not changed significantly, while the electrolyte leakage (EL) increase significantly at 12 d, and the leaf relative water content (RWC) decrease significantly at 24 d. The visual turf quality maintained above the acceptable level (6.0) throughout the experiment period though a significant decline occurred after 4 d. Under 6 000 mg/kg Pb²⁺ stress, all physiological indexes in centipedegrass changed significantly at 4 d, and plants died at 12 d. In contrast, under 3 000 mg/kg Pb²⁺ stress, seashore paspalum did not decreased in leaf Fv/Fm, osmotic potential and chlorophyll content, which were significant higher than the control at 12 d, 16 d, 24 d. There were no significant differences in EL and visual turf quality between 3 000 mg/kg Pb²⁺ treatment and the control. Although a significant decrease occurred in leaf RWC at 12 d, it recovered at 24 d. Under 6 000 mg/kg Pb²⁺ stress, chlorophyll content of seashore paspalum still maintained the control level. The EL increased significantly after 4 d, and the osmotic potential, RWC and Fv/Fm decreased significantly after 4 d, but they recovered to the control level at 12 d, 16 d, 20 d, and 20 d, respectively. Although visual turf quality was lower than the control, it still maintained above the acceptable level

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throughout the experiment period. These results indicated that seashore paspalum had the capacity to repair the Pb²⁺ injures under the 6 000 mg/kg concentration and lead tolerance was higher than centipedegrass.

Keywords: seashore paspalum centipedegrass soil lead stress

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