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研究简报

蚯蚓非光滑体表试样的法向土壤粘附特性

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摘要：

以赤子爱胜蚓（Eisenia foetida）为研究对象，利用微粘附力测试系统，通过单因素试验探讨蚯蚓非光滑体表的法向粘附力随含水量的变化规律；通过正交多项式设计法寻求正压力与卸载速度对蚯蚓非光滑体表法向粘附力的影响，建立了回归方程。试验结果表明，蚯蚓体表试样的法向粘附力随含水量的增加呈抛物线趋势增加，与钢试样相比，最大减粘率达到44%；正压力对法向粘附力呈二次效应关系，卸载速度对法向粘附力呈一次效应，随正压力和卸载速度的增加粘附力增加。本研究可为生物非光滑表面仿生研究以及揭示仿生耦合机制提供基础数据。

关键词： 蚯蚓 非光滑 法向粘附力 土壤粘附 仿生耦合

Study on Adhesion Characteristics of Earthworms′ Non-smooth Surface

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Abstract:

The earthworm （Eisenia foetida） was taken as research object. A tiny adhesion testing system was used to discover the changing regulation between soil moisture content and normal adhesion force of earthworm′s non-smooth surface by single factor test. Through orthogonal multinomial experiment, the iinfluence of positive pressure and unloading speed to normal adhesion force of earthworm′s non-smooth surface was explored, and regress equation was esstablished. The test result showed that the normal adhesion force was increased with a parabola tendency along with the increase of soil moisture content. Comparing with steel specimen, the maximal rate of reducing adhesion was 44%. The positive pressure assumed two effective relations to normal adhesion force. The unloading speed assumed one effect to normal adhesion force. The adhesion force will increase along with the increase of positive pressure and unloading speed. This study can provide basic data for bionic research on biologic non-smooth surface and revealing bio-mimetic coupling mechanism.

Keywords: earthworm non-smooth normal adhesion force soil adhesion bio-mimetic coupling

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