

芽孢杆菌接种剂量对花棒和柠条幼苗生长的影响

黄焜¹, 王雨¹, *高广磊^{1,2,3,4,5*}

(1. 北京林业大学水土保持学院, 北京 100083; 2. 林木资源高效生产全国重点实验室, 北京 100083; 3. 宁夏盐池毛乌素沙地生态系统国家定位观测研究站, 盐池 751500; 4. 北京林业大学林业生态工程教育部工程研究中心, 北京 100083; 5. 北京林业大学水土保持国家林业和草原局重点实验室, 北京 100083)

摘要:【目的】芽孢杆菌(*Bacillus*)菌剂可形成土壤微生物膜, 显著提高土壤抗风蚀能力, 但它对风沙区植被恢复的影响尚不明确。【方法】本文采用盆栽试验, 分析使用不同菌剂施用量(0、1、3、5、7、10 g/kg)和施用方式(喷施、混施)施用芽孢杆菌混合菌剂对典型沙生植物花棒(*Corethroedendron scoparium*)和柠条(*Caragana korshinskii*)幼苗光合作用和荧光特性的影响。【结果】芽孢杆菌菌剂能有效胶结、改良风沙土, 土壤固结层厚度、硬度较未施加菌剂分别提升 32.23%-131.11%和 79.94%-138.22%, 土壤脲酶和蔗糖酶含量也显著提升, 在防风固沙的同时改善风沙土性质; 1-3 g/kg 施用范围内芽孢杆菌菌剂对植物光合作用和荧光特性产生随菌剂施用量增加而增加的促进作用, 在 3-10 g/kg 施用范围内促进作用随菌剂施用量增加而逐渐减少; 花棒和柠条的菌剂最佳施用量分别为 3 g/kg 和 1 g/kg; 不同施用方式之间无显著差异。【结论】施用适量芽孢杆菌菌剂所产生的土壤微生物膜能促进花棒和柠条幼苗生长。(800~1000 字)(综述采用非结构式摘要, 但字数应达到 800~1000 字)

Effects of inoculation dose of *Bacillus* fungicides on the growth of *Corethroedendron scoparium* and *Caragana intermedia* seedling

Huang Kun¹, Wang Yu¹, Gao Guanglei^{1,2,3,4,5*}

(1. School of Soil and Water Conservation, Beijing Forestry University, Beijing 100083; 2. State Key Laboratory of Efficient Production of Forest Resources, Beijing 100083; 3. Yanchi Ecology Research Station of the Mu Us Sandy Land, Yanchi 751500; 4. Engineering Research Center of Forestry Ecological Engineering, Ministry of Education, Beijing Forestry University, Beijing 100083; 5. Key Laboratory of State Forestry and Grassland Administration on Soil and Water Conservation, Beijing Forestry University, Beijing 100083)

Abstract: 【Objective】*Bacillus* fungicides can effectively improve the wind erosion resistance and properties of soil by forming soil microbial film, but its effect on the vegetation restoration in the wind-sand areas is still unclear.

【Method】In view of this, a pot experiment was conducted in this study to analyze the effects of soil microbial film produced by *Bacillus* mixtures fungicides at different application rates (0, 1, 3, 5, 7, 10 g/kg) and application methods (spraying, mixing) on the photosynthesis and fluorescence characteristics of seedlings of the typical sand plants *Corethroedendron scoparium* and *Caragana korshinskii*. 【Result】The results show that the *Bacillus* fungicides could effectively cement and improve the wind-sand soil, so that the thickness and hardness of the soil consolidation layer increased by 32.23%-131.11% and 79.94%-138.22% compared to that without fungicide application, and the content of soil urease and sucrase were significantly increased which could improve the nature of sandy soil while preventing wind and fixing sand; the *Bacillus* fungicides could produce an increased promotion of photosynthesis

and fluorescence characteristics of the plants with the increase of the fungicide application rate when the application rate of the fungicide was from 1 to 3 g/kg, and the promotional effect would be reduced with the increase of the application rate from 3 to 10 g/kg; the optimal application rates were 3 g/kg and 1 g/kg in the case of the *C. scoparium* and *C. intermedia*. Respectively, the effects of different application methods were not significant.

【Conclusion】 The study showed that the soil microbial film *Bacillus* fungicides produced by the application of appropriate amount of *Bacillus* fungicides could promote the growth of *C. scoparium* and *C. intermedia* seeding.