

Mechanisms of the effect of high-performance ester composite materials on plant growth under soilless conditions

Qingxiu Zhang^{1,2}, Zhen Liu^{1,2}, Jin Liao^{1,2}, Cuiying Zhou^{1,2}

¹ Guangdong Engineering Research Centre for Major Infrastructures Safety, School of Civil Engineering, Sun Yat-sen University, No.135 XinGangXiLu, Guangzhou 510275, China

² Guangzhou Engineering Research Centre for Major Infrastructures and Safety in Transportation, School of Civil Engineering, Sun Yat-sen University, Guangzhou 510275, China

Abstract: The application of high-performance ester materials in soil erosion and soil and water conservation is an important topic in soil remediation research. At present, the mechanism of the role of high-performance ester materials in vegetation restoration has not yet been clarified, resulting in an insufficient basis for adjusting the optimal ratio of high-performance ester composite materials for soil improvement. To this end, the mechanism of the effect of high-performance ester composite materials on the germination and growth of plant seeds is investigated in this paper by conducting plant cultivation experiments under soilless conditions. The results showed that the high-performance ester composite materials could effectively improve the germination ability of seeds and promote the growth of plant conditions. The results showed that the high-performance ester composite materials seedlings. There were differences in the promotional effects of the high-performance ester adhesive and water-retaining materials, with the adhesive material significantly promoting the development of the radicle and the water-retaining material significantly promoting the growth of the germ. Different amounts of adhesive materials have different effects on plant growth. A small number of adhesive materials promotes seed germination, while excessive adhesive materials will have an inhibitory effect. Based on this, the optimal additive amount of adhesive materials suitable for plant growth and the optimal weight ratio of adhesive materials to water-retaining materials were determined. Meanwhile, the influence mechanism of high-performance ester composite materials on plant growth was revealed. This study provides a theoretical basis for the optimal ratio adjustment of high-performance ester composite materials for improving soil.

Keywords: high-performance ester composite materials; seed germination; plant growth; influence mechanism; soilless condition