The 2018 World Congress on
Advances in Civil, Environmental, & Materials Research (ACEM18)
Songdo Convensia, Incheon, Korea, August 27 - 31, 2018

Biopolymer application for soil moisture retention and vegetation growth improvement in sand

*An T.P Tran[1)], Ilhan Chang[2)], Jooyoung Im[3)] and Gye-Chun Cho[4)]

[1), 3), 4)] *Department of Civil and Environmental Engineering, Korea Advanced Institute of Science and Technology (KAIST), 34141 Republic of Korea*
[2)]*School of Engineering and Information Technology, University of New South Wales, Canberra, ACT 2600, Australia*
[2)]*ilhan.chang@unsw.edu.au;* [4)]*gyechun@kaist.edu*

ABSTRACT

Vegetation cover plays an important role in stabilizing the soil surface by resisting surface erosion and desertification factors. Surface vegetation acts as a shelterbelt that reduces the intensity and flow rate of fluid flows near the soil surface, while vegetation roots reinforce soil via the formation of root-particle material that reduces particle detachment. In this study, biopolymers, namely, starch and xanthan gum hydrogels (pure starch and xanthan gum, xanthan gum-starch mixtures), are tested as soil conditioners to improve the water-holding capacity and vegetation growth in sand soils. Perennial ryegrass, which is a common pasture grass species with applications in civil engineering and environmental engineering practices, is used as a target indicator in this study. The sand is treated by a 0.5% biopolymer-to-soil ratio. Specimens are cultured in a climate control chamber with temperature, humidity, and daylight simulation functions. At the 30 first days, 7 ml/day daily precipitation is supplied for seed germination and sprout growth, while drought conditions are simulated after 30 days. The results suggest the promising possibility that biopolymer treatments may enhance the survival ration of vegetation under severe drought environments, which could be applicable for soil stabilization in arid and semiarid regions.

1. INTRODUCTION

Vegetation cover plays a range of roles in controlling soil erosion via controlling runoff and soil losses in most climatic areas. The stability of a slope, which often consists of well-drained and low-cohesive soil, depends on the mechanical reinforcement provided by the plant roots to the soils and on the soil suction distributed within the untreated

---

[1)] Graduate Student
[2)] Senior Lecturer
[3)] Graduate Student
[4)] Professor
*Note: Paper to be submitted to
"Geomechanics and Engineering, An International Journal" for the purpose of Special Issue.