

Optimum of interlayers in reconstructed soil with Yellow River sediment for restoring subsided coal mined land to farmland

Zhenqi Hu¹, Xiaotong Wang², Kevin McSweeney³, and Yong Li¹

¹China University of Mining and Technology - Beijing Campus

²Peking University

³University of Illinois at Urbana-Champaign

April 28, 2021

Abstract

Underground coal mining causes land subsidence, a large area of cultivated land is destroyed. The Yellow River interlayer filling reclamation technology is the powerful way to restore cultivated land. Understanding the mechanism of action of interlayers in reconstructed soil filled with Yellow River sediments is essential to achieving sustainable land management in the Yellow River regions. Column experiments and Field experiments were conducted to optimum of interlayers in reconstructed soil with Yellow River sediment for restoring subsided coal mined land. Our findings show that the inclusion of interlayers in the sediment reduced water leakage and moisture evaporation, and improved the water-holding capacity of the material in comparison to conventional reconstructed soil profile (CK2). When the 30 cm thickness of interlayer, putting 2 interlayers in sediment (T6) was the optimal profile with the highest water-holding capacity. In comparison to CK2, the migration rate of wet front decreases by 32.16%, the cumulative evaporation decreases by 16.29%, the volumetric water content of filling layer (θ_f) increases by 121.56%, and the water-holding coefficient (CWR) increases by 59.47%. It is also proved by field experiments. The wheat and maize yields of T6 improved 51.84% and 54.80%, respectively, as compared with CK2, that closer to undisturbed farmland (CK1). This study provides a valuable framework for subsided land reclamation regarding the method of placing interlayers into Yellow River sediment for enhancing water retention and productivity.

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Zhenqi Hu ¹Institute of Land Reclamation and Ecological Restoration, China University of Mining and Technology (Beijing), Beijing, China., **Xiaotong Wang** ²College of Urban and Environmental Sciences, Peking University, Beijing, China., **Kevin McSweeney** ³Department of Natural Resources and Environmental Sciences, University of Illinois at Urbana-Champaign, Urbana, USA., **Yong Li**¹

Correspondence

Zhenqi Hu, 345 Zonghe Building, D11 Xueyuan Road, Haidian District, Beijing, China.

E-mail: huzq1963@163.com;

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Acknowledgments

This work was funded by the National Natural Science Foundation of China (No. 41771542). The authors would like to express appreciation to members of the research group at the China University of Mining and Technology for providing great help in terms of field operations.

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