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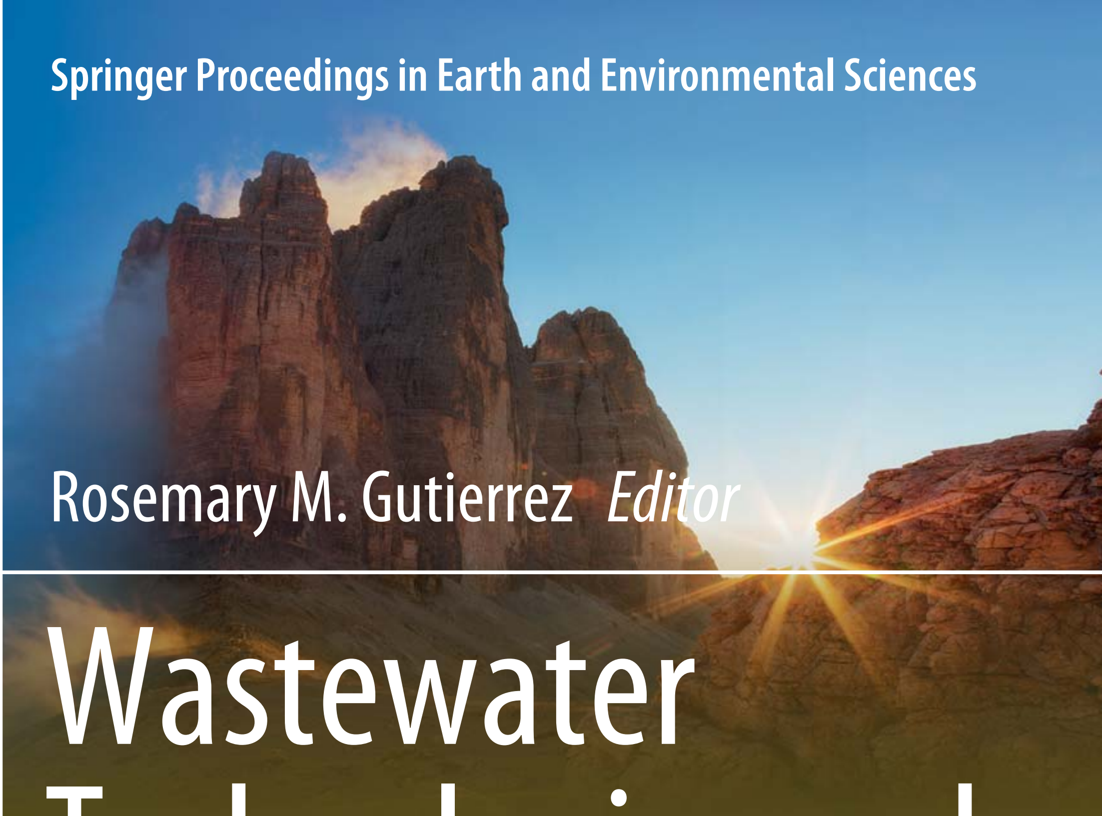

Rosemary M. Gutierrez *Editor*

Wastewater Technologies and Environmental Treatment

Proceedings of the ICWTET2020

Springer

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ISSN 2524-342X ISSN 2524-3438 (electronic)
Springer Proceedings in Earth and Environmental Sciences
ISBN 978-3-030-61988-6 ISBN 978-3-030-61989-3 (eBook)
https://doi.org/10.1007/978-3-030-61989-3

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Dear Distinguished Authors and Guests,

It was a great pleasure to welcome all participants in the 2020 the 2nd International Conference on Wastewater Technologies and Environmental Treatment (ICWTET2020). Due to COVID-19 pandemic which is currently affecting many countries, ICWTET2020 had been held on June 19–20, 2020, as a webinar.

Its purpose is to serve as an international forum for the presentation and discussion of recent advances in the field of wastewater technologies and environmental treatment. ICWTET facilitated the sharing of data and ideas, promote collaborations, and address common challenges to wastewater technologies and environmental treatment. ICWTET provided an effective environment for active learning, discussions of real-world case studies, and networking between like-minded peers and scientists with interest in the field of wastewater technologies and environmental treatment.

I wish to thank the authors and the reviewers for contributing to ICWTET2020. I also express my gratitude to all technology committee members, conference chairs, keynote speakers, sponsors, and conference participants for their support and contributions to ICWTET2020. With great hope, I wish the organizers a most successful conference in ICWTET2021.

I look forward to your participation in ICWTET2021.

With our warmest regards

Prof. Rosemary M. Gutierrez
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Contents

Effects of Argillaceous Shale Efflorescence on Soil Water Content and Soil Properties in Newly-Increased Farmland

Qiguang Dong, Na Li, Yufei Xiong, and Jing He

Abstract In the land remediation of the Weibei Loess Plateau, a large number of argillaceous shale efflorescence was mixed with newly-increased farmland soil. To study the effect on soil water content in newly-increased farmland by argillaceous shale efflorescence, a mixture of argillaceous shale efflorescence and local loess, ancient soil was researched in this study to investigate its effect on soil water in two types of soil. The results showed that the addition of argillaceous shale efflorescence could slow the infiltration of loessial soil to a certain extent and improve the water holding performance; while the argillaceous shale efflorescence could accelerate the infiltration of soil water to a certain extent after adding to the clayey ancient soil. The argillaceous shale could also improve the quality of the newly cultivated land and has potential application value for improving the soil texture.

Keywords Argillaceous shale efflorescence · Soil water content · Newly-increased farmland

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R. G. Gutierrez (ed.), *Wastewater Technologies and Environmental Treatment*, Springer Proceedings in Earth and Environmental Sciences,
https://doi.org/10.1007/978-3-030-61989-3_1

1 Introduction

Land remediation is the management of inefficient, unreasonable and unused land, and the restoration and utilization of land damaged by production and construction and natural disasters to improve land utilization, including agricultural land consolidation, land development, land Reclamation, construction land improvement, etc. (Yang et al. 2013; Liu et al. 2015), which is an important way and effective measure to increase the area and quality of cultivated land. The current land improvement project has been implemented for many years, and the amount of new cultivated land has increased considerably, but its quality is not optimistic (Yang 2011).

In the Weibei Loess Plateau of Shaanxi Province in China, there are abundant wasteland resources, and most of them have not been used reasonably. Implementing land improvement projects in this area can effectively achieve the balance of occupation and compensation of cultivated land resources in Shaanxi Province. Soil quality is the main criterion for judging whether new cultivated land can achieve high yield and efficiency and whether land remediation can achieve sustainability (Zhou et al. 2014). Due to soil formation and the impact of human activities, many soils in the Weibei Loess Plateau contain various amounts and types of gravel or other rock efflorescence (Zhou et al. 2011). During the process of rehabilitating desert grasslands on the Loess Plateau, it was found that a large number of argillaceous shales existed in some areas, and its efflorescence was often mixed into the newly cultivated soil. This has changed the physical structure of the soil and the stability of the soil, and caused changes in the way of water movement in the soil, which affected the redistribution of water (Mehuys et al. 1975; Xu and Shang 2008; Wang et al. 2012; Yang et al. 2009).

At present, there are many studies on the improvement of soil quality of new cultivated soil improvement additives. According to the source of raw materials, soil improvers can be divided into natural improvers, synthetic improvers, natural-synthetic copolymer improvers, and biological improvers (Chen and Dong 2008). Among them, natural modifiers are relatively low in cost and easy to obtain, and are mainly divided into inorganic materials and organic materials. Relevant research on the effects of inorganic materials on soil quality has mostly focused on zeolites, bentonite, fly ash, gypsum, vermiculite and other materials (Hao et al. 2005; Wang et al. 2005). Zeolite has a good water storage capacity. After being applied to the soil, it can increase the water content of the cultivated layer of the soil by 1–2%, increase the field water capacity of the cultivated layer of the soil in the arid area by 5–15%, and its strong adsorption The capacity and high cation exchange capacity can adsorb heavy metals in the soil, promote the release of nutrients in the soil, and have certain effects for improving the status of water and fertilizer shortages in newly-added cultivated soils. Using bentonite to improve sandy soil can increase the content of clay and increase the moisture content of the soil. In addition, bentonite has a certain swelling, dispersibility, and adhesiveness. Applying soil can increase the number of aggregates, increase soil porosity, and reduce soil. Bulk density etc. Fly ash, as an inorganic solid waste, is also commonly used to improve the physical properties of clay and sandy soils, and can increase the content of boron, zinc, and silicon in the soil. Although these natural minerals have certain effects in improving soil structure and soil chemical properties, most of the related studies are performed on a single type of soil, and most of them are focused on the improvement of sandy soils, and very few Considering the characteristics of soils with different texture types, there are still some theoretical and technical problems in practical applications, such as the application amount, application method, and the limitation of large-scale popularization and application of these natural mineral reserves. To this end, exploring the universal addition of relatively abundant externally added materials and studying its impact on the soil quality of newly cultivated land with different texture types is of great significance to further improve the quality of newly cultivated land and promote the ecological construction of land improvement projects.

Based on the physical and chemical characteristics of argillaceous shale, this study intends to set up a combination of argillaceous shale efflorescence with local loess and ancient soil, and discuss its impact on the soil water distribution of newly-increased farmland.

2 Materials and Methods

The study selected mud shale efflorescence and different types of soil for mixing and mixing, and set up a pot experiment. The argillaceous shale efflorescence and soil samples selected for the study were collected from a land improvement project area in Tongchuan City, Shaanxi Province. Among them, the soil samples are two types of loess soil and paleo soil. The texture of the soil is silty loam. The texture of the collected loessal soil is powdery loam. The collected samples are air-dried and passed through a 2 cm sieve. The shale efflorescence materials are mixed with loessal soil and ancient soil in different proportions. Alfalfa is planted as test plants. The specific test treatment is shown in Table 1. For each treatment, a quantitative irrigation was performed on April 17, 2019, and the soil water content of the mixed soil was periodically measured after the irrigation. The soil water content was sampled by a ring knife and measured by the drying method. The measurement depths were 0–20 cm and 20–40 cm. Each measurement was repeated 3 times.

Table 1 Treatment of the study

Test treatment	Vs (argillaceous shale):Vl (loessal soil)	Test treatment	Vs (argillaceous shale):Vp (paleosol)
H1	1:1	G1	1:1
H2	1:2	G2	1:2
H3	1:5	G3	1:5
CK1	0:1	CK2	0:1

3 Results and Analysis

3.1 Influence of Argillaceous Shale Efflorescence on Loess Soil Water Content

The soil water content is affected by water replenishment and the characteristics of the soil itself. Figures 1 and 2 reflect changes in the average value of soil water content at different depths after mixing loessal soil and argillaceous shale in different proportions. It can be seen from Fig. 1 that in the 0–20 cm surface soil, CK1 (Vs:Vl = 0:1) and H3 (Vs:Vl = 1:5) show a trend of first increase and then decrease (Vs:Vl = 1:1) and H2 (Vs:Vl = 1:2) both show a trend of increasing first and then stabilizing. Among them, CK1 decreased from 44.63 to 31.98%, a decrease of 12.65%, and H3 decreased from 38.85 to 26.07%, a decrease of 12.78%. The soil

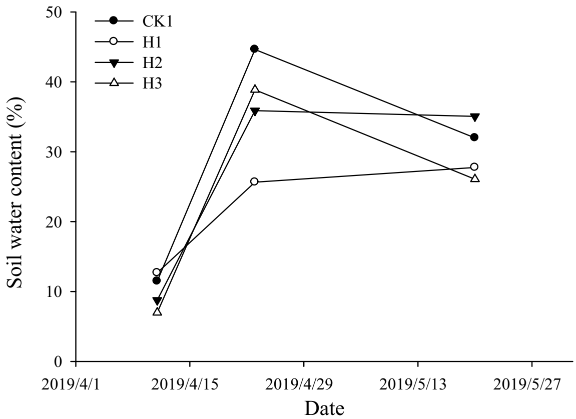

Fig. 1 Variation of soil water content of 0–20 cm in mixed soil of loessal soil and argillaceous shale

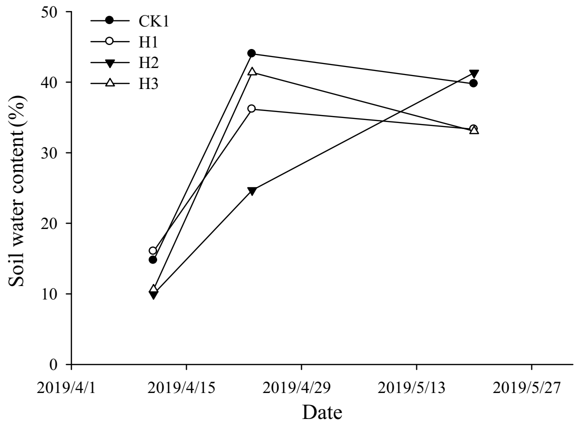

Fig. 2 Variation of soil water content of 20–40 cm in mixed soil of loess soil and argillace shale