Vegetation restoration technology for Pisha Sandstone Area

Peiqing Xiao, Wenyi Yao, Pan Zhang

Yellow River Institute of Hydraulic Research

4-8 May, 2020
Vienna, Austria
Background

Pisha sandstone (PS) is composed of a thick layer of sandstone, arenaceous shale, and mudstone.

- Low degree of diagenesis
- Poor bonding mechanism
- Low compressive strength
soil-covered area: 8400km$^2$

sand-covered area: 3800km$^2$

bare area: 4500km$^2$

White: $\text{Ca}_{0.6}\text{Na}_{0.19}\text{K}_{0.05}(\text{Si}_{10.4}\text{Al}_{0.42})(\text{Al}_{3.52}\text{Fe}_{0.64})\text{O}_{10}(\text{OH})_2$

Red: $\text{Ca}_{0.8}\text{Na}_{0.07}\text{K}_{0.06}(\text{Si}_{9.3}\text{Al}_{0.31})(\text{Al}_{3.50}\text{Fe}_{3.19}\text{Mg}_{1.20})\text{O}_{10}(\text{OH})_2$
Microstructure of PS

- Sediment particles are coarse, more than 80% of particles larger than 0.05mm.
- Obvious boundaries, few bonding substances and most of them are carbonates and clays.
- Porous cementation, strong friction and meshing force without water.

SEM images in 1000 times magnification
A type of consolidation plant-growing material is synthesized.

◆ Water-retention test

![Graph showing solitification time vs. temperature for 3%, 4%, and 5% W-OH]

◆ Consolidation test

◆ Fertilizer-retention test

◆ Germination test

First reaction stage

Second reaction stage

I Add raw material

W-OH

Discharge

V Add raw material

II Change temperature ①

III

IV Change temperature ②

V Change temperature ③

VI

VII

VIII

50 g石灰岩与肥料均匀混合
400 g, 2 mm
石灰岩试样
2 cm细砂土
滤纸
纱布

软质棉

◆ Water-retention test
The vegetation coverage increased from 25% to more than 75% after extensive promotion.
The method has been widely accepted by the local community and soil conservation bureau.
Thanks!