Effect of Adding Different Proportions of Arsenic on the Carbon Content of Sandy Soil

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Abstract. In order to explore the effect of different proportions of arsenic sandstone on the carbon content of sandy soil, the total organic carbon index of arsenic sandstone and sand composite soil was selected for analysis. The carbon content is the highest, especially in the 0-20cm soil layer. After 9 years of cultivation, the 0-10cm total organic carbon content of each proportion of the composite soil layer is significantly higher than that of the sandy land. The average total organic carbon of 9 years of cultivation Compared with three years of cultivation, it has increased by 68.50%, which is a significant increase. In the early stage of compounding, due to engineering disturbances and disturbance of the natural cultivation process of the soil, the total organic carbon content in the compounded soil has a downward trend. With the later cultivation of the compounded soil, the total organic carbon increased significantly, and the addition of arsenic was greatly increased. This accelerated the natural succession process of sandy soil.

Keywords: New cultivated land, Soil quality, Organic carbon.

1. Introduction
The development and utilization of Mu Us sandy land resources is the fundamental way to solve the prevention and reuse of sandy land. Studies have shown that adding different proportions of arsenic to the sand can enhance the cementation of the sand. The simple sand leaks water and fertilizer, and the soil unity is poor and cannot be satisfied. For crop growth, after adding a proper proportion of arsenic sandstone, the clay and fine powder particles in the arsenic sandstone can make up for the lack of colloidal substances in the aeolian sandy soil, and the improvement of the aeolian sandy soil's cementing capacity can also solve the problem of easy disintegration and loss of the arsenic sandstone. The reasonable combination of the two to form soil can not only reduce or prevent the water leakage of sandy land, but also weaken the phenomenon of hard compaction of arsenic sandstone, achieve the purpose of improving the physical properties of the soil and promoting the formation of sand.
In order to explore the effect of different proportions of arsenic on the carbon content of sandy soil, the total organic carbon index of arsenic and sand composite soil was selected to analyze the characteristics of the influence of different proportions of arsenic on the sandy soil carbon pool under different years.

2. Materials and methods

2.1. Overview of the test area

The study area is located in Yuyang District, Yulin City, Shaanxi Province. It is a sandy grassland area in northern Shaanxi. It is located at the southern edge of the Mu Us Sandy Land and the northern end of the Loess Plateau. It is mainly composed of gentle sand dunes and sand chains. The area has a mid-temperate continental monsoon climate. Seasonal changes are obvious. The average annual precipitation is 413.9mm, the average annual temperature is 8.1℃, the average frost-free period is 155 days, and the average annual evaporation is 1904mm. The soil type in the project area is mainly sandy soil, and most of the area is barren sand.

The volume ratios of arsenic sandstone to sand are selected to be added in the proportions of 1: 1, 1: 2, and 1: 5, respectively, and each plot is covered with different mixing ratios of composite soil on the surface 0~30cm.

2.2. Sample collection

Samples were taken after the potatoes were harvested at 3 and 9 years of planting. Each plot adopts the S-shaped sampling method and evenly collects 9 points to form a mixed sample. Take it back to the laboratory to air dry and grind it through a 0.149 sieve to determine soil organic carbon.

3. Test results and analysis

3.1. The effect of adding different proportions of arsenic sandstone on the total organic carbon of sandy soil after 3 years of renovation

Through the compounding of arsenic and sand in different proportions, the relationship between the total organic carbon of each soil layer of the compounded soil and the compounding ratio in 2013 and 2019 was explored. The results show (Figure 1) that after 3 years of combination of arsenic sandstone and sand, the highest total organic carbon content in each soil layer is pure sand, and the difference is significant in 0-10cm and 10-20cm soil layers. The difference is not significant in the 20-30cm soil layer. In the ratio of arsenic sandstone to sand 1: 1 and 1: 2, the total organic carbon of each layer of the composite soil shows 0-10cm > 20-30cm > 10-20cm, and in the ratio of 1: 5, The total organic carbon of each layer presents 0-10cm > 10-20cm > 20-30cm, and the total organic carbon of each layer of pure sand shows the rule of 10-20cm > 0-10cm > 20-30cm.

![Figure 1. The total organic carbon content of various soil layers in different proportions in 2013 after the combination of arsenic and sand.](image)
3.2. The effect of adding different proportions of arsenic on the total organic carbon of sandy soil after 9 years of renovation

After 9 years of combination of arsenic and sand, the soil with the highest total organic carbon content in each soil layer is the soil with a 1:1 combination of arsenic and sand. From the combined soil after 9 years of cultivation, for the soil layers of 20cm and 20-30cm, the total organic carbon content of each proportion tends to be stable. The average total organic carbon content of 3 years of cultivation was 2.00g/kg, and the average total organic carbon content of 9 years of cultivation was 3.37g/kg, which was an increase of 68.50% compared with 3 years of cultivation.

![Figure 2. The total organic carbon content of various soil layers in different proportions in 2019 after the combination of arsenic and sand.](image)

4. Conclusion

After 3 years of combination of arsenic sandstone and sand, the total organic carbon content of each soil layer in the sandy land is the highest, especially in the 0-20cm soil layer. After 9 years of cultivation, the total organic carbon content of each soil layer is 0-10cm. The organic carbon content is significantly higher than that of sandy land. The average total organic carbon of 9 years of cultivation has increased by 68.50% compared with 3 years of cultivation, which is a significant increase. In the early stage of compounding, due to engineering disturbances and disturbance of the natural cultivation process of the soil, the total organic carbon content in the compounded soil has a downward trend. With the later cultivation of the compounded soil, the total organic carbon increased significantly, and the addition of arsenic was greatly increased. This accelerated the natural succession process of sandy soil.

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