Study on the Active Effect of Soil Nutrient Elements

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Abstract. The purpose of this study is to ecologically soil, reduce fertilization and maintain land productivity. In this study, the amount of nutrient elements stored in the soil is large, and the soil samples are treated with long-term constant and different water content to determine the activation amount of the solid elements in the soil. The results showed that the content of available phosphorus and available potassium released by XH6 in different water content cultures was higher than 3.89% and 10.12% of XH10, respectively. The content of nitrate nitrogen released by XH4 was higher than that of treated XH4. %.

The content of ammonium released under treatment of XH10 was higher than that of treatment with XH10 of 24.11%. The release nutrients varied with the culture time, but the release of nutrients such as ammonium nitrogen, nitrate nitrogen, available phosphorus and available potassium peaked on the 14th day of culture, and stabilized in the latter culture. So, the high moisture content has a certain release and increase effect on soil available potassium and available phosphorus.

1. Introduction

Nutrient is one of the key requirements for crop growth. The soil contains a large amount of inert mineral elements. By studying the changes of soil nutrient activation, it aims to accelerate the transformation, activation and release of soil mineral nutrients, and achieve no fertilizer. Production is of great significance.

In the rural areas of China's Loess Plateau, there is often a custom of “changing fertilizers”. Every summer, the villagers removed the old clams and replaced them with new ones. The old bauxites that had been smoked for two or three years were crushed and used as fertilizer. According to the relevant data[1], every 1kg of cave soil contains 1.2~2.2g of phosphorus, 2.6~9.8g of potassium, 0.6~1.2g of sulfur and 1.0~1.8g of calcium.

This is a research focus of soil mass organic reconstruction to rely on soil mass itself some conditions to improve the function of soil mass repair. Soil mass organic reorganization takes the construction of land life system as the research goal, and the construction of land life system can not be separated from the participation of many elements. How can promote the effective release of some
beneficial elements? Some studies have shown that litter will have some impact on the release of trace elements in different types of trees on the Loess Plateau[2]. Some researchers by studying the release of nitrogen, phosphorus and potassium after withering of masson pine artificial forest showed that appropriate temperature and humidity environment is more conducive to the release of nitrogen and phosphorus in wither leaves[3]. Other studies also pointed out that soil fauna can physically decompose the coarse-grafted plants and increase the specific surface area of the litter. At the same time, soil fauna excreted the excrement directly, whose nutrient content was rich, easily decomposed and reduced the C / N ratio of the fallout, so that the nutrients of the fallout were easier to release[4].

2. Methods
The loess soil was collected from wheat fields in key laboratory of degraded and unused land consolidation engineering, the ministry of natural resources of the People’s Republic of China. The soil samples were collected from the surface of the first phase of the Fuping Pilot Project (0-20 cm), and the basal nutrient contents (total nitrogen, available potassium, available phosphorus) and field water holding capacity were determined as experimental background values. The moisture was set to 4 treatments, wherein treatment I (XH4) was 40% relative water content, and the amount of distilled water was 11.3 mL; treatment II (XH6) was 60% relative water content, and the amount of distilled water was 17 mL; treatment III (XH8) is a relative water content of 80%, and the amount of distilled water added is 22.6 mL; wherein the treatment IV (XH10) is 100% relative water content, and the amount of distilled water is 28.3 mL. The air-dried soil sample required for each treatment is 100 g. Add distilled water, prepare the moisture, put it into the plastic bag, and seal it immediately. The BOD incubator was placed for constant temperature culture, and the culture temperature was set to 25 °C. Each treatment was repeated 3 times, the weight of the plastic bag was weighed every 10 days, and the water loss was supplemented according to the gravimetric method, and samples were taken at 3, 5, 7, 14, 20, 30, 40, 50, 60 d after the culture (A total of 108 bags of soil to be tested were placed, and the contents of ammonium nitrogen, nitrate nitrogen, available phosphorus and available potassium were determined, and the release and activation of N, P and K nutrients were analyzed.

3. Results
3.1 Ammonium nitrogen content activation release trend
Figure 1 shows the change trend of ammonium nitrogen content with different water content gradients. As can be seen from Figure 1, the average release of ammonium nitrogen in the soil during the two-month culture period was highest under the treatment of XH10. The ammonium nitrogen is a reduced nitrogen, which is generally higher in flooding conditions, which is relatively higher than 49.48% of XH4, higher than 28.12% of XH6, and 12.29% higher than XH8. Under the four treatments, the release amount of ammonium nitrogen was the largest on the 14th day of culture, and at this time, a peak appeared during the culture period. Among them, the treatment XH10 was 21.08% higher than the treatment XH4, 25.37% higher than the treatment XH6, and 6.30% higher than the treatment XH8. Therefore, under the treatment of XH10 for the 14th day of culture, the release of ammonium nitrogen in the soil was the most.
3.2 Nitrate nitrogen content activation release trend
Figure 2 shows the change trend of nitrate nitrogen content with different water content gradients. It can be seen from Fig. 2 that during the two-month culture period, the average release amount of nitrate nitrogen in the soil is highest under the treatment of XH4. Nitrate nitrogen is oxidized nitrogen, which is generally less abundant in paddy fields. It is higher than 5.23% of XH6 and 6.66% higher than XH8, which is higher than 24.11% of XH10. Under the four treatments, the release amount of nitrate nitrogen was the largest on the 14th day of culture, and at this time, a peak appeared during the culture period. Among them, the treatment XH4 was 0.11% higher than the treatment XH6, 6.43% higher than the treatment XH8, and 8.02% higher than the treatment XH10. Therefore, in the treatment of XH4 for the 14th day of culture, the release of nitrate nitrogen in the soil was the most.

3.3 Available phosphorus content activation release trend
Figure 3 shows the change trend of available phosphorus content with different water content gradients. As can be seen from Figure 3, the average release of available phosphorus in the soil during the two-month culture period was highest under the treatment of XH6, which is relatively higher than 2.23% of XH4, higher than 0.79% of XH8, and 3.89% higher than XH10. Under the four treatments,
the amount of available phosphorus released was the largest on the 14th day of culture, and at this time, a peak appeared during the culture period. Among them, the treatment XH8 was 1.28% higher than the treatment XH4, 2.49% higher than the treatment XH6, and 6.05% higher than the treatment XH10. Therefore, under the treatment of XH6 for the 14th day of cultivation, the available phosphorus in the soil was most released.

Figure 3. Trends in available phosphorus content over time at different water contents

3.4 Available potassium content activation release trend

Figure 4 shows the change trend of available potassium content with different water content gradients. As can be seen from Figure 4, during the two-month culture period, the average release of available potassium in the soil was highest under treatment of XH6. The treatment XH6 was 9.48% higher than the treatment XH4, which was 1.28% higher than the treatment XH8, and 10.12% higher than the treatment XH10. Under the four treatments, the amount of available potassium released on the 14th day of culture was the largest, and at this time, a peak appeared during the culture period. Among them, the treatment XH6 was 21.92% higher than the treatment XH4, 1.52% higher than the treatment XH8, and 21.92% higher than the treatment XH10. Therefore, in the 14th day of culture under XH6 treatment, the release of available potassium in the soil was the most.

Figure 4. Trends of available potassium content with time at different water contents
4. Conclusion
Under the condition of different water content, the relative water content was 60%, the release of available phosphorus and available potassium was the largest, and the release of nitrate was the highest when the relative water content was 40%, and the ammonium when the relative water content reached 100%. The release of nitrogen is the largest. The release nutrients varied with the culture time, but the release of nutrients such as ammonium nitrogen, nitrate nitrogen, available phosphorus and available potassium peaked on the 14th day of culture and stabilized after culture.

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