Study on Soil Nutrients and Beneficial Microbe Cultivation of Grape Root Zone in Sandy Non Cultivated Land

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Keywords: Sandy Soil, Root Zone Soil, Beneficial Microorganism, Soil Fertility

Abstract: The western region of China has a vast area and a magnificent territory, but most of them are sandy non cultivated land. At the same time, the western region is also an important base for grape planting and derivative production, so the development and utilization of sand gravel non cultivated land is imminent, which is not only the industrial upgrading in the western region, but also an important way for China's further economic development. In this paper, through the discussion of the related concepts of sand gravel non cultivated land, the current soil analysis methods are analyzed, and the analysis methods of beneficial microorganisms are discussed. At the same time, this kind of soil is sampled and collected, and it is analyzed. The conclusion is that the sandy non cultivated land soil fertility is not enough, and the content of beneficial microorganisms is low, so it is necessary to pay attention to the level in the process of planting and fertilizing Balanced fertilization.

1. Introduction

There are abundant land resources in the west of China, mainly Gobi and gravel non cultivated land, which is a very valuable development resource for the overall situation of national economic development, with great exploitability and great development potential. Sand gravel non cultivated land has few diseases and insect pests and no pollution, so it is very suitable for pollution-free cultivation of grape. The rational development and utilization of sand gravel non cultivated land resources is not only the optimization and upgrading of industries in the western region, but also an important way of rural economic development, which is also an important step to promote the western development and even the national economic development. In the development of sand gravel non cultivated land, we should not only consider the development efficiency and results of sand and gravel non cultivated land, but also consider the sustainable development and take into account the overall effect of the whole ecological development. Focus on China's actual ecological and economic effects, and achieve a balance between ecological effects and economic effects [1-3].

In the western region, the gravel non cultivated land is more concentrated in the northwest region, such as Xinjiang. At the same time, Xinjiang is the largest wine grape planting base. The grape wine industry directly drives the local farmers to increase their income and become rich. At the same time, the reason why grapes can develop and grow in the western region is that grapes have strong adaptability to the environment and can be planted and cultivated in various severe soil environments [4]. The main reason of grape quality in Xinjiang is the local climate. Only the climate resources of tiandudao can produce such delicious grapes. Xinjiang is located in the northwest inland area of China, far from the sea, the annual precipitation is rare, so there are more sunny days. In addition, the high temperature in summer and the long days make the grapes here receive sufficient sunlight. At the same time, in addition to sufficient sunlight in Xinjiang, there is also a huge temperature difference between day and night, which makes grapes accumulate sufficient sugar, so Xinjiang's grapes, Hami melon, watermelon and other fruits are relatively sweet. All kinds of organic and inorganic nutrients in the soil are the core factors of whether the soil can be cultivated, and whether the sustainable development depends on the soil nutrients to a great extent. At the same time, the final vegetation development and fruit quality are also closely related to the various nutrients in the soil. In addition to soil nutrients, the soil rich in beneficial microorganisms is also a key factor affecting grape variety and yield. In addition to a certain amount of water and nutrients, vegetation

  DOI: 10.25236/civeb.2020.024

growth also needs a suitable soil environment with enzyme activity and microbial activity, which can promote soil activity and fertility. From the perspective of the relationship between soil and microorganisms, many scholars have explored the growth and development process of vegetation, found the laws of microbial activity and fertility maintenance, and clarified the relationship among vegetation, soil and microorganisms, which provided a theoretical basis for later practical work [6].

With the rapid development of the national economy, the polarization of economic development in the eastern and western regions of the country is serious. In order to better promote the development of the western region and carry forward the advantages of the western geographical environment, this paper analyzes the soil nutrients and beneficial microorganisms in the grape root region based on the rich sand and gravel non cultivated land in the western region, and explores a planting suitable for the characteristics of the region Methods and methods.

2. Research methods of soil nutrients and beneficial microorganisms in sandy soil

In order to better study and analyze the grape soil nutrients and beneficial microorganisms in sand gravel non cultivated land, this section focuses on the related knowledge concepts, which is conducive to the smooth progress of the experiment and summary in the following article.

2.1 Related Concepts of Sandy Non Cultivated Land

Sand gravel non cultivated land is one of the most important, which is distributed in all kinds of hillsides and mountains. The depth of sand gravel soil is generally less than 50 cm. The soil is rich in all kinds of gravel and debris after weathering or degradation. Because of the high permeability of soil, all kinds of nutrients in soil are extremely deficient. The soil is mostly yellowish brown. According to the soil section, this type of soil has black soil layer and leaching layer. The soil is weakly acidic or neutral. This kind of soil has strong permeability and good air permeability. The activity of aerobic microorganism is dominant, which can promote the decomposition of organic matter and accelerate the mineralization of organic matter. The soil is loose and easy to cultivate. Soil capillary action is strong and water movement is fast. The suitable cultivation period is also long. The seedlings of plants and plants are easy to be inserted and planted. However, due to the lack of nutrition, the plants are easy to senescence in the later stage.

2.2 Concepts Related to Beneficial Microorganisms

Microorganisms in the soil is an important part of maintaining the soil nutrient cycle. Beneficial microorganisms can help the soil to carry out organic degradation, cycle various types of elements in the soil, stabilize the nutrient dynamic cycle in the soil, and keep the soil in a usable state. Only the integrity and functional diversity of soil can be maintained. Microbial diversity is an important factor to improve microbial function and ecosystem stability. The root area in the soil is the area where vegetation or species of plants directly exchange materials with soil, which is the only place for material exchange between plants and soil, and plants also rely on this area to benefit and co-exist with soil [7]. Under the influence of plant roots, the soil nutrients in the root area and the non root area are greatly different under the influence of plants, and the microbial community is also very different. Plant growth needs the participation and action of rhizosphere microorganisms. The metabolic activities of plant growth promoting bacteria can decompose and transform soil nutrients and be absorbed by plants. At the same time, some substances secreted by microorganisms can also greatly improve the adaptability of plants to the environment. Plant species, health status, growth stage and other factors can affect the microbial community structure of rhizosphere soil. In addition, the physical and chemical properties of soil, such as soil nutrient status, pH value, temperature and humidity, have great influence on microbial community [8].

2.3 Soil Collection and Analysis

Soil analysis is divided into chemical analysis and physical analysis. Generally speaking, soil analysis refers to chemical analysis, and analyzes the composition of soil internal substances. By collecting the corresponding soil samples, the soil samples are decomposed by chemical method and the content of the internal substances is measured. The content of soil organic matter, the content of quantitative elements of the sudden and effective quantitative elements, pH value, cation exchange capacity are determined and the composition of exchange base. [10]

2.4 Soil Collection and Analysis

Calculation method of organic carbon content

$$(mg*C*kg^{-1}) = \frac{\overline{\quad 12 \quad}\; 4*10^3 M(V_0 - V)f}{W} \tag{1}$$

Soil microbial biomass carbon:

$$Bc = \frac{Ec}{K_{EC}} \tag{2}$$

3. Study on soil nutrient and beneficial microorganism culture of grape root zone in sandy soil

3.1 Experimental Preparation

Soil collection: a certain area in the west is taken as the sampling area, with an area of no less than 200 square kilometers. The soil depth is divided into three layers: 0-20cm, 20-40cm and 40-60cm. The soil weight is not less than 5kg and stored.

Selection of experimental objects: Red Globe, baijiagan and kashkar grape varieties were selected as control. The tree age is 5-7 years. Ensure that there is no obvious damage on the appearance of the grape tree and ensure the quality of the grape tree.

3.2 Experimental Way

Soil pH and organic matter content were taken as examples

PH measurement steps:

1) Select the soil sample with a weight of about 15g, put it into the container, and then take a fixed amount of distilled water without carbon dioxide, and mix it with the selected soil to ensure uniform mixing. After mixing evenly, put a magnetic stirrer into the mixed liquid and stir on the instrument for 1 minute. Let it stand for 20 minutes.

2) Turn on the machine and heat for about 10 minutes in advance. Immerse the glass electrode prepared in advance into the container containing standard buffer solution. The pH value of the solution is 4.8. For the control electrode, take the glycerine pump electrode as an example, set the pH meter at 4.8, and operate repeatedly until the value remains unchanged. Take out the electrode from the dissolver, rinse it, then absorb the water, and then insert it into the ph4.01 standard buffer solution to check whether the pH value is correct.

3) Wash the electrode with distilled water, absorb water with filter paper, insert the glass electrode and calomel electrode into the soil test solution or suspension, read the pH value, repeat three times, and take the average value as the measurement result.

Soil organic microorganism measurement steps:

1) Soil pretreatment and fumigation

2) Place the fumigated soil into a polyethylene plastic container, add 100 ml 0.5 mol / L potassium sulfate, shake for 30 minutes, and filter with medium speed quantitative filter paper in the plastic bottle. At the same time of fumigation, weigh 3 parts of soil into polyethylene plastic bottle, directly add quantitative potassium sulfate to extract, and take another 3 parts of soilless blank to analyze the extraction solution immediately.

3) After the above steps, take about 5ml of soil extract and put it into a 150ml container. At the same time, add quantitative potassium dichromate and sulfuric acid solution into it. Then put several glass beads in it and stir it. After fully stirring, put it into a 155 ℃ phosphoric acid bath and boil for 10 minutes. After cooling, transfer the solution to a 150 ml conical flask without damage.

Titrate with 0.5mol/l ferrous sulfate standard solution, the color of the solution changes from orange yellow to blue, and then to reddish brown, which is the end point of titration.

4. Experimental results and analysis of soil nutrients and beneficial microorganism culture in grape root zone of sandy non cultivated land

4.1 Contents of Nutrients and Organic Matter in Soil Samples

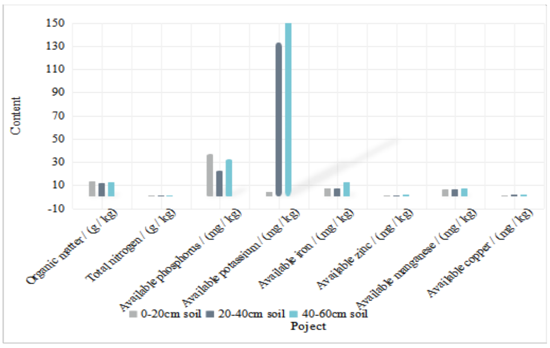

Fig.1.Contents of Soil Organic Matter and Inorganic Matter at Different Depths

According to the table, the content of available potassium is relatively large, and there are a lot of potassium elements in the deep and surface. It includes the content of water-soluble potassium in soil and potassium element exchanged with plant roots, which is often included in exchangeable potassium due to its low proportion. Because the plant growth needs more potassium, the content of available potassium is one of the important indicators of soil potassium supply; organic matter content is more than 10g / kg, relatively rich.

Table 1. Contents of Soil Organic Matter and Inorganic Matter in Different Depths

	0-20cm soil	20-40cm soil	40-60cm soil
Organic matter / (g / kg)	13.4	11.8	12.7
Total nitrogen / (g / kg)	0.9	0.9	0.6
Available phosphorus / (mg / kg)	36.77	22.39	32.14
Available potassium / (mg / kg)	4.5	133.38	216
Available iron / (mg / kg)	7.45	6.95	12.68
Available zinc / (mg / kg)	1.43	0.9	1.56
Available manganese / (mg / kg)	6.16	6.39	7.19
Available copper / (mg / kg)	1.36	1.58	1.7

The content of organic matter in 0-20cm, 20-40cm and 40-60cm soil is 13.4g, 11.8g and 12.7g, respectively; the total nitrogen content is relatively stable, in the middle and low level; the content of available phosphorus is 36.77mg, 22.39mg, 32.14mg, which is the secondary standard; the content of available potassium is 4.5mg, 133.38mg, 216 mg, the deep soil content is higher, and the content of other metal elements is shown in the table, which has a certain regularity Secondly, the more metal content in soil, that is, the metal content increases with the depth of soil.

4.2 Content Changes of Elements and Organic Matter in Root Zone Soil

The changes of soil organic matter and element contents can be changed over time, as shown in Table 1. Compared with the root zone soil nutrient content, the root zone soil nutrient content was significantly higher than the soil surface area. The highest content of water-soluble calcium in the surface soil is close to 250 mg, and it decreases with the increase of soil depth; the basic content of available potassium is almost the same, which is around 150 mg, and the middle content of available phosphorus is low; the organic matter is also over time, the surface content is slightly higher than the deep content, and the content of other metal trace elements is small, which belongs to the normal phenomenon, However, in the process of planting grapes and other fruits, the demand for trace elements is relatively small, but it can not be completely absent, which means that grape planting should pay more attention to the injection of trace elements, not too much or not.

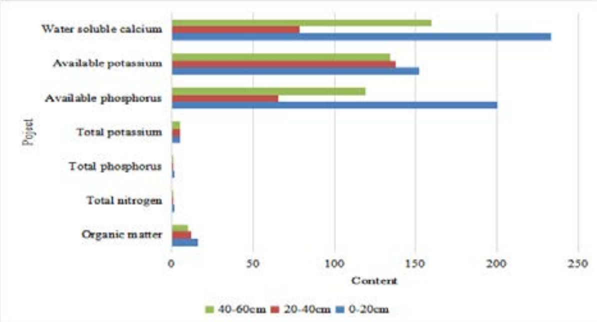

Fig.2. Changes of Soil Elements and Organic Matter in Root Zone

4.3 Nutrient Classification in the Second National Soil Survey

Table 2. Nutrient Classification Criteria of the Second National Soil Survey

Level	Organic matter	Hydrolyzable nitrogen	Available phosphorus	Available potassium
Level 1	>40	>150	>40	>200
Level 2	30-40	120-150	20-40	150-200
Level 3	20-30	90-120	10-20	100-150
Level 4	10-20	60-90	5-10	50-100
Level 5	6-10	30-60	3-5	30-50
Level 6	<6	<30	<3	<30

As shown in Table 2, this table is the nutrient grading standard of the second National Soil Census, and the soil fertility of the experimental site is analyzed according to the nutrient classification standard of the second National Soil Census.

5. Conclusion

Grape not only has the demand for mineral nutrients in soil, but also has a certain regularity in the absorption ratio of various elements. The imbalance of some elements in soil will hinder the absorption of nutrients by roots. The content of trace elements in soil was analyzed in this experiment. It was found that the soil nutrients in the root zone of sand gravel non cultivated land were not ideal, and the content of beneficial microorganisms was low. At the same time, the results of different types of grape trees and soil in different places were different. However, the development of sand gravel non cultivated land resources is an important way for farmers in the western region to become rich. Therefore, it is necessary to develop this type of soil reasonably according to the local actual situation and local policies. In the actual grape planting, we should pay attention to the combined use of nitrogen, phosphorus and potassium fertilizer, and actively promote grape balanced fertilization technology to promote income increase.

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