

## Key Techniques for Regulation and Control of Land Reclamation in Yan'an

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### Abstract

**Based on the understanding of potential hazards such as soil structure, runoff generation and nutrient loss in the Loess Plateau, the study of the formation mechanism of the treatment of the ditch and the improvement of the land in the Loess Plateau Sexuality, sustainability of engineering effects, and safety of the ecological environment. This study combines the methods of geology exploration, field long-term location monitoring, field plot experiment and simulation and laboratory analysis to reveal the mechanism of the middle-flow formation of the loess plateau, and to construct the key technology of comprehensive regulation of the soil middle stream. Relying on the land demonstration project of Zhigou Land for technical demonstration application and promotion, to solve the problem of "dryland water irrigation" on the Loess Plateau, in order to provide theoretical basis and technical support for the sustainable development of land management.**

### Keywords

**Ditching land, Channel, Water interception, Rrigation and drainage, Dual-purpose channel.**

### 1. Introduction

The Loess Plateau is one of the regions with the highest soil erosion and the most serious soil erosion in China, and the ecological environment is relatively fragile. Since the founding of New China, the party and the state have attached great importance to the ecological construction of the Loess Plateau. They have successively experienced slope management, combined treatment of gully slopes, comprehensive management of small watersheds, and returning farmland to forests and grasslands. Especially since the implementation of the project of returning farmland to forests (grass), the vegetation coverage has increased from 31.6% in 1999 to 59.6% in 2013, and the vegetation coverage has increased greatly<sup>[1]</sup>, effectively curbing the soil erosion on the Loess Plateau, and the ecological environment has been extremely Great improvement. However, after the implementation of the project of returning farmland to forests and grasslands on the Loess Plateau, a large number of sloping farmland were converted to arable land, and the area of cultivated land was reduced. As of 2012, the scale of returning farmland to forests (grass) exceeded twice the upper limit of 1.5 mu of per capita cultivated land on the Loess Plateau<sup>[2]</sup>. The situation of relatively large population-cultivated land has emerged in the Loess Plateau. In order to consolidate the results of returning farmland to forests and grasslands, effectively increase the area of cultivated land, improve the quality of existing cultivated land, ease the contradiction between people and land, and ensure national food security, in 2013, the Ministry of Natural Resources (formerly Ministry of Land and Resources) and the Ministry of Finance jointly approved Yan'an. The construction of the ditch land was included in the construction

of the major land remediation project in the country. The first phase of the project involves 13 counties and districts and 134 townships and towns in the city, with a total scale of 506,700 mu and a total investment of 5.172 billion yuan<sup>[3]</sup>.

## 2. Water interception technology

The problem of soil flow in the project area of the Ditch Land is prominent, and it plays an important role in promoting soil erosion, especially gravity erosion. Even the erosion caused by the soil flow is much higher than that of the plate erosion and gully erosion. In the form of surface erosion, in the land of the ditch, the soil in the soil will cause the flooding of the channel farmland, increase the risk of salinization of the farmland soil, and change the redox environment of the submerged layer and affect the growth of rice in the paddy field. It will have some adverse effects on paddy field production, and may also cause loss of nutrients such as nitrogen and phosphorus in the soil.

Rice field water management is a major factor in rice production. After rice heading and flowering, the stems and leaves no longer elongate, the floret development is completed, and the water requirement of the seedlings is reduced. In order to increase the permeability of the field, reduce the occurrence of diseases, improve the root activity, prevent premature senescence of the leaves, and promote the robustness of the stems, a water management method of "dry and wet alternating, wet-based" should be adopted. However, the mid-stream of the ditch-making soil in the area lasts for a long time, and the paddy field in the paddy field is in a state of flooding for a long time, which seriously affects the aeration in the field and is very unfavorable for the growth of rice.

By setting the intercepting ditch laterally in the direction of the gravity soil in the area of the gully, the upstream water can be cut off, and the mid-stream of the field can be discharged in time to regulate the flow in the middle of the soil. At the same time, the drainage function can be passed through the intercepting ditch. The adjustment of the groundwater level in the terraced land ensures that the cultivated layer of the farmland maintains a reasonable water content. For the paddy field, the water in the paddy layer of the paddy field can be eliminated, and the redox state of the soil profile of the paddy field can be improved, eventually forming a multi-water leak. The method of using less water to protect the rafts for unpowered farmland irrigation.

According to the characteristics of the soil in the area of the land, the interception ditch is constructed to realize the regulation of the middle stream in the upper stage and realize the efficient use of the middle stream. The intercepting ditch is of great significance in the land remediation project, especially in the rich areas of the soil, and the excavation of the intercepting ditch is even more essential. First of all, the existence of the middle stream causes the water in the field to be too large to be constructed, and a water intercepting ditch is excavated in the lower part of the terrain, and the middle stream in the field is pooled, so that the accumulated water in the field is quickly drained. The internal water table is lowered, and the field is quickly dried, which is convenient for construction. Secondly, during the flood season, the water in the field can be drained, the flood disasters can be alleviated, and the secondary salinization of the soil caused by the formation of the wetland can be prevented. Finally, the water accumulated in the ditch can be re-irrigated to the field during the dry period. In order to effectively alleviate the drought.

## 3. Irrigation and drainage dual-channel technology

In the existing farmland water conservancy project, the irrigation and drainage channels occupy a certain farmland area, which will reduce the utilization efficiency of the land and is not suitable for the development of trench land-growing agriculture. In the paddy field planting process, interval irrigation and drainage are required, and the "dry and wet alternate, wet-based" water management method is adopted. The rice is maintained in the period of rice growth. "Deep water returning to green, shallow water sputum, water booting, dry and wet cultivation to the old "reasonable irrigation system" to achieve the purpose of regulating water with water, rooting with gas, protecting leaves with roots, and sturdy seeds with leaves. In order to ensure that the paddy water volume is suitable for crop

growth, drainage is more important where the groundwater level is higher. At the same time, the simultaneous irrigation of different fields during farmland irrigation will result in different irrigation water volume, and too high or insufficient water is not conducive to crop growth. More importantly, the traditional irrigation facilities are prone to cause poor water and gas conditions in rice.

The design of irrigation and drainage canal can improve the water and gas conditions of rice rhizosphere by adjusting the water in the field at the right time. The most important thing is to be able to reach the optimal irrigation and drainage conditions for rice growth.

The farmland irrigation and drainage channel facility comprises a channel and a plurality of water distribution devices, the water distribution device comprises a throttle gate for blocking the water flow, at least one intake gate and at least one water outlet gate, the control gate is perpendicular to the water flow direction and fixed on both sides of the channel. One or more intake gates and one or more intake gates are provided on each side of each throttle. Since the irrigation and drainage dual-use channels are generally located in the middle of the farmland, when the intake gates and the water discharge gates are provided on both sides of the channel, the farmland on both sides of the channel can be separately irrigated.

The lower end of the intake sluice is flush with the farmland, and the lower end of the sluice gate is lower than the farmland, which is convenient for the drainage operation of the farmland. The farmland irrigation and drainage dual-use channel facility is a kind of new farmland irrigation and drainage facility that can effectively utilize land and take into account the irrigation and drainage of farmland. It can meet the different needs of rice in different periods. It is a new type of farmland irrigation and drainage facility with convenient and simple operation. It can realize the irrigation of different fields in the farmland when water is needed, and the drainage of different fields in order without water, which can significantly promote the development of agricultural paddy field in the dryland of the Loess Plateau.

#### **4. Governing the land to comprehensively control the engineering model**

According to the formation mechanism of the middle stream of the Loess Plateau, based on the formation mechanism of the middle stream of the loess, based on the comprehensive improvement project of the land for the treatment of the ditch, the comprehensive management of the ditch, the drainage ditch, the intercepting ditch, the irrigation and drainage, and the like The irrigation and drainage measures can realize the unpowered regulation and utilization of surface water, soil water and groundwater resources for the treatment of land, improve the utilization efficiency of water resources, and form an ecological agricultural landscape that combines drought and water in the loess plateau.

Through the construction and application of this integrated irrigation system, not only can the timely adjustment of the farmland moisture in the land for land control can be realized, but also the farmland for the treatment of land can be protected from floods, droughts, mudslides and other soil erosion disasters. The implementation of the intercepting ditch technology can adjust the soil moisture of the farmland, improve the redox environment of the paddy field in the paddy field, and reduce the risk of salinization. The irrigation and drainage dual-use canal achieves the purpose of “drying and simmering in the dry season” and solves the problem.

The problem of irrigation and drainage of farmland effectively prevents the occurrence of farmland disasters and droughts. The combination of the two forms of the regulation system of the loess plateau to control the land flow from the surface of the field to the interior of the soil, from the dry season to the rainy season Timely air conditioning control of resources. In addition, combined with the setting of field roads, the planting of farmland shelterbelts, and the laying of canal life corridors, the regional ecological environment is protected while improving the quality of cultivated land in the land.

## References

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