

# Development process and trend of medium and low yield field reconstruction in Shaanxi Province

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**Abstract.** The transformation of medium and low yield grain fields is an important part of cultivated land regulation, which is basically consistent with the requirements of high standard farmland construction. The cultivated land consolidation has experienced from overcoming the single limiting factor to exploring the integrated factors combining the adjustment of ownership and then to the ecological landscape construction target, which has put forward different requirements on the engineering construction, land capacity improvement and management organization innovation integration of cultivated land consolidation. At present, the concrete measures of land leveling, irrigation and drainage, field road and forest protection network have been studied in the field engineering construction of medium and low yield grain fields in Shaanxi province. In the aspect of soil fertility improvement, effective measures such as ditch treatment, soil fertility improvement, soil layer recombination and crop optimization were studied. In the aspect of management organization innovation, the research of property right model combining different yield reform mode and different cultivated land consolidation mode has promoted the optimization and transformation of medium and low yield grain fields in different degrees.

**Key words:** Medium and low yield fields; engineering construction; land capacity enhancement; landscape construction; Shaanxi Province

## 1. Introduction

By the end of 2018, there were 60.7555 million mu of cultivated land in Shaanxi Province, and the area of medium and low yield land reached 42 million mu, accounting for 70% of the total area of cultivated land. It is certain that the yield of existing cultivated land will be significantly increased by comprehensive management, improvement of production conditions and increase of yield per unit area and multiple cropping index. In the cultivated land of Shaanxi province, the proportion of medium and low yield grain fields is more serious, especially distributed in the wind-sand beach area along the Great Wall of northern Shaanxi, loess plateau area of northern Shaanxi, Weibei tableland area, Guanzhong plain area and mountainous and hilly area of southern Shaanxi, which runs through the topographic characteristics of various regions of the province and different ecological zones, forming serious medium and low yield grain field barriers. At present, government departments and enterprises have carried out some effective exploration and treatment, but there are still the following deficiencies: first, there is a lack of engineering construction standards for the corresponding ecological

area, and no effective zoning classification; Secondly, it fails to combine engineering construction with soil fertility improvement under different ecological conditions and lacks key technologies and integrated applications in soil fertility improvement. Third, it fails to effectively combine engineering construction, land capacity improvement and management organization integration and innovation, leading to frequent management and protection problems after engineering construction.

Therefore, how to effectively carry out the reconstruction project of medium and low yield grain fields in Shaanxi Province, identify the key limiting factors for the reconstruction and construction of medium and low yield grain fields in different ecological zones, develop the sequence combination of grain fields projects, soil capacity improvement and operation management and protection technology standards based on the characteristics of different ecological zones, and form the integrated system of the reconstruction and construction project of medium and low yield grain fields in different ecological zones in Shaanxi Province. In addition, key pilot projects should be established for effective promotion and demonstration, so as to increase the

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quantity, quality and output of grain fields in Shaanxi Province, realize the transformation goal of "high yield, high efficiency and green" medium and low yield grain fields, and guarantee the food security of Shaanxi Province. It is a problem that needs to be focused on and solved at the present stage.

## **2. Development process and trend of transformation of medium and low yield grain fields**

The transformation of medium and low yield grain fields at home and abroad is different from the land consolidation and land consolidation that started first a large number of scholars have done related research on this aspect. Chinese land comprehensive improvement related research self Since the 1980s, it has gone through four stages: initiation, development, evolution and extension replanning (1981-1985), recoordination (1986-1996), reengineering (1997-2009) with the four processes of re-coordination (2010 to now), it has become a national top-level strategy-oriented coordination.

A comprehensive platform and an important lever for promoting modernization, ecological progress, rural revitalization and urban-rural integration [1-2]. Land consolidation is to ensure rural development and improve the efficiency of land use. It can increase the area of cultivated land, reduce the fragmentation of cultivated land, and improve agricultural production capacity [3]. Overall land consolidation, including the comprehensive treatment of fields, water, roads, forests and villages, agricultural land consolidation, industrial and mining abandoned land reclamation benefits Use, urban and rural inefficient use of land redevelopment. Rural areas of land consolidation activities are mainly cultivated land consolidation, the implementation of cultivated land consolidation, can coordinate nervous people Land relations to alleviate land use conflicts [4]. At present, land consolidation is more limited to engineering and technical attributes, and its core objectives are mainly focused on material aspects such as expanding farmland scale, improving cultivated land quality and optimizing village layout. In some areas, farmland consolidation is only regarded as a means to occupy land space provided by urban construction. Traditional cultivated land consolidation blindly pursues the increase of cultivated land quantity and ignores the service function of ecosystem. It is suggested that the quality of landscape unit area and ecosystem service value should be improved in the process of land consolidation [5]. Scholars argued that the traditional operation mode of relying solely on the government-led "top-down" lacks effective social response and communication mechanism, resulting in the dislocation of the value orientation of the participants, which leads to the contradiction between the original intention of land consolidation supply and the actual situation. Traditional cultivated land consolidation model has a single financial input mechanism and insufficient incentives for project implementation and management subjects, resulting in low overall efficiency. In the traditional cultivated land consolidation mode, the

government plays the dominant role, and farmers have little enthusiasm. Moreover, the scale of agricultural land management shows the characteristics of "small, scattered and fragmented", and the degree of agricultural organization and marketization is low. The lack of public participation causes a series of problems, such as light management of reconstruction and separation of construction and management, which affects the long-term and effective play of the comprehensive benefits of cultivated land consolidation [6]. Therefore, we should start from the Angle of land science, pay attention to the adjustment of farmland ownership, let farmers actively participate in the cultivation of farmland, become the leader, so as to improve the efficiency of land use.

After the reform of national institutions, the high standard farmland construction and high efficient water-saving projects have become the main carriers of farmland construction. At present, the "top-down" government-led construction mode before the institutional reform is still inherited, which mainly focuses on four major engineering measures, such as land leveling, field roads, farmland water conservancy and forest protection network, ignoring the ownership adjustment, the combination of engineering construction and fertility improvement, and the combination of fertility improvement and management organization innovation. The result is that cultivated land consolidation especially in the transformation of low-and medium-yield grain fields can not play an effective role.

## **3. Development process and trend of farmland engineering construction**

Overseas, the development of farmland capital engineering construction has been relatively perfect, especially in the field of ecological agriculture is relatively complete. Compared with foreign countries, the reconstruction and development of low-yield grain fields in our country mainly focuses on the high standard farmland construction and land space planning projects. It has experienced three stages. The second stage is combined with the ownership adjustment to adjust the comprehensive factors; In the third stage, ecological landscape construction was carried out on the basis of adjustment and improvement of comprehensive factors. But now our country needs to change from the past four farmland projects construction, land leveling, field road, farmland water conservancy and protected forest network to a more comprehensive farmland project construction combined with local conditions and ownership adjustment [7]. Because the land is too scattered, the ownership relationship is too complicated, and the corresponding labor force is insufficient.

Therefore, although high-standard farmland construction has made some achievements in recent years, some areas have basically entered the stage of perfecting agricultural supporting infrastructure, but there are still some problems in the construction process. For example, some local departments of farmland construction standards are different, the planning content is uneven, the effect is too ignored, the shape Type attention degree is too high, late

supervision and management is not enough. It is urgent to develop grain field projects for different ecological areas Standards to accurately support the implementation of the transformation project of low - and medium-yield grain fields.

#### **4. The development process and trend of grain field fertility enhancement**

In recent years, due to the continuous high intensity utilization, use and cultivation imbalance, fertility imbalance, soil degradation serious, straw resources Due to rational utilization of source, agricultural non-point source pollution and water and soil loss, the soil point pollution rate of cultivated land exceeded the standard It reached 19.4%, and there were more agricultural film residues in northwest and other places. The decrease of soil organic matter content, especially the low quality grade of some supplementary cultivated land, has seriously affected the cultivated land output. Especially, the sand beach area along the Great Wall of northern Shaanxi, loess plateau area, Weibei tableland area, Guanzhong plain area and mountainous and hilly area of southern Shaanxi are faced with different problems such as fertility decline, soil organic matter content decline, biodiversity reduction and soil texture damage.

Liu Yansui et al. took the hilly and gully region of loess as an example to carry out experimental research on geographic engineering and countermeasures for high-quality agricultural development, including six soil-relationship fertility enhancement technologies, including climate-crop optimization, soil structure improvement, topographic-crop optimization, soil quality improvement, soil-crop optimization, and benefit-crop optimization [8]. In summary, domestic and foreign scholars have carried out researches on measures to improve the fertility of medium and low yield grain fields from the aspects of soil texture, crop optimization, returning materials, etc. However, they mainly explore the fertility improvement technology of medium and low yield grain fields from the micro perspective of soil science and so on. They fail to develop targeted fertility improvement technology from different ecological regions in Shaanxi, combine exploration with management organization innovation, and identify management and protection mechanism.

#### **5. Integration model and trend of medium and low yield grain field renovation project and management organization innovation**

As a key part of cultivated land improvement, the transformation of medium and low yield grain fields is to timely supplement cultivated land and revitalize stock An important approach to land, to optimize urban and rural land use, to strengthen intensive land use, and to improve land productivity is essentially for people In the re-debugging of ground relations, the error of any link will affect regional stability and development. Among them, land property right is the core and main line of cultivated

land renovation, land property right space Replacement is the way of cultivated land consolidation, and property right manifestation is the important direction of cultivated land consolidation. How to integrate the three Joint innovation is the key to promote smooth progress of land consolidation. Currently our country is not Few pilot in the process of reform for land consolidation accumulated valuable experience, including: Qingyuan City in Guangdong Province to villagersThe self-government approach promotes land integration, adjusts scattered land, liberalizes management rights, and promotes appropriate scale agricultural operations Integrated development of rural industries [9]; Zhao Jiamao as village collective property rights system reform In accordance with the principle of "clear ownership, clear rights and responsibilities, strict protection, flow of elements", the property rights are defined Clear, through the land transfer and pricing of shares will land stock conversion, incremental rights issues, land shares and other kinds of The method was transformed into villagers' equity, which promoted the demutualization of rural assets and land share ownership, and revitalized various resources Su [10]; Nongnong Tun, Longzhou County, Guangxi, has adopted the "small and large" soil of farmer autonomy Land consolidation mode, through farmers independent "small and large" to achieve centralized contiguous, and land transfer To expand the scale of operation and realize the organizational innovation of production relations is the "bottom-up" and "top-down" of farmers and the government a typical representative of the combination of "lower" [11]; In Yangchun County, southern Anhui Province, organized land transfer is implemented on the basis of virtual right confirmation. Virtual ownership gives farmers quantified shares The right, and the organization of land circulation is relying on the "integration of parts" to achieve land integration, in the collective land ownership The basis of activation not only protects the interests of small farmers, but also connects modern agriculture.

In view of the exploration of different innovation modes in local areas, the exploration carried out by land consolidation as the carrier can be described as experienced and effective. In general, the successful implementation of land consolidation mode relies on the clear definition of property rights, but also needs to bring into play the integration function of land ownership to land contract rights and land management rights to achieve efficient and orderly land transfer, which is precisely the advantage of China's collective land ownership over private land ownership Of course, each mode has its scope of application and defects, and there are similarities and differences among various regulation modes. Therefore, how to further deepen the integration and innovation mode of medium and low yield grain field renovation project (engineering standards and land capacity improvement), property rights reform and land transfer, explore the common and characteristic experience of different successful cases, dig deeply into the factors and combinations that can be copied, promoted and used for reference, and follow the principles of adapting to local conditions, gradual progress, easy replication and promotion? This paper summarized and

condensed the integration model and regulation path of medium and low yield grain field renovation project and management organization innovation for different ecological areas.

## 6. Conclusion

The lack of research and judgment of the core link of the reconstruction project of medium and low yield grain fields, the unknown diagnosis of key obstacle factors and the lack of construction standards of grain fields in different ecological areas lead to the different departments in the same region have inconsistent understanding of the reconstruction of medium and low yield grain fields, lack of coordination and other problems, and the lack of targeted farmland construction standards in non-ecological areas. The lack of support of key technologies and integrated application of technologies leads to the lack of expected effects of construction funds. As the land ownership relationship is too complicated, the cultivated land area is too scattered, and the plots are fragmented, the integration degree of efficient utilization of engineering technology and management organization innovation of medium and low yield grain fields is low, which is an obstacle to the construction of large-scale high-standard farmland with guaranteed harvest in drought and flood in most areas of Shaanxi Province. In Shaanxi Province, there is a lack of corresponding typical ecological zone division of medium and low yield grain field transformation, engineering construction standards corresponding to different ecological zones, models, promotion and demonstration of integration of land fertility improvement technology and management organization innovation.

Therefore, remote sensing image and field survey will be used to identify the spatial distribution of medium and low yield grain fields in Shaanxi Province at this stage, and then divide different ecological zones into different types, such as sand beach area along the Great Wall of northern Shaanxi, loess plateau area of northern Shaanxi, Weibei tableland area, Guanzhong plain area and mountain hilly area of southern Shaanxi Province. The core links of medium and low yield grain field construction in different ecological zones of Shaanxi Province will be studied and identified and key obstacle factors will be identified. The standard and combination model of grain field construction in different ecological areas were studied, such as land leveling project, irrigation and drainage project, field road project and forest protection network project. Research and develop the key technologies for improving the fertility of medium and low yield grain fields in different ecological areas, such as soil structure improvement technology, soil fertility improvement technology, green biological efficient utilization technology, etc. To explore the collaborative innovation and efficient utilization mode of grain field construction project and management organization innovation (land transfer, property right reform, etc.), study the construction of responsible subjects for efficient utilization and management of grain field project, study the multiple collaborative management and protection

mechanisms of government, village groups and management subjects, and then establish the demonstration zone of integration innovation mode of grain field construction project and management organization in different ecological areas. Play a role in promoting and leading.

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