

# Problems and Suggestions in The Construction of Ecological High Standard Farmland

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## Abstract

**The construction of high-standard farmland is an important measure to implement the strategy of " storing grain in land and technology " and ensure national food security. Promoting the construction of ecological high-standard farmland is undoubtedly of great practical significance for the development of resource-saving and environment-friendly agriculture and the promotion of high-quality development of agriculture and rural areas. In the new period, how to strengthen the ecological concept of high-standard farmland construction, implement ecological measures, and vigorously promote the construction of ecological high-standard farmland is a problem that farmland construction management departments and farmland construction workers need to face and think about. This paper gives preliminary suggestions on the above issues, which can provide reference for the construction of high-standard farmland.**

## Keywords

**High standard farmland construction; Ecotype; Green development; Partition construction.**

## 1. The meaning of ecological high standard farmland

The core meaning of ecological high standard farmland is not only to ensure the food security in agricultural production and the effective supply of agricultural products, but also to carry out high standard management of farmland from the perspective of ecological balance, so as to realize the overall management of farmland planting quantity, planting quality and ecological environment. Clean recycling of waste generated in agricultural production, improve the utilization rate of land resources, reduce the ecological environment pollution caused by agricultural development. The construction of ecological high-standard farmland can effectively curb the depletion of cultivated land reserve resources, and form high-standard farmland with convenient field management and high and stable crop yield. Through the application of high and new technologies in the field, a new model of modern circular agriculture, such as high-quality and safe agricultural product production, ecological breeding, waste recycling, and efficient utilization of water resources, is constructed, and projects such as weight loss and drug reduction, ecological protection, and non-point source pollution prevention and control are implemented.[1].

## 2. Existing problems

The early construction of high-standard farmland focuses on the improvement of production capacity and does not pay enough attention to the improvement of farmland ecological environment. In the design and construction of high-standard farmland projects, the concept of green development has not been fully reflected, and there are problems affecting the ecological environment such as simple hardening ditch roads. In addition, due to the lack of effective integration with measures such as good varieties, good laws and good mechanisms, some high-standard farmlands still follow the traditional extensive production methods after they are completed. The intensity of resource consumption is high, and the improvement of cultivated land quality is not obvious. The role of supporting the green development of modern agriculture has not been fully played. The main reasons are :

(1) The lack of attention to the construction of ecological quality agricultural land. The concept of green development is not strong. Subject to the old order and inertial thinking, ecological management measures have not been widely used. At the same time, there is a lack of understanding of the negative impact of agricultural land construction. Although the construction of high-quality agricultural land can significantly improve production conditions, inappropriate engineering construction will also destroy vegetation and soil ecology, leading to plant death, or small animals cannot escape in canals and reservoirs.

(2) The project construction plan is not perfect. The water-saving construction of agricultural land mainly refers to the construction standards of water conservancy projects in large and medium-sized irrigation areas, and the construction standards of water-saving facilities in small agricultural land are relatively few. For the construction measures in some places, in order to achieve the purpose of beauty and existence, too much concrete is used in the construction of irrigation and drainage channels and rural roads, especially a large number of canal cladding, which to some extent destroys the original agricultural land ecosystem. It causes frogs, snakes, fish and other organisms to lose their habitats, while reducing the natural absorption and purification functions of pesticides and fertilizers in ditches.

(3) Pay attention to construction, neglect ecological management and protection. After the construction of the project, the ecological management and protection system is not in place, and a few damaged projects cannot be repaired in time, shortening the life of the project ; there is a lack of scientific systems to arrange irrigation and drainage of farmland, and excessive irrigation or occasional floods often occur[2].

## 3. Partition construction

In view of the different obstacles in different regions and the different ways of solving them, it is necessary to clarify the key points and priorities of governance. Therefore, the key points of ecological high-standard farmland construction in different regions are also different.

The northeast region mainly focuses on the main constraints such as black soil degradation, winter drought, spring drought, and soil erosion[3]. It focuses on improving farmland irrigation and drainage facilities, protecting black soil, and saving water and increasing grain.

The Huang-Huai-Hai region is mainly aimed at the main constraints such as spring drought, groundwater overexploitation, low soil organic matter content, soil salinization, etc., in order to improve the irrigation guarantee rate, agricultural water use efficiency, and cultivated land quality. The main direction is to carry out high-standard farmland construction around steadily increasing the production capacity of grain crops such as wheat, corn, and peanuts.

The middle and lower reaches of the Yangtze River mainly focus on the main constraints such as soil acidification and gleying, frequent rainstorm and flood disasters, and seasonal drought. In order to enhance the flood control and drainage capacity of farmland and soil improvement,

high-standard farmland construction is carried out around the stable improvement of grain and economic crop production capacity such as rice, rapeseed and wheat.

The southeast region is mainly aimed at the main constraints such as many mountains and hills, small and scattered plots, soil acidification and gleyization, and typhoon rainstorm hazards. The main direction is to enhance the ability of farmland to defend floods, improve soil acidification and soil gleyization, and carry out high-standard farmland construction around consolidating and improving the production capacity of grain and economic crops such as rice and sugarcane.

The southwest region mainly aims at the main constraints such as many hilly mountains, fragmentation of cultivated land, engineering water shortage, poor soil water retention capacity, and easy occurrence of soil erosion. In order to improve the terrace rate and road accessibility, and increase the thickness of soil, high-standard farmland construction is carried out around the stable improvement of grain and economic crop production capacity such as rice, corn, rapeseed, and sugarcane[4].

The Loess Plateau in Northwest China is mainly aimed at the main restrictive factors such as serious soil erosion, water shortage and fragmentation of cultivated land. In order to improve the terrace rate, water storage and soil moisture conservation, the construction of high standard farmland is carried out around the stable improvement of the production capacity of grain and economic crops such as corn, wheat, small grains and rapeseed. The northwest inland oasis agricultural area in the northwest region is mainly aimed at the problems of climate drought and waste of irrigation water resources, as well as land desertification and soil secondary salinization. The main direction is to improve farmland infrastructure, water-saving irrigation, soil moisture conservation and fertilization, and to carry out high-standard farmland construction around steadily increasing the production capacity of grain and economic crops such as cotton, corn, wheat, beet and rapeseed.

The Qinghai-Tibetan region is mainly aimed at the main constraints such as severe cold in the plateau, thin soil layers in cultivated land, poor soil, and fragile ecological environment. The main direction of the project is to improve farmland infrastructure, improve soil, and prevent cold and heat preservation. High-standard farmland construction is carried out around the solid improvement of the production capacity of grain and economic crops such as bare, wheat, and rapeseed[5].

#### 4. Measures and suggestions

(1) The concept of ecological construction is implemented into specific project projects through planning and refined into specific construction measures. The project planning should be reasonable project layout, scientific determination of control measures, minimize the impact of project construction on the local ecological environment, and improve the construction of ecological field projects according to local conditions..

(2) Construction of ecological irrigation and drainage project. First, the construction of ecological water channels. First of all, the original channel should be reconstructed and expanded as much as possible to reduce the new excavation surface. The branch canal avoids one-time permanent hardening as far as possible, and adopts prefabricated block masonry ; field canals are generally not lined without affecting water delivery. Secondly, the introduction of green environmental protection materials and the use of ecological concrete, such as ditches using stone pile or design vertical and horizontal connected ecological belt, and maintain a certain roughness, to build a multi-functional water supply and drainage system ; third, the well irrigation area should all adopt pipeline irrigation, well, pump, pipe network and other facilities are complete, the layout is scientific and reasonable[6]. The second is to optimize the design of drainage ditch. On the one hand, we should highlight the heterogeneity of morphology, on the other hand, we should highlight the heterogeneity of materials. The original ecological soil is

the main soil above the middle gully, and the hard revetment design can be adopted in the area where there are landslides and soil erosion risks. Below the ditch, it is also necessary to adjust measures to local conditions, adopt more ecological materials for protection, and minimize concrete lining. Third, the construction of ecological slope protection. According to the specific conditions of rivers and ditches, layered slope protection can be adopted to improve the matching of ecological concrete slope protection and biological slope protection. Design ecological corridors, ecological holes, stepped ecological springboards, animal escape slopes, fish and shrimp hiding spaces, etc., to maintain the original ecological living environment. Fourth, optimize pumping station design. Promote integrated integrated pumping stations in suitable areas to reduce damage to the geological environment. Mixed flow pump can be used instead of centrifugal pump to reduce the cost of irrigation electricity. Fifth, the dredging of rivers, ponds and ditches around farmland is often carried out to give full play to the natural absorption and purification function of ecological ditches for residual pesticides and fertilizers. In addition to increasing storage facilities in the drainage ditch, some emergent or submerged plants with good purification effect can also be planted to purify and absorb non-point source pollution.

(3) Construction of ecological field road project. The field road should be combined with the reasonable layout of human settlement environment renovation and beautiful rural construction, and the new materials and technologies of ecological environmental protection should be adopted. One is to change the customary practice of concrete hardening in the field road pavement. On the premise of ensuring traffic and suitable operation, sand and gravel pavement or soil pavement can also be used for those remote field roads. The second is to increase the ecological function of roads. For roads with multi-functional production and life, half ecological pavement and half cement pavement design can be adopted. The production road adopts 'porous' design, and all road subgrades should be reserved with 'ecological corridors' for free passage of organisms. In the area of developing rural tourism[7], some field wooden trestles can be appropriately built to facilitate tourists' sightseeing.

(4) Promote the application of ecological agronomic measures. The first is to do a good job of land leveling in combination with land transfer, including field surface leveling, ridge construction, waste ditch pond remediation, abandoned land reclamation, etc., to create conditions for mechanized operations and the development of moderate scale operations. The size of the field should be appropriate, and sometimes some landscape elements that conform to local characteristics should be retained or rearranged. Second, demonstration and promotion of new varieties and new technologies. In terms of varieties, the coverage of improved varieties in high-standard farmland project areas should reach more than 95%. In terms of technology, including efficient farming techniques (such as no-tillage mulching technology with emission reduction and improved adaptability, intercropping and multiple cropping and rotation technology using climatic conditions); high-efficiency fertilization techniques (such as soil testing formula, slow / controlled release fertilizer, organic fertilizer replacement, etc.); integrated pest control techniques (such as pesticide reduction, mechanical pesticide saving, chemical pesticide substitution and the implementation of light trap, sex attract, color attract, food attract measures). Fourth, promote dry land to paddy field. At present, with the acceleration of urbanization, paddy fields have obvious adjustment effect on regional ecological environment, and it is also conducive to the construction of farmland 'artificial wetland'.

(5) Vigorously develop ecological circular agriculture. Through the combination of agriculture and animal husbandry, planting and breeding, promote the comprehensive utilization of livestock and poultry manure resources. First, according to the requirements of developing ecological agriculture, we should actively build a large agricultural circulation system combining planting, breeding and adding, and moderately promote three-dimensional planting.

The second is to strengthen the application of straw returning technology, convert crop straw into organic matter, and improve soil fertility. The third is to strengthen the recycling of agricultural waste, such as the construction of biogas slurry pool, field cellar or composting pool, and the appropriate layout of pesticide, fertilizer and other agricultural inputs packaging and residue and other waste field recycling device, so that the high standard farmland project area waste recovery rate reached more than 90 % [8].

(6) Strengthen the construction of farmland forest network. Farmland shelterbelt network plays an important role in windbreak and sand fixation and improving farmland microclimate. In the construction of farmland shelterbelt network, one is to pay attention to ecological diversity, which can be combined with trees and shrubs to avoid the use of single tree species. The second is to take into account the landscape. Under the premise of ensuring the protection function of farmland forest network, some ornamental trees or flowers are appropriately matched, such as purple micro, red leaf Photinia, camphor and other ornamental plants. Third, scientific planning layout. Reasonably set the spacing and width of the forest belt, and pay attention to the coordination and complementarity with the original trees.

(7) Adhere to comprehensive management. One is the construction organization management. Construction enterprises should put forward scientific and reasonable arrangements for each operation link, including the progress of the construction period, the optimal allocation and timely scheduling of personnel, materials and equipment, and at the same time, implement protective measures such as dust and noise during the construction period to minimize the impact of construction on the environment. The second is the management and protection after construction. Proper project management can extend the service life, reduce construction costs and improve investment returns. Third, farmland irrigation management. By establishing a scientific irrigation system, the optimal allocation of water resources is maximized, and the maximum economic value is created at the minimum resource cost.

(8) Strengthen organizational security. First, increase policy support and accelerate the construction of agricultural and rural ecological environment protection system. Strengthen farmland ecological management and implement the most stringent water resources management system and farmland protection system [9]. Second, increase capital investment, establish a stable growth mechanism for financial investment in farmland construction, and continuously increase the proportion of ecological governance investment in high-standard farmland construction. The third is to optimize the investment direction of requisition-compensation balance funds. Through the approval of new cultivated land in farmland construction, the adjustment income of new cultivated land indicators is given priority to the construction of ecological high-standard farmland. Fourth, stabilize the farmland construction management team. After the institutional reform, the number of personnel in the farmland construction management team has been greatly reduced, and the work tasks have been increasing. Therefore, it is more necessary to give full play to the main role of the township level in the construction of high-standard farmland projects. The county-level farmland construction management department should focus on the management function, step by step from the 'athlete' role to the 'referee' position, and focus on the guidance and supervision of the main work of township construction.

According to the endowment of natural resources, the characteristics of agricultural production and the main obstacle factors of production, the key points and contents of construction are determined according to local conditions, and the comprehensive management of farmland, soil, water, road, forest, electricity, technology and management is promoted as a whole, so as to improve the farmland infrastructure, realize the comprehensive matching and meet the needs of modern agricultural development. The concept of green development will run through the whole process of high standard farmland construction, strengthen the intensive and economical utilization of water and soil resources and ecological environment protection,

strengthen the protection and improvement of cultivated land quality, prevent soil pollution, realize the coordination of agricultural production and ecological protection, and enhance the ability of sustainable agricultural development.

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