

The Impact of High Standard Farmland Construction Based on Water-saving Irrigation on Grain Production Capacity

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Abstract: Through the implementation of the high standard farmland construction project, the original other grasslands in the project area have been developed, the irregular land has been leveled, the excavation of irrigation pipe trench and the matching of pipe fittings have improved the shortage of the original irrigation and drainage facilities in the project area, greatly improving the irrigation conditions of farmland, effectively preventing the loss of soil fertility, promoting the development of the potential of land production, and the comprehensive quality of farmland has been greatly improved. After the arrangement of cultivated land, the quality grade of cultivated land is slightly higher than that of adjacent plots, the grain production capacity has been improved, and the overall quality of cultivated land in the project area will reach a certain level after the application of organic fertilizer, soil fertility and other measures.

Keywords: High standard farmland, Water saving irrigation, Grain production capacity, Cultivated land quality.

1. Introduction

Drought and water shortage is the biggest threat to agricultural production and the main constraint to agricultural development. In order to give full play to the role of water conservancy facilities, solve the existing problems, improve the utilization rate of irrigation water, ease the pressure of increased water demand caused by economic development and population growth, alleviate the contradiction of seasonal water shortage in the irrigation area, improve the degree of irrigation conservation, and take the way of water saving irrigation is the inevitable choice of the project area. The implementation of water-saving irrigation projects can play an exemplary role in the construction of water conservancy projects in the county, drive the comprehensive development of water-saving transformation in the county, and realize the sustainable utilization of water resources and the sustainable development of agriculture.

Water saving transformation is the need to promote agricultural restructuring and increase farmers' income. After the implementation of the project, the water conveyance conditions in the project area have been improved, the timeliness requirements for crop water demand have been basically met, and the agricultural production conditions have been further improved. The adjustment of industrial structure has been accelerated, and the rapid development of various social undertakings in the region has been promoted. It is the support and guarantee for the sustainable development of the social economy in the irrigation area, which has improved the comprehensive agricultural production capacity and increased the income of farmers. Water saving transformation is the need of ecological construction in the project area. The construction of water-saving irrigation project can enable the sustainable development of orchard construction. With the development of orchards and other areas, the scale will be gradually formed, which can effectively change the local microclimate and improve the local ecological environment.

2. Overview of the Project Area

The project area is located in Shangnan County, Shaanxi Province, between 110°24'22"~110°01'43" E and 33°05'53"~33°44'37" N. It is located in the south of the middle latitude. The north and northwest belong to the temperate climate zone, while the southeast and middle belong to the northern subtropical climate zone. It is characterized by warm climate, abundant rainfall, four distinct seasons, no cold winter, and no hot summer. The annual average temperature is between 10.7°C and 15.0°C, the average temperature is 14.0°C, the extreme maximum temperature is 40.5°C (July), the minimum temperature is 12.1°C (January), the annual average sunshine hours are 1973.5h, the active accumulated temperature above 0°C is 3877.2°C to 5485.7°C, the annual average accumulated temperature $\geq 10^\circ\text{C}$ is 4406.0°C, the average sunshine is 1973.5h, the percentage of sunshine is 45%, the soil evaporation is 550-600mm, the frost free period is 185-230d, and the annual average rainfall is 803.2mm.

3. Analysis of Infrastructure Conditions

3.1. Analysis of Water Conservancy Status

There is no irrigation supporting facilities in the project area, which can not meet the demand for water-saving irrigation. It seriously restricts the development of irrigation benefits in the irrigation area, seriously affects the optimization and adjustment of rural industrial structure and farmers' income increase, and restricts the development of rural economy. The cultivated land in the project area is flat and concentrated. However, due to less investment in water conservancy projects in recent years, most of the cultivated land in the project area cannot be irrigated. Some of the irrigated land has no water conservancy facilities, and the irrigation water utilization coefficient is extremely low, which seriously restricts the grain yield in the project area.

3.2. Current Situation of Road Traffic Facilities

National Highway 312 and Xihe Railway cross the east and west in Qingyuhe Town. By the end of 2011, the total length of roads in Qingyuhe Town was 1.5km; Road pavement area is 45000 square meters; There are 3 bridges in the town, with a total length of 80m. The cement road to the village in Guofenglou Town is 67km long, and the provincial highway Guoshan Road and Xihe Expressway pass through the town. The expressway is more than 10km long and has one expressway exit. By the end of 2011, the total length of roads in the town and district of Guofenglou Town was 1.4km; Road pavement area is 42000 square meters; There are 4 bridges in the town, with a total length of 250m.

3.3. Analysis on Current Situation of Power Facilities

The power grid is densely distributed in the project area, the rural power supply rate has reached 100%, the rural power grid transformation has been completed, and the transmission lines crisscross, fully meeting the people's production and living electricity needs. The project area is equipped with high-voltage power grid and transformation facilities, with sufficient power supply, high-voltage lines and low-voltage lines, which can meet the needs of industrial and agricultural production and local farmers for lighting.

4. Analysis of Water Supply and Demand Balance in The Project Area

4.1. Irrigation System

Irrigation design assurance rate: 75% for pipe irrigation; Irrigation water utilization coefficient: pipe irrigation 0.85. The main crops in the project area are mainly wheat and corn. The current annual wheat planting ratio is 65%, corn planting ratio is 60%, apple planting ratio is 10%, and vegetable planting ratio is 5%. It is predicted that the canal irrigation quota will remain unchanged in the design level year. The proportion of wheat planting, corn planting, apple planting and vegetable planting will be adjusted to 60%, 55%, 15% and 10% respectively.

According to the industrial water quota of Shaanxi Province and the division table of agriculture, forestry, animal husbandry and fishery in Shaanxi Province, the net irrigation quota of crops is 40-50 m at 75% assurance rate³/Mu, the design is 45m³/mu, and the irrigation quota of corn is 40m³/Mu.

4.2. Irrigation System in The Project Area

According to the survey, the well irrigation area in the current year plants vegetables. According to the industry water quota, Shaanxi Local Standard (DB 61/T 943-2014), the medium annual irrigation quota for vegetable planting is

290m³/mu. According to the composition of crops in the project area, the irrigation method and the irrigation system summarized by many years of experiments, the comprehensive net irrigation quota of canal irrigation area in the current year is 186.75m³/Mu, the current water utilization coefficient of the canal is 0.58, and the comprehensive gross irrigation quota is 321.98m³/Mu. After the pipeline is laid, the comprehensive net irrigation quota of the channel is predicted to be 194.75m in the design level year³/Mu, irrigation water utilization coefficient reaches 0.85, and comprehensive gross irrigation quota is 299.12m³/mu.

5. Grain Production Capacity Analysis

The implementation of high standard farmland construction projects can promote social stability and the construction of a new socialist countryside. On the one hand, the implementation of the water conservancy and irrigation project in the project area can effectively improve the productivity of cultivated land. After the completion of the project, the grade of cultivated land can be increased by at least one grade, and it is estimated that 231000 kg of new capacity can be achieved. According to the current crop planting proportion in the irrigation area, the survey data of irrigation yield increase and the price of agricultural products in 2019. According to the analysis and calculation, the net irrigation benefit is 460000 yuan based on the annual income increase of 100 per mu of land. Since the proportion of irrigation water has decreased year by year after the implementation of water-saving measures, using the saved water in non-agricultural sectors can produce indirect benefits, which are 46000 yuan based on 10% of the direct benefits. According to the above calculation and analysis, the annual benefit of the project is 506000 yuan.

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