Research on the Application of Agricultural Engineering Technology in Agricultural Modernization

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Abstract: In recent years, with the rapid improvement of China's science and technology level, China's agricultural engineering technology has also made considerable progress. The development of agricultural engineering technology provides an important technical foundation for the realization of agricultural modernization, especially in the effective use of agricultural resources, the improvement of agricultural labor productivity, and the transformation of agricultural production and operation methods. Therefore, we must increase the promotion and application of agricultural engineering technology in various agricultural production and operation activities. This will help promote the gradual development of China's agricultural production in the direction of mechanization, automation, informationization and intelligence, so as to fully realize the modernization of China's agriculture.

1. Introduction
Agricultural production is an important foundation for ensuring China's economic development and social stability. For a long time, China's agriculture has been restricted by technical conditions and other objective factors. Not only has its production and management methods been backward, but its production efficiency is low, which restricts the balanced development of my country's social economy. With the improvement of China's scientific and technological level, significant technological achievements have been made in the field of agricultural engineering technology in recent years. Agricultural engineering technology based on biotechnology and modern engineering technology has injected strong impetus into the scientific management of agricultural production, the full utilization of agricultural resources, and the improvement of agricultural productivity. Agricultural engineering technology covers engineering technology, automatic electrification technology, agricultural machinery technology and engineering management technology. Therefore, the rational use of agricultural engineering technology can effectively enhance the ability of agricultural production to resist natural disasters and promote the change of agricultural production and management models. At the same time, this will help break through the limitations of traditional agriculture relying on natural weather, and lay a solid foundation for the realization of China's agricultural modernization.

2. Overview of Agricultural Engineering Technology
Agricultural engineering technology is a comprehensive technology that covers the knowledge of multi-disciplinary fields such as agricultural planting technology, agricultural machinery technology, engineering management technology, genetic engineering technology, and agricultural product processing technology. The application of agricultural engineering technology can realize the construction of a unified and coordinated operation and maintenance mechanism with technical structure as the core. Meanwhile, biotechnology, computer technology and network information
technology are also important contents in agricultural engineering technology. Therefore, the use of agricultural engineering technology in agricultural production can provide important technical support for the innovation of agricultural production and management models [1]. Agricultural engineering technology organically integrates the types of agricultural industries, business entities, and service objects, so that its internal management structure is more reasonable and orderly, and an organic whole is formed through the interaction of different elements. As a result, in the industrial upgrading and transformation of modern agriculture, we must make full use of the comprehensive and integrated characteristics of agricultural engineering technology to optimize the industrial upgrading path and management mode, so as to promote the modern development of my country's agriculture. Otherwise, when applying agricultural engineering technology in agricultural production and management, we must fully integrate the phased and regional characteristics of agricultural development in the region, so as to effectively achieve the goal of increasing agricultural production and income.

3. Using Agricultural Engineering Technology to Realize Agricultural Modernization
In order to realize the modernization of China's agriculture, we must actively use agricultural engineering technology. The core of the actual application of agricultural engineering technology is to take the actual demand in agricultural production and industrial development as the basic starting point, and improve the efficiency of agricultural production, management and investment through the application of agricultural engineering technology. This will help to enable agricultural engineering technology to give full play to its integrated characteristics, and prompt Chinese agriculture to gradually establish a modern comprehensive agricultural engineering system. Furthermore, this will also help to further optimize the production, processing and circulation of agricultural products, strengthen the construction of agricultural infrastructure, and promote the promotion and application of mechanization, automation and intelligent technology and equipment.

3.1 Use Agricultural Engineering Technology to Improve Agricultural Production
Productivity is an important criterion for evaluating the development level of agricultural production, while traditional Chinese agricultural production mainly relies on manual operations. This leads to low labor efficiency, which not only affects the competitiveness of my country's agricultural products in the international market, but also severely restricts the modernization of my country's agricultural development. Therefore, if we want to develop modern agriculture, we must improve the production efficiency of agricultural production, and the application of agricultural engineering technology is an important way to improve labor productivity. With the continuous improvement of my country's agricultural machinery technology and equipment manufacturing level and the application of new automation, information and intelligent technologies in agricultural machinery, various large-scale modern agricultural machinery and equipment have been increasingly used in agricultural production. The combined operation of high-power agricultural machinery has greatly improved the efficiency of agricultural production, and the field operation speed of tractors in some farmland production has reached more than 10km/h [2]. In the meantime, the combined operations of sowing and cultivation, fertilization, and transportation machinery, and the application of integrated machinery and equipment for harvesting and threshing straw have greatly reduced the labor intensity of agricultural production. Now, one person can efficiently complete production tasks that used to require a lot of human resources to complete, which effectively promotes the improvement of agricultural production efficiency (mechanized operations of agricultural production and see Figure 1). At present, automatic hooking technology and hydraulic control and technology have become common technical methods in agricultural machinery and equipment, and various new types of agricultural machinery and material technologies have also been continuously developed and applied. In modern agricultural production, advanced agricultural engineering technologies such as electronic equipment, network information technology, online monitoring technology, and drones are gradually being used to complete production and management. This not only releases a large amount of agricultural labor, but also improves the automation and intelligence of agricultural production and management.
Simultaneously, it can not only automate the control of agricultural machinery, but also monitor the running status of agricultural machinery in real time, so as to reduce the chance of failure of agricultural machinery and equipment. This ensures the continuity of agricultural production operations and lays a good technical foundation for the realization of agricultural modernization.

![Figure 1: Mechanized Operations in Agricultural Production](image)

3.2 Use Agricultural Engineering Technology to Increase the Utilization Rate of Agricultural Resources

3.2.1 Use Agricultural Engineering Technology to Increase the Utilization Rate of Land Resources

Modern agricultural production still needs to be based on land resources, so the effective use of land resources is an important prerequisite for the promotion of agricultural modernization. In traditional Chinese agricultural production, due to the lack of scientific planning and reasonable protection measures for land resources, the use of land resources has long been in a state of extensive management. This not only severely restricted the development of agricultural production, but also caused a large amount of land resources to be abandoned or overused, leading to environmental problems such as soil desertification, soil erosion, and weathering degradation of woodland and grassland. These are all constraints affecting the modernization of Chinese agriculture. In consequence, in modern agricultural production and management, we must actively apply agricultural engineering technology, strengthen the exploration and understanding of land resources, accurately grasp the characteristics of land resources, and combine the exploration data for scientific planning and design to improve the utilization rate of land resources [3]. Especially for areas that have not yet formed a comprehensive land planning plan, local government departments should optimize and integrate the local land resource system through the effective use of agricultural engineering technology. Besides, local government departments should also adopt effective technical methods to take effective land resource management measures, conduct scientific evaluation and review of land resource development and utilization projects, strengthen the construction of high-standard farmland, and increase agricultural production and income. While using land resources, we must also actively adopt ecological protection technologies, actively control soil erosion problems, reduce soil environmental pollution, and take necessary protection and control measures for important ecological function areas such as grasslands and woodlands to ensure ecological Realize the rational and full utilization of agricultural land resources on the basis of environmental balance. This can guarantee my country's food security, meet the needs of social and economic development for agricultural products, and promote the modernization of my country's agriculture.
3.2.2 Use Agricultural Engineering Technology to Increase the Utilization Rate of Water Resources

Water resources are also an important resource foundation in agricultural production. There is a large supply and demand contradiction between the demand for irrigation water in traditional agricultural production and the increasingly tense water resources, which restricts the development of agricultural production in China. Otherwise, when floods occurred, the past agricultural production and management methods were obviously insufficient in resisting natural disasters. Therefore, we must actively use agricultural engineering technology, through the use of drip irrigation technology, surface irrigation facilities and the construction of water conservancy projects to achieve the purpose of saving water resources, improving water resources utilization, and effectively enhancing the ability of agricultural production to respond to floods. In addition, we should also pay attention to the application of agricultural engineering technology to control the pollution of agricultural irrigation to the natural water environment, reduce the discharge of pollutants, and reasonably control the extraction of groundwater resources. At the same time, we should also use water conservancy engineering technology and sewage treatment technology to provide technical support for the realization of sustainable development of agricultural production and to lay a good foundation for China's agricultural modernization.

3.2.3 Use Agricultural Engineering Technology to Optimize the Structure of Agricultural Resources

The resource elements and structure involved in the process of agricultural production and management are relatively complex, so we must make full use of agricultural engineering technology and improve the effectiveness of technology applications, so as to provide important technologies for the planning, management and optimization of agricultural resource structure support. Concurrently, we should also use agricultural engineering technology to improve the system of agricultural management so that agricultural production can create greater social and economic benefits. Only in this way can modern agriculture be able to adapt to the actual needs of the new period and effectively promote the modernization of my country's agriculture.

3.3 Use Agricultural Engineering Technology to Change Agricultural Production and Management Methods

Traditional agricultural management mainly relies on manual operation methods and accumulation of production experience, and its management quality and efficiency are relatively low. Therefore, we must actively use agricultural engineering technology, computer technology and network information technology to dynamically monitor the growth of crops, climate and environmental parameters to improve the comprehensiveness and accuracy of information collection and processing. In this way, corresponding field management measures such as irrigation and spraying of pesticides can be taken according to the changes of parameters in time. The application of remote monitoring technology can enable farmers to know the situation of farmland in time even if they are not on the farmland site, and carry out corresponding operations through remote control. At the same time, through the application of agricultural engineering technology, farmers can master advanced agricultural production technology more timely, and obtain relevant technical guidance to improve the efficiency of farmland management. For example, we can increase production and income by planting new or improved crops, and reduce pollution of natural water and soil to help farmers better master new biological science and technology. In addition, the promotion of plastic greenhouse planting technology has also greatly increased the output of crops, and the output of some agricultural products can reach the level of 10,000 kg/hm2. Moreover, it can also adjust the growth and maturity time of crops according to the actual changes in the agricultural product market, so that the time to market and supply cycle can better adapt to the market environment to meet market needs and achieve the purpose of increasing production and income. [4]. The application of advanced production technologies such as soilless cultivation technology has enabled agricultural production to reduce to a certain extent the dependence on traditional agricultural production resources such as land, and has brought about tremendous changes in agricultural production and management models. The application of agricultural
engineering technology has provided important technical support for the technological development of China's agricultural production and the overall upgrading and transformation of the industry, thereby creating favorable conditions for the modernization of agriculture.

3.4 Use Agricultural Engineering Technology to Enhance the Ability of Agricultural Production to Resist Natural Disasters

Traditional agricultural production is relatively easy to be affected by natural conditions. Once the occurrence of diseases, pests and droughts and floods, it will cause a large-scale reduction in agricultural production. Due to China's vast territory, complex natural environment and frequent occurrence of various natural disasters, large areas of farmland are affected every year. The average annual area of affected farmland reaches about 30 million hectares, and some of the farmland may even experience severe agricultural production reductions such as failure to harvest. This not only caused heavy losses to agricultural production and affected the improvement of the economic level of rural areas in my country, but also greatly restricted the modernization of agriculture [5]. Hence, we must actively use agricultural engineering technology in modern agricultural production, and improve the ability of China's agricultural production to resist pests and diseases and various natural disasters through the application of agricultural machinery technology, modern farmland irrigation technology and various advanced technologies. For example, we can use drone technology to monitor the growth of crops and the occurrence of pests in the regional environment, providing an important reference for early detection and early prevention of natural disasters. Meanwhile, we can use agricultural engineering technologies such as motor pumps, sprinkler irrigation and drip irrigation, and adopt methods such as constructing water diversion projects to enhance the ability to resist drought, so as to ensure the water demand for agricultural production in arid areas and when drought disasters occur. Moreover, through the construction of water conservancy projects and the application of farmland water conservancy technologies, the effects of disaster prevention and mitigation can be achieved when floods occur, and the impact of floods on agricultural production can be reduced, so as to ensure China’s agriculture through the use of modern agricultural engineering technology production safety.

4. Conclusion

Agricultural engineering technology is a comprehensive technology covering multiple disciplines such as engineering technology, agricultural production technology, mechanical technology, biotechnology, automation technology, electrical technology, and management technology. The effective application of agricultural engineering technology in agricultural production can not only greatly improve the labor efficiency of traditional agricultural production, but also increase the utilization rate of important agricultural resources such as land and water. Furthermore, agricultural engineering technology can also significantly improve the ability of agricultural production to resist natural disasters by changing agricultural production and management methods, so as to better ensure the stable development of agricultural production and achieve the goal of increasing agricultural production and income. This will help promote the modernization of China's agriculture and provide important technical support for the balanced development of China's various industries.

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