

Application and Development of Agricultural Mechanization and Automation in Modern Agriculture

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Abstract: Agricultural mechanization and automation is an important way to realize agricultural modernization and improve agricultural production efficiency. This paper expounds the application status and development path of agricultural mechanization automation. Firstly, the popularization of the mechanization automation technology in agricultural production, the application of major crop production and the application of the technology, facility agriculture and precision agriculture. Secondly, the development path of agricultural mechanization and automation is discussed, including technological innovation and research and development investment, talent training and team building, promotion and demonstration and experience exchange and so on. The article points out that agricultural mechanization and automation is the only way for the future agricultural development, which needs the joint efforts of the government, enterprises and farmers to promote.

Keywords: Agricultural mechanization; Agricultural automation; Modern agriculture; Application and development

Introduction

With the acceleration of population growth and urbanization process, agricultural production is faced with multiple challenges, such as increasing the output per unit area, saving human resources and protecting the ecological environment. Automation of agricultural mechanization is an effective way to solve these problems. The application of mechanization and automation technology can improve labor productivity, reduce production cost, reduce the labor intensity of farmers and protect the ecological environment, which is of great significance to promoting agricultural modernization and ensuring national food security.

1. Application status quo of agricultural mechanization and automation

1.1 The popularity of mechanized automation technology in agricultural production

After years of development, China's agricultural mechanization and automation level has made great progress, but compared with developed countries, the gap is still large. The total power of agricultural machinery is only equivalent to 140 million horsepower, and the status of agricultural power is not commensurate. On the one hand, China has a vast territory, complex terrain, agricultural production is relatively scattered, agricultural machinery equipment can not meet the needs of all regions; on the other hand, the existing agricultural machinery equipment is mostly traditional machinery, low degree of automation and intelligence, and the requirements of modern agriculture development. Therefore, continuing to improve the level of agricultural mechanization and automation, is an important task of China's agricultural modernization.

1.2 Application of mechanized automation technology in the production of major crops

For the production of different crops, the application degree of mechanization and automation technology is different. In terms of grain crops, the mechanization and automation level of wheat and rice production is relatively high, and the key links such as sowing, fertilization, harvesting and so on have been mechanized operation; while the mechanical yield of corn is low, and the proportion of manual operation is still large^[1]. The mechanization level of cash crops such as cotton and oil is generally behind, in addition to the use of machinery and tools, other links are mostly manual operation, low degree of mechanization automation. On the other hand, facility agriculture and precision agriculture are the use of mechanization automation technology in recent years.

1.3 Application of mechanized automation technology in facility agriculture and precision agriculture

Facility agriculture and precision agriculture are regarded as the hot spots and growth points for the application of mechanized automation technology. In facility agriculture, advanced technologies such as automatic control system, environmental monitoring system and UAV spraying have been widely adopted to realize precise control of environmental parameters and agricultural materials. In the field of precision agriculture, precise diagnosis of the status of crop growth and differentiated operation measures such as variable fertilization and variable

spraying, which fully reflects the important role of mechanized automation technology in improving agricultural quality and efficiency. The application of these technologies has significantly improved the automation and intelligence level of agricultural production.

2. The development path of agricultural mechanization and automation

2.1 Technological innovation and R & D investment

The continuous innovation of agricultural mechanization and automation technology is the key driving force of promoting agricultural modernization. In order to realize technological innovation, we must increase the investment in basic theoretical research. Basic theoretical research provides theoretical support for the breakthrough of mechanization automation technology, and is the inexhaustible driving force of source innovation^[2]. Emphasis should be placed on strengthening basic research in agricultural robots, intelligent control systems and precision operation devices, and establishing a technological innovation system closely combining industry, university and research, so as to promote the mutual promotion of theoretical research and practical application. We should give full play to the role of universities and research institutes in basic research, encourage forward-looking basic research, and provide sustained impetus for the innovation of agricultural mechanization and automation technology. At the same time, the government and enterprises should continue to increase investment in research and development to promote the breeding and industrialization application of the new generation of agricultural mechanization automation technology. We will focus on supporting the research and development, integration and innovation of emerging technologies such as intelligent agricultural machinery and equipment, agricultural Internet of Things, agricultural big data, and agricultural robots, and constantly improve the level of automation, intelligence, and precision of agricultural production. We will establish an innovation alliance that combines government, industry, university, research, and application, concentrate our efforts on solving major technical problems, and promote the efficient application of scientific research achievements. In addition, we will improve the agricultural machinery product innovation system, improve the incentive mechanism, encourage enterprises to increase investment in research and development, and accelerate the transformation of scientific and technological achievements into real productive forces.

2.2 Talent training and team building

The development of agricultural mechanization and automation is inseparable from talent support. At present, the lack of compound talents of agricultural mechanization and automation in China restricts the popularization and application of related technologies. Colleges and universities should strengthen the construction of agricultural engineering majors, improve the talent training system, introduce advanced teaching concepts and practical teaching links, and cultivate innovative talents with the dual quality of agricultural knowledge and engineering technology^[3]. At the same time, we should pay attention to the integration of industry and education, strengthen the cooperation with agricultural machinery enterprises, invite industry experts to participate in teaching, so that students can understand and master the actual needs of enterprises, so that the knowledge and skills learned are more close to the reality. At the same time, we should strengthen the training of on-the-job personnel, and comprehensively improve the theoretical level and practical operation ability of the employees by offering special lectures and practical skills. Establish a sound on-the-job training system, formulate training plans for different positions and levels, ensure the continuity and systematization of training, and help agricultural machinery practitioners to learn and improve. Government departments should also formulate talent incentive policies to create a good environment for the construction of agricultural mechanization and automation talent team, and attract more excellent talents to join this cause. In addition, we should pay attention to the introduction of international talent and intellectual support. By carrying out international academic exchanges and talent training projects, we can create better conditions for the local training of engineers and researchers, and at the same time, we can directly introduce foreign outstanding talents to enrich China's agricultural mechanization automation talent team. We will encourage international cooperative scientific research projects, promote personnel training and academic exchanges, accelerate the absorption of advanced foreign concepts and technologies, and inject new vitality into the development of agricultural mechanization and automation in China.

2.3 Promoting demonstration and experience exchange

The extensive promotion of agricultural mechanization automation technology cannot be separated from demonstration guidance and experience exchange. We will build a number of promotion demonstration bases and platforms to promote the transformation and application of scientific and technological achievements in rural areas^[4]. The demonstration base can concentrate on displaying all kinds of advanced and applicable technology and equipment, provide first-hand practical operation training and on-site observation for agricultural producers, and accelerate the popularization and application of new technologies in agricultural production practice. These demonstration bases should take measures according to local conditions, choose appropriate technologies to use according to the actual situation of different regions, and give full play to the role of typical guidance. Establish a multi-channel and multi-level experience exchange mechanism, so that experts, scholars, researchers, agricultural machinery enterprises and farmers from all aspects can speak freely, exchange and share successful practices and

problems encountered, and propose solutions. At the same time, summarize and popularize the typical experience and practices of agricultural mechanization and automation in some regions and farmers, and continuously improve and perfect the technology application mode. In addition, make full use of new media and other modern communication channels to promote the concept and experience of agricultural mechanization automation, improve the public awareness and acceptance of relevant technologies, and create a good public opinion atmosphere for the popularization of agricultural mechanization automation in rural areas. With the help of the Internet, mobile APP and other emerging media, we will introduce the advantages of new technologies and new equipment to farmers vividly and intuitively in the form of graphic and live video broadcast, eliminate their doubts and concerns, create a strong atmosphere, and promote the comprehensive promotion of new technologies in rural areas.

3. Tag

Agricultural mechanization and automation is the only way of agricultural modernization, which is of great significance to improve agricultural production efficiency and guarantee national food security. Only by continuously promoting the automation process of agricultural mechanization, increasing the intensity of technological innovation, improving the talent training system, and strengthening the promotion and application, can we effectively solve the many challenges facing China's agricultural development and promote the process of agricultural modernization.

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