

Analysis on the Driving Factors and Countermeasures of the Changes of Apple Production Distribution in the Loess Plateau

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Abstract: The development of apple industry is affected by climate, market environment, infrastructure, production technology, policy and other factors, which affect the increase and decrease of fruit growers' planting area. Therefore, on the basis of previous studies, this paper sums up the driving factors affecting the changes of apple industry distribution in the Loess Plateau into three aspects: natural factors, socio-economic factors and production technology factors, and analyzes the factors of apple industry changes from multiple angles. And put forward the corresponding countermeasures and suggestions from the perspectives of government, social enterprises and farmers.

Keywords: Apple production, Loess Plateau, Driving factors.

1. Analysis of Driving Factors

1.1. Natural Factors

Climate change has a significant impact on apple yield in the Loess Plateau. Light, heat and water are all important factors affecting apple yield. In the process of apple production, the shortage of Rain Water is prone to drought disaster, while the rainstorm weather is easy to produce fruit drop and secondary fruit, apple production needs appropriate precipitation, insufficient or excessive precipitation is easy to have a negative impact[1]. The effect of temperature and light on apple industrial layout is positive. Sufficient light and temperature conditions are conducive to the accumulation of sugar and coloring in the process of apple production. Too high or too low temperature will adversely affect apple production. The producing area of the Loess Plateau is a continental monsoon climate region, with sufficient light, large temperature difference between day and night, and large terrain undulation, scattered planting distribution and good light conditions in the process of apple production, which have a positive impact on apple production distribution. It has little correlation with the changes of apple industry distribution in the Loess Plateau. However, natural disasters such as frost, hail and rainstorm have a great negative impact on the distribution of apple production[2]. If the apple encounters natural disasters in the critical growth period, the yield will be seriously reduced, and then affect the layout of the apple industry[3]. The influence of natural factors will lead the apple industry to gradually move to the climate suitable area for apple growth, and promote the change of the layout of the apple industry.

1.2. Socio-economic Factors

1.2.1. The Guiding Effect of Market Mechanism on Apple Industry layout

The role of market is the decisive factor to promote the development of industry. Apple has a long production cycle and needs a stable market environment. The Loess Plateau is one of the main producing areas of apple in China, and a relatively mature apple market has been formed. Apple

production has a certain scale, which can provide a stable market environment for the sustainable development of the apple industry. At the same time, within the apple market on the Loess Plateau, the market mechanism with cost and price as the core will further affect the distribution of apple planting in the producing areas. the economic benefits of apple production by fruit farmers directly affect the expansion and reduction of apple planting area in the future, and the apple industry is gradually moving to areas with low land and labor costs and high apple sales prices.

1.2.2. The Positive Effect of Complete Infrastructure on The Development of Apple Industry

The improvement of infrastructure is the key factor for the rapid development of apple industry in the Loess Plateau. First, transportation construction is a fundamental condition for the economic development of a region or even a country, and there is a significant correlation between the convenience of transportation and the changes of apple industrial layout. The main lines of traffic in the Loess Plateau are Longhai-Lanxin Line and Beitongpu-Taijiao-Jiaoliu Line. The length of the highway was 124771 km in 2015, but the terrain on the Loess Plateau is uneven, and the traffic accessibility of some villages is still poor. The circulation and transportation of agricultural products has been restricted. Transportation conditions have a direct impact on Apple sales. Areas with high transportation convenience have lower transportation costs and are closer to the market. It is easy to gain advantages in the process of purchase and sale, which is more conducive to improving the economic benefits of fruit growers. Second, orchard infrastructure can improve the ability of apples to resist disasters during their growth. Apple planting is highly dependent on the natural environment. With the change of climate and environment, the apple industry bears a greater risk of natural disasters during the growth and development period. Fruit trees anti-freezing smoke, anti-hail net and other facilities can effectively reduce the impact of natural disasters in the apple growth and development period. Thus it can be seen that the construction of disaster-resistant infrastructure can reduce the worries of fruit farmers in the production process, and is more conducive to mobilize the enthusiasm of

fruit farmers to produce and grow apples. Third, the importance of irrigation facilities for agricultural production in the Loess Plateau. The precipitation in the Loess Plateau is small and concentrated, and the agricultural irrigation mode is mainly based on "relying on heaven for food". The growth of apple needs sufficient water, so the superior irrigation conditions have become one of the important factors affecting the distribution of apple industry in the Loess Plateau.

1.2.3. The Change of Labor Force Drives the Internal Layout and Migration of Producing Areas

The change of labor cost and the gradual aging of the labor force will affect the production expectations of farmers, and the layout of the apple industry is more inclined to the areas with superior labor conditions. In the process of apple production, from growth, bagging to fruit picking, fruit farmers need to pay a lot of time cost, and even need to increase a lot of labor cost in bagging and other heavy workload links, and labor costs account for a large proportion of apple production costs. With the change of social industrial structure, non-agricultural employment opportunities are increasing, and the economic benefits brought by non-agricultural employment are often higher than those brought by agricultural production. The rapid development of the secondary and tertiary industries in the Loess Plateau has attracted a large number of young workers to work in cities, resulting in a shortage of labor in the apple industry, which already requires a lot of labor costs. At the same time, a large number of labor exports make the age structure of the rural working population in the Loess Plateau aging, it is difficult to maintain a large area of orchard work in the critical period of apple growth, and farmers have to reduce the apple planting area in the future. Therefore, the layout of the apple industry will be affected by labor costs and the aging of rural labor.

1.2.4. The Intervention Effect of Policy on Apple Industry layout

The development of any industry needs the support of government departments, and the government's measures will affect the layout of Apple industry from all aspects. After the implementation of the policy of returning farmland to forests in the Loess Plateau, especially during the period from 1996 to 2005, the area of cultivated land decreased by $2.06 \times 106\text{hm}^2$, a decrease of 12.92%, while the area of woodland increased by $2.56 \times 106\text{hm}^2$, an increase of 21.93%, creating conditions for the rapid development of apple industry in the Loess Plateau. In the process of apple production, the production costs of chemical fertilizers, organic fertilizers and pesticides account for a large proportion. The government's measures to change the value-added tax on the production and sales of related products have a certain impact on the cost of apple production. The change in production cost will change the results of farmers' acreage decision. Basic education in rural areas is also a key factor in regional development. The government's emphasis on rural education and preferential policies are conducive to training more talents who master high and new technology for the development of rural areas, and then inject new vitality into the efficient and green development of the apple industry. In addition, the differences in the efficiency of implementing policies by government departments in different regions will also lead to different layouts of apple industry in different regions in the same time and space. Take agricultural subsidies as an example, in areas where agricultural subsidies are issued more quickly and procedures are more concise, farmers will be more

enthusiastic about apple planting, thus affecting the future development of apple industry in this region.

1.3. Production Technical Factors

Judging from the changing trend of the average technical efficiency of apple production throughout the country, the level of technical efficiency of apple production increased rapidly from 2001 to 2010, from 0.82% in 2001 to 0.906 in 2010, with an average annual growth rate of 1.28%. The annual growth rate was 3.23% in Shaanxi Province and 0.07% in Gansu Province. The improvement of average technical efficiency of apple has brought about an increase in apple yield per unit area and total output, which has comprehensively enhanced the market competitiveness of the apple industry in the Loess Plateau. First of all, the quality and economic benefits of apples are closely related to the varieties of apples, and combined with the characteristics of high risk of natural disasters in the apple industry, the seedling technology of new disaster-resistant varieties of apples is very important to the disaster resistance and quality of apples. Secondly, as the main body of apple production, the cultural quality and technical level of fruit growers are generally low, and some fruit growers do not know enough about planting management technology, which leads to the poor production efficiency of orchards and does not liberate complete productivity. Systematically learning orchard planting management technology and implementing an efficient and green production mode can effectively increase the income of fruit growers. In addition, among the many factors restricting the development of apple, pest management has been widely valued by fruit farmers. The use of traditional chemical fertilizers and pesticides will not only increase the production costs of fruit farmers, but also cause pollution to the soil. If the amount of pesticides is insufficient, pests will pose a serious threat to apple production. It can be seen that there is a strong correlation between pest control technology and apple production. In addition to the production technology mentioned above, it also includes agricultural products processing technology, soil testing and fertilization technology, water-saving irrigation technology and so on. The progress of these production technologies is bound to affect the distribution of apple industry in the Loess Plateau.

2. Countermeasures and Suggestions

2.1. Government Perspective

Grasp the changing law of the layout of apple industry in the Loess Plateau and optimize the layout of apple production. On the whole, the apple industry in the Loess Plateau has shown a trend of "moving to the west and expanding to the north", and continues to concentrate to the areas with good light and heat conditions and perfect irrigation facilities. However, at present, there are still some problems in the distribution of apple industry, mainly manifested in that there are still large-scale apple parks in some low-lying areas vulnerable to frost and hail. On the other hand, the areas in the northwest with better light and thermal conditions are suitable for apple growth, which do not give full play to their natural advantages due to the less planting area of apples due to various factors such as market distance, traffic accessibility and so on. The government should comply with the changing law of apple industrial layout and remove obstacles in order to further optimize the industrial layout structure, so as to improve the efficiency of land use in the region and solve the

bottleneck of apple industry development in Northwest China.

To explore the intensive and large-scale production mode of apple to promote the development, transformation and upgrading of apple. Apple's large-scale operation through the comprehensive allocation of land, labor, capital and management, the main purpose is to expand the scale of production, reduce costs and investment, so as to better connect with the market. Individual apple production of farmers is difficult to obtain the price advantage in the process of purchase and sale, and has poor ability to resist market risks and natural disasters. The government should encourage farmers to carry out land transfer in an orderly and reasonable manner, avoid unnecessary administrative intervention in the process of land transfer, improve the social security of land-lost farmers, and remove the ideological obstacles of farmers' land transfer. Drawing lessons from the successful experience of industrial scale development in the past, combined with the actual production in the production areas of the Loess Plateau, introducing high-quality social enterprises in the form of policy subsidies to help rural areas build modern and large-scale agriculture, or encourage the development of large apple households, private farms, apple ecological industry demonstration parks, to achieve apple modernization development.

Improve the construction of public infrastructure in the producing areas to clear the obstacles for optimizing the spatial layout of the industry. In the process of the change of apple industrial layout, some problems such as poor traffic accessibility and imperfect orchard infrastructure have been exposed, which shows that there are still shortcomings in the infrastructure supporting the development of apple industry. In order to break through the hardware obstacles in the development and layout change of apple industry, the government should increase financial investment, quickly promote the construction of urban and rural transportation, water conservancy facilities, communications and other infrastructure, and reduce the production input of fruit growers. bring more convenient conditions for apple production, purchase and sale. We will promote the construction of orchard irrigation infrastructure in the main apple producing areas, improve the water supply network between orchards, and promote the construction of infrastructure such as village roads and dangerous bridges in remote areas suitable for apple growth, so as to improve the convenience of apple transportation.

Reduce the production cost and arouse the production enthusiasm of fruit farmers through financial means such as agricultural subsidies. Chemical fertilizers and pesticides are the most expensive parts of apple production. Finance can appropriately reduce the value-added tax on the production and sales of some chemical fertilizers and pesticides, reduce their market prices, indirectly reduce the cost of apple production, and affect farmers' planting choices. Due to the high risk of natural disasters in the apple industry, the scientific agricultural insurance subsidy mechanism is also the focus of the government. To improve the agricultural insurance subsidy policy, it is necessary for the government to increase financial investment, provide two-way subsidies to agricultural operators and agricultural insurance companies, and attract small farmers' willingness to participate in insurance by increasing the proportion of compensation paid by insurance companies and reducing insurance costs.

2.2. Social Enterprise Perspective

Accelerate the deep integration of the Internet and Apple industry, and build Apple big data information platform. In recent years, e-commerce and digital economy have become one of the important forces for the development of agriculture. The online sales mode of digital agriculture, especially live broadcast with goods, has become an effective sales mode of agricultural products. In the process of development, the apple industry in the Loess Plateau should pay attention to the combination of online and offline, and build an apple information exchange network platform, on the one hand, provide channels for farmers to understand market information more comprehensively and directly. on the other hand, through the network celebrity economy to broaden the original apple sales model, so that the organic combination of industrial resources, production technology and market information, to achieve the effective allocation of resources and efficient transmission of information in the apple industry. In the process of the operation of Apple's information network platform, it is necessary to strengthen management, ensure high-quality service from production sources to consumers, and establish a series of practical and effective supervision mechanisms to promote the development of information modernization of Apple industry.

To build a well-known Apple brand and pay attention to the role of publicity in the development of the industry. There are many apple brands in the Loess Plateau, the degree of organization is not high, the competition among brands is fierce, and the development of leading enterprises is relatively weak, which weakens the overall brand competitiveness of the producing areas on the Loess Plateau. At the same time, in the process of the transfer of the focus of industrial layout, the cooperative organization of peasant household production is not strong, which is not conducive to the intensive and large-scale development of industry. In this environment, social enterprises should strengthen their own brand construction, actively promote publicity, improve brand utilization, improve the brand awareness of small farmers through advertising and propaganda, create conditions for brand integration, and create a unified and well-known brand with characteristics. Enhance the market competitiveness of Apple brand.

Strengthen the research and development of deep processing and prolong the apple industry chain. Small-scale apple enterprises can establish a farm apple leisure picking garden, which can be combined with leisure agriculture to promote the deep integration of agriculture and tourism and realize the mutual promotion between different industries. Large-scale apple production enterprises should extend the apple processing chain and produce reprocessed products such as Apple Cider Vinegar, cider and applesauce so as to improve the economic benefits of the industry. Research and develop multi-shape apples in the production process, design apple essence packaging, form apple products with industrial characteristics and stronger attraction, and increase the added value of apple.

2.3. Peasant Household Perspective

Optimize the apple planting area and stabilize the planting area. The channel for fruit growers to obtain market information is very limited, so it is difficult to judge the market trend from piecemeal market information. Farmers should fully consider the planting conditions and market environment when making planting decisions. Planting

choices should not be made blindly in the environment where the overall apple market supply exceeds demand. The development thinking of the unsuitable climate for apple growth should be changed and other grain or cash crops should be replanted. Under the premise of fully considering the natural conditions and market environment, the apple production layout structure should be adjusted reasonably.

Actively learn advanced production technology and adjust the structure of apple varieties. The age structure of fruit growers is gradually aging, and there is a lack of understanding of advanced production technology and professional agricultural knowledge, especially the more important dwarfing cultivation mode and planting density in apple production. Farmers should actively participate in agricultural production technology training provided by the government and village committees, and learn advanced technologies such as fruit tree planting and apple processing, so as to improve the quality of apples. On the other hand, red Fuji is the main variety of apple in the market, and the absolute dominant situation of red Fuji in the market should be gradually changed. Farmers can appropriately increase the production of early and middle ripe varieties under the condition of high quality, late maturity and storage tolerance, in order to meet more diversified market needs and avoid the situation of homogeneous competition in Red Fuji.

Improve the orchard management mode and management mode, and gradually move towards large-scale and industrial production. Small-scale farmers have limited ability to invest

in orchards, generally do not have perfect disaster prevention facilities, and it is difficult to gain advantages in the process of purchase and sale. Farmers should slowly lift the thinking restrictions on the transfer of land, and more actively cooperate with production cooperatives or agricultural enterprises to promote the large-scale and intensive production of apple industry. Large agricultural households should pay attention to the adjustment of operation mode and management mode, improve the utilization efficiency of orchards, increase the output rate of apple land, learn the excellent experience of large-scale management mode, and apply new technology to improve the degree of mechanization and save labor costs. realize the specialization of apple production.

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