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Agricultural Ecological Zoning Plan of Old Industrial Bases in Liaoning Province, China

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Abstract On the basis of brief description of current situation of old industrial bases and primary industry of Liaoning Province, the paper introduces the general situation of agriculture-ecological zoning plan in Liaoning Province. First, the ecological bases of agricultural zoning plan are introduced through various topographic and geomorphic types, regional climate differences and imbalanced distribution of natural resources; Second, in accordance with the theory of comparative advantage, distribution of production and resource economics, on the basis of comprehensive evaluation of agricultural natural resources, with the principle of fully excavating economic function of different natural resources, and in order to improve allocation efficiency of the two resources of market and government, the formation of ecological zoning plan of agriculture in Liaoning Province is analyzed; Third, according to *Regional Layout Planning of Characteristic Agricultural Products of Liaoning Province* (2006–2010), the paper describes basic layout of agriculture-ecological zoning plan in Liaoning Province. The policy support of agriculture-ecological zoning plan in Liaoning Province is analyzed from three aspects-support policy of functional zone major in producing grain, support policy of other characteristic agriculture-ecological zone and support measures of development of agriculture-ecological zone. The paper also analyzes experiences of agricultural development of old industrial bases in ecological zoning plan: First, agriculture-ecological zoning plan is a effective way of the revitalization of old industrial bases; Second, scientificity of plan is the basis of improving competitiveness of regional agriculture; Third, multi-input mechanism guiding by government is the key of agricultural packing effect; Fourth, integrated agricultural industrial chain is guarantee of realizing industrialization in ecological zone.

Key words Old industrial bases of Liaoning Province, Ecological zoning plan, Agricultural revitalization, Major grain producing areas, China

In face of new economic development opportunity in our country, some provinces which are old industrial bases as well as major grain producing areas often confront dual development pressure. As old industrial bases, they need to realize reindustrialization, revitalize the economy of cities. As major grain producing areas, they should make sure of food safety, realize sustainable development of agricultural economy and increase farmers' income. In these areas, when promoting coordinated growth of agriculture and industry, governments always face larger constraint of resource and capital than in other areas^[1]. So, how to choose agricultural revitalization strategy that appropriate to characteristics of old industrial bases, it becomes an urgent problem for these areas. In these years, Liaoning Province have made ecological zoning plan as emphasis, fully expressed agricultural comparative advantages in various regions, and well realized coordinated growth of agriculture in various regions. In 2009, GDP of the primary industry in Liaoning Province is 141.4 billion yuan, 27 times than that in 1999. GDP per capita of the primary industry is 20 252 yuan, ranked the fourth in whole country, only lower than Jiangsu, Shanghai and Hainan. The experience of Liaoning province has reference significance in realizing agriculture revitalization in old industrial bases.

1 General situation of ecological zoning plan of agriculture in Liaoning Province

1.1 Ecological foundation of ecological zoning plan of agriculture in Liaoning Province Various geomorphic types, different regional climates and imbalance of natural resources distribution are the natural conditions foundation of ecological zoning plan of agriculture in Liaoning Province. Liaoning Province located in remaining range of Changbai Mountains and in the shore of the Bohai Sea and Yellow Sea. It is high in north-east and low in southwest. Its landform covers mountainous regions, hills and plains. Regional climates are very different. The rain is abundant in southeast, but insufficient in northwest. However, sunlight radiant quantity of the west and south region is higher than that of east. Characteristic of agricultural land resources distribution are obvious. Liao River plain in the middle area mainly is arable land, land coastal areas primarily is orchard, mountainous areas in two sides are mainly forest land and grassland mainly spreads over the hills in the west and plains in the middle. Different agricultural ecological conditions decide comparative advantages of agricultural production of areas in the province. Taking full use of these advantages, we can realize rational division of labor inside the area, expand agricultural function and realize transformation from traditional agriculture to modern agriculture^[2].

1.2 Formation of ecological zoning plan of agriculture in Liaoning Province Ecological zoning plan of agriculture in Liaoning Province is in accordance with comparative advantage theory, production distribution theory and theory of resource

economics, on the basis of overall evaluation of agricultural natural resources and with the principle of fully excavating economic function in different natural regions. It aims to improve allocation efficiency of market and government. Before dividing specific agricultural development area, we comprehensively evaluate agricultural natural resources and economic social resources in the first place. The main content of overall evaluation of agricultural natural resources is subdividing the natural endowment of land resources, water resource, climate resource and variety resources of main agricultural products of every region in the province. Evaluation of agricultural economic social resources mainly includes zoning condition of ecological region, economic condition, agricultural science, agricultural service system and so on. Through these evaluations, we set constraint set to ecological zoning plan of agriculture and make the plan establish on the basis of possibility and reality. The key link of determining agricultural development region is analysis and prediction of comparative advantage of agricultural products production in all the regions. The analysis of comparative advantage of agricultural products production uses comprehensive comparative advantage index method, overall advantage exponent of its core evaluation index = (efficiency advantage exponent \times scale advantage exponent)^{1/2}, in the formula, efficiency advantage exponent reflects the ratio of production efficiency of one agriculture in one region to average efficiency of the whole province, if the exponent greater than one, the variety has comparative advantage in the province. Scale advantage exponent reflects the scale and specialization of one agricultural product in ecological zone, the bigger the exponent is, the stronger the scale advantage is. Overall comparative advantage reflects reality advantage of one agricultural ecological zone. In order to make the plan has a certain foresight, in the process of plan determination, gray system theory is also used to predict development tendency of agricultural products, and productive potentials of the main agricultural products of each region are analyzed. On the basis of these evaluations, analysis and prediction, agricultural ecological zoning development plan is determined.

1.3 Basic pattern of agricultural ecological zoning plan of Liaoning Province According to *Regional Layout Planning of Characteristic Agricultural Products in Liaoning Province* (2006–2010), agricultural ecological regions of Liaoning Province are divided into ten agricultural characteristic industrial districts which are on the basis of high-quality grain base, with high-quality animal by-products, fine fishery, fruits, vegetables and oil plants as principle, with flowers and plants, medicinal materials, edible mushroom and characteristic forest product as supplement, with emphasis and multiple functions. Among them, fine-quality grain base is basic areas to realize guarantee function of grain safety of the state and regions. According to ecological condition, these areas are also divided into key development areas and suitable development areas^[3]. Taking the famous high-quality rice as an example, Liaoning Province has respectively determined fourteen counties and cities to be the production base of high-quality rice, includes Sujiatu, Li-

aozhong, Dawa, Panshan, Tieling and so on, and seventeen counties and cities such as Xinchengzi, Qingyuan and etc. to be the suitable development areas. In some production base of high-quality rice, emphasize construction of stock breeding bases and standardization production demonstration pilot. The areas of high-quality animal by-products, fine fishery, fruits, vegetables and oil plants are the main economic function areas to realize improvement of quality of life and increment of peasant income. The selection of these kinds of areas has considered not only ecological condition, but also regional advantage of market, transportation, science and technology. For example, in the selection of production advantage areas of high-quality animal by-products, twenty counties and cities which are determined as production base of high-yield cows are all close to market and located in suburbs and surrounding areas of big and middle cities. And raising areas of hens are planned along the line of Shenyang–Shanhaiguan and Shenyang–Dalian expressway which has convenient transportation. Although flowers and plants, medicinal materials, edible mushroom and characteristic forest product are in the second line of development, its economic functions, ecological functions and cultural functions are irreplaceable for other production areas. The industrial districts of medicinal materials and characteristic forest products are mainly located in mountain areas in the east, it has explored new economic growth points for these areas which are inappropriate to farm, rear poultry and fishery, and at the same time, done good to ecological resources.

2 Policy support for agricultural ecological zoning development in Liaoning Province

2.1 Policy support for main functional zones of grain

Grain safety is primary goal of agricultural economic growth in major grain producing areas. Grain safety has strong nature of public products. Direct support of financial capital is major form of construction of grain functional areas. In order to improve efficiency, financial capital use the method of centralized utilization and key support in the construction of large commodity grain base. In the process of determining scope of base, we strictly control the conditions of going into bases. With the accordance of agricultural ecological zoning plan, from the key areas which have comparative advantages both in corn and rice, we have selected four project areas-Shenyang, Tieling, Jinzhou and Panjin, determined twelve construction counties. In support project, the capital mainly uses in production links with strong positive externalities, including small-sized irrigation and water conservancy project, stock breeding project, pest control project, soil and fertilize management and other agricultural technological service facility. Among them, small-sized irrigation and water conservancy project take more than 80% of the capital. When setting policy goal, we emphasized on brand construction of increasing production of high-quality rice, non-polluted rice, organic rice and so on. Meanwhile, we make increment of peasants in project areas as the examination index. From the actual development situation of the area in these years, under the policy support which is on the basis of ecologi-

cal comparative advantage and using capital in important areas, the object of coordination between grain safety and peasant increment has become realized.

2.2 Policy support for other characteristic agricultural ecological zones In other characteristic agricultural ecological zones, through guidance of government policy and capital, gradually build multilevel, multiform and various input system with credit financing as backbone, rural collective and personal investment as basis and foreign direct investment as important part. First, government provide policy guarantee for bringing in private capital. For example, in order to develop high-quality animal husbandry, government carried out a series of policy guarantees in the plan, utilization and tax of the land it needed. In greenhouse vegetables ecological zone, government strengthened construction of green channel and give extra help in transportation management and charge. Second, increase cultivation and help of agricultural leading enterprises. To the leading enterprises in fishery, oil processing, flowers and plants production in the ecological zone, government gave vigorous support for soft loan, tax and so on, encourage private capital centralizing to advantage zones and express industrial packing effect. Third, attach importance to utilization and spread of agricultural technologies in ecological regions. In aspects of fishery, high-quality fruits, medicinal materials and so on, push out technological innovation projects, carry out policy of encouraging combination of industries, universities and research. To the key technology like fruit cap bagging, government gave capital subsidy for producers in demonstration areas. Through these policy supports, it has already formed agricultural sustainable development which has reasonable production arrangement, obvious industrial packing effect and optimal agricultural structure. And government have cultivated a batch of agricultural leading enterprises which have certain scale and driving force, to promote increment of peasant in each ecological zone.

2.3 Supporting measures of agricultural ecological development in districts At the same time of supporting each agricultural district with differences and importance according to ecological characteristics, government carries out series of supporting measures to solve universality issues faced by each agricultural ecological zone. First, increase construction of wholesale market of agricultural products. According to ecological zoning plan of agricultural products, on the basis of scientific site selection, cultivate large-scale wholesale market of agricultural products which is perfect in soft and hardware facilities, various in functions, advanced in types of operations and prominent in varietal characteristic, to provide value realization platform gathered with transaction, information and distribution functions. Second, improve logistic capacity of agricultural products inside the province. Through emphasizing support for modern logistic enterprises of agricultural products, accelerate cold chain system construction of agricultural products, perfect policy of "green channel" for fresh and alive agricultural products, reduce logistic cost, improve logistic efficiency of agricultural products and realize successful cohesion of production

and marketing of agricultural products in each ecological zone. Third, based on agricultural ecological production zoning, proceed in ecological environment zoning and evaluate ecological bearing capacity of each ecological environment zone. According to differences of agricultural ecological environment situation, take different environmental remediation measures, and take highlighted management measure to the vulnerable areas. And realize sustainable development of regional agriculture through these measures.

3 Analysis of agriculture revitalization experiences in old industrial bases under ecological zoning plan

3.1 Agricultural ecological zoning plan is an effective way of agriculture revitalization in old industrial bases Double roles of old industrial base and major grain producing areas often bring enormous pressure to local government. These areas release a great deal of surplus labour power in the past industrial development process, create severe ecological environmental pollution and bring in many negative effects for transfer of rural labor and sustainable development of agriculture. Economic strength of many old industrial bases is comparatively bad, the local government is lacking of enough financial resources, so the strength of industry supporting agriculture can't reach optimal level. Taking strategy of agricultural ecological zoning plan is conducive to breaking contradiction between industrial revitalization and agricultural development and achieving more agricultural development profit with limited financial capital. This development strategy transforms from overall support to focused support, it is good to express scale effect of financial capital. Take the support policy of major grain producing areas as an example, Liaoning Province only put into financial capital 0.3 billion yuan during Eleventh Five-Year Plan. But, project zones only select 12 main production counties, support projects are fewer but better, so the effect of policy is very obvious. The other characteristic of the development strategy is transformation from gross guidance to structure guidance. Ecological zoning plan promotes structure diversification of regional agriculture and individuation of products. So, it remits the contradiction between production increment and profit increment of peasants, and makes financial support more transform into real interest of peasants.

3.2 Scientificity of plan is the basis of improving competitiveness of regional agriculture One of the key points of agricultural ecological zoning plan is making fine agriculture and improving additional value and competitiveness of agricultural products. Agriculture of Liaoning Province has promoted rapidly these years, it is just a result of this policy. If we want to product high-quality products, respecting natural law and economic law and ensuring scientificity of plan is the foundation. Only fully expressing agricultural comparative advantage and guiding by demand and market, can we reduce blindness and low-level repetition. In selecting ecological appropriate zone of characteristic agricultural products, Liaoning Province took a very comprehensive and systematic evaluation

of natural ecological environment. Evaluation of land resources, water resource, climate resources and variety resources of main agricultural products are all established on the basis of quantitative analysis. And specific data base of agricultural resource is built to realize dynamic management. So, the determined production areas of characteristic agricultural products are all the best. Characteristic agricultural products areas are also fully considered regional conditions of production place. Selection of agricultural ecological zones are established on the basis of theories like economic geography, resource economics and so on to make selected areas not only can produce high-quality agricultural products but also can produce and sell agricultural products in a comparatively low cost and have strong competitiveness. Scientific agricultural ecological zoning plan is the basis of natural possibility and economic feasibility of development of fine agriculture. Characteristic agricultural products determined by this standard in Liaoning Province often have strong development potential. For instance, dairy products produced in some high-quality production area of animal by-products have already grown from regional brands to influencing products of the whole country in a short time.

3.3 Multi-input mechanism guiding by government is the key of formation of agricultural packing effect In order to make natural condition advantage of agricultural ecological zone transform into comparative advantage of economy, it is necessary to realize effective collection of resources for production. This kind of collection should take different resource combination form according to different functions in each zone. Ecological zone with function of grain safety guarantee, government resources should express important effect to provide fine infrastructure and technology service for grain production and give compensation for positive externalities for society provided by grain producers. To ecological zone with other functions, we should fully express leading function of peasant household and enterprises, especially intensify driving force of leading enterprises of characteristic agricultural products and realize dependable crop and increment of peasant households in the areas. In the aspect of cultivating leading enterprises, government should, on the one hand, attract private capital to enter into selected agricultural zones through policy preference in the aspects of tax, land, plan and so on, on the other hand, take finance discount to guide financial industry to provide enough financial support for enterprise development. Liaoning Province just has taken the measures of setting specific technically improvement and interest subsidies fund for processing industry of agricultural products to promote development of agricultural business model of "leading enterprise + production base + intermediary organization + order from peasants". To the investment

guidance of peasants in the agricultural ecological zone, we can also express demonstration effect of demonstration households. In ecological zone of green house vegetables, Liaoning Province exactly is by means of construction of specialized village of "One Village One Product" and demonstration area of safe production to realize overall spread of some key projects^[4]. These measures can lead capital collection with less financial capital and improve allocation efficiency of financial capital.

3.4 Making integrated agricultural industrial chain is the guarantee of realizing industrialization of ecological zone

Ecological zoning plan determines natural conditions foundation of agricultural development, but in order to realize agriculture revitalization, it is also necessary to break through development patterns with production as the main part. To characteristic agricultural products, we should bring the whole industrial chain of research, production, logistics and *etc.* into development plan to be the supporting object. In this way, we can get rid of disadvantageous position of agriculture of old industrial bases in industrial chain and realize industrialization of high additional value. On the basis of ensuring support for production, Liaoning Province has attached more importance to integration of spread of agricultural scientific research, logistic construction of agricultural products and market development. So, rapid development of agriculture also has vigorously pulled development of related industries, especially some modern service industry. Under general situation, tertiary industry of large agricultural province is relatively backward. If we pay attention to constructions of service industries in earlier stage and latter stage of agricultural production in the process of agriculture revitalization, it can improve transaction conditions between local agricultural products and external economic entity, and also can express absorbing effect of related service industries to agricultural surplus labor power, refine industries division, and make organic combination of optimization of agricultural development, peasant income and the whole economic structure.

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