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Development Strategy Research of Modern Eco-Agriculture on the basis of constructing the Rural Circular Economy-For the Example of Shandong Province

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Abstract

Modern eco-agriculture belongs to the development patterns of circular agriculture and low-carbon agriculture, and developing modern eco-agriculture is the objective requirement to establish the Scientific Concept of Development, to coordinate the relationship of man and nature and to realize the agricultural sustainable development. After the long-term practices, different areas in Shandong Province have formed various development models and have accumulated much experience. However, Shandong's modern eco-agriculture development exists some restrictive factors, such as the contradiction between land and population, the shortage of water and biology resources, the deterioration in ecological environment, the lag of technology development, the low technical quality of peasants, the imperfection of service system and so on, so we must take some pertinent policies and measures to develop the eco-agriculture sustainably and healthily.

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The development of modern eco-agriculture is not only the objective requirement to establish the Scientific Concept of Development, to coordinate the relationship of man and nature and to improve rural ecological environment, but also the inevitable choice of constructing the harmonious society in countryside and implementing the strategy of sustainable development in agriculture. Shandong is one of the provinces which early developed modern eco-agriculture and circular agriculture in China. As a big province of agriculture and population, its agricultural resources are short, agricultural ecological

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environment is relatively weak, and there are more restrictive factors and prominent problems in developing modern eco-agriculture and circular agriculture, so it will show a positive significance through adopting corresponding countermeasures and measures to promote the sustained and rapid development of modern eco-agriculture.

1. Theory and Practice on the Development of Modern Eco-agriculture

1.1. Basic connotation of modern eco-agriculture

Modern agriculture is usually expressed for different patterns such as oil agriculture and eco-agriculture, the modern oil agriculture which mainly relies on input of chemical substances to improve yield and economic income causes the excessive consumption of water resources and the deterioration of ecological environment, as a result, it is considered of a kind of unsustainable development of agricultural model, and the modern eco-agriculture that is considered of agricultural mode of sustainable development is paid widespread attention gradually[1]. Actually, modern eco-agriculture which uses ecology principle and system science method, combines many achievements of modern science and technology of traditional agriculture and uses the natural resources adequately and reasonably realizes the unification of the benefit on agricultural ecology, environment, economy and society, makes agriculture go the way of sustainable development of benign circle, therefore it gradually become the trend of agricultural development in the contemporary world[2]. And the essence of circular agriculture is to utilize natural resources and environmental capacity in ways of treating environment friendly, so as to realize ecologicalization of economic activities in agriculture and the unification of the three aspects including economy, society and ecology [3]. Therefore, the development of modern eco-agriculture and circular agriculture has the consistency of target, they both require people to form benign and mutual mechanisms with natural environment and ecological system in activities of agricultural production, and then to realize the objective of conserving resources and using energy repetitively [4].

1.2. Development of modern eco-agriculture between China and Foreign Countries

As traditional eco-agriculture, China has a long history and rich experience, but the researches and practices on modern eco-agriculture firstly emerged in some developed countries. Compared with these countries, the development of modern eco-agriculture in China was relatively backward. In 1950s and 1960s, the practical activities on modern eco-agriculture began in Germany, Switzerland, UK, Japan and other developed countries. After 1980s, China gradually established a batch of ecological families, ecological village, ecological towns, etc. Basically, the development of modern eco-agriculture in Shandong is identical with that in the whole nation, since 1980s, Shandong has conducted many pilot projects on eco-agriculture in mountains, plains and coastal areas, modern eco-agriculture gradually shows good development momentum, forming various development modern eco-agriculture patterns, which contain the type of mountains, hills, plains, coastal regions, the Huanghe Delta, regions of rivers and lakes, suburbs, etc. In the practice of eco-agriculture construction, agricultural resources are used efficiently, the recycling of energy and the exploitation of new energy get remarkable achievements, and the level of agricultural standardization is enhanced constantly.

1.3. Basic process on the development of modern eco-agriculture in Shandong

Shandong has carried out eco-agriculture trials in part of areas since 1985, the construction takes 20 years and generally experiences four important stages: (1) the stage of experiment and research
concerning eco-agriculture (1985-1988), people mainly organized and carried out experimental study about eco-agriculture in small range and established over 20 experimental districts of village level of different types in the plains, mountains and coastal areas; (2) the distensible stage of pilot project on eco-agriculture (1989-1993), the number of pilot project in Shandong was increasing rapidly, and the experimental departments of eco-agriculture had increased to over 200 until 1993; (3) the construction stage of pilot counties in eco-agriculture (1994-2004), after 1994, the priorities of eco-agriculture in Shandong gradually changed from the scale of township, village to the scale of county, the three counties (districts) including Wulian, Linzi and Linqu were listed as the first batch of pilot counties on eco-agriculture in China, 15 counties (cities, areas) such as Guan County was defined as the first batch of provincial-level pilot counties in Shandong; (4) the further expansion and spread stage of eco-agriculture (2005- ), under the demonstrating and driving of pilot counties, eco-agriculture was built steadily, Shandong gradually the development modes which had various traits.

2. Restrictive factors in modern eco-agriculture and circular agriculture development

2.1. The contradiction between population and land is aggravates, and soil condition is worrying

The contradiction between population and land increasingly stands out in Shandong, and cultivated area is decreasing. Because there is always increase but no decrease in the phenomenon that non-agricultural construction occupies farmland after China’s Liberation, cultivated area has declined from 130 million mu at the beginning of New China to less than 100 million mu at present, cultivated area per capita has fell from 2.88 mu to about 1 mu. By the end of 2008, the population of Shandong occupied 7.1% of the country, but the cultivated area only accounted for 5.9%, the occupied quantity of cultivated area per capita was less 0.4 mu than the country. At the same time, the condition of soil resources on which the development of modern eco-agriculture and circular agriculture relies is worrying. In Shandong Province, The soil erosion area reaches to 31 thousand per square kilometer and occupies 19% of the whole province, the quantity of erosion is 250 million ton, and that is equivalent to 3.5 billion kilogram standard fertilizer; the salinization area of cultivated land is about 10 million mu and accounts for 10% of the total land area, the secondary salinization which caused by seawater intrusion is aggravating in coastal areas; the whole level of farmland fertility is on the low side, the area ratio of the medium-low yield land reaches to over 70%, the phenomenon that Nitrogen, Phosphorus, Potassium and other trace elements are short exists in different degrees in many places [5].

2.2. Water and biology resources of agriculture are short

Water resources used for agriculture lack, the contradiction on seasonal shortage of water is serious. In Shandong Province, average annual rainfall is about 700 millimeters, freshwater resources per capita is 357 stere, it only occupies 1/6 of the average level in our country and 1/24 of that in the world, the number is far below 1500 stere per capita which is the lowest line that is internationally recognized; the freshwater resources of cultivated land per mu is about 341 stere, it is only 13.4% of China’s average level and 3.3%of the world. Now agriculture is still the important users of water resources in Shandong, agricultural water accounts for more than 80% of the total water consumption, the shortage of water resources, flooding and drought bring adverse effects to eco-agriculture, the rate of water deficiency is about 30% in the normal years, and the rate in the dry years is higher. In addition, biological resources decrease sharply, and the ecological system of agriculture is weakened constantly. Compared to the developed countries and many advanced cities of our country, the amount of forest resources that Shandong own is lower, and forest coverage is only 20%. Due to the destruction of ecological conditions
plus the excessive and disorderly hunt, wildlife resources, especially the natural enemies of agriculture such as beneficial insects, beneficial birds and useful animals decrease sharply, disruption of ecological balance in agriculture aggravates.

2.3. Unreasonable production mode in agriculture exacerbates the deterioration of rural ecological environment.

In the past, the long-term land reclamation activity by destroying grasses and trees together with the excessive cutting and grazing caused the serious damage of ground vegetation in Shandong Province, the crisis of land desertification, salinization and soil erosion is increasingly serious. Agricultural production is polluted by urban and rural household garbage and sewage except for the three kind of industrial waste, and farmers excessively use chemical capital goods such as chemical fertilizers, pesticides, herbicides and plastic films, which make agricultural land and environment contaminative. The amount of sewage discharge in Shandong reaches to 1.5 billion ton every year, 80% in that directly discharges into surface water or infiltrated into underground without treating effectively, the behaviors result in the quality decline of irrigation water, 48% of surface water dose not accord with the water quality standard of irrigation and fisheries. The approximate amount of excrement for animal husbandry is 40 million ton and that of urine and sewage reaches 300 million ton [6]. Some dung and sewage discharged into rivers without purification treatment are the important pollution source of water and environment. Therefore, the irrationality of agricultural production mode aggravates the degeneration of rural ecological environment and hampers the benign development of eco-agriculture seriously.

3. Conclusions

3.1. Strengthen the propaganda of eco-agriculture and circular agriculture, and improve the eco-agricultural consciousness of the society and farmers

Widely disseminate and popularize the laws on protecting ecological resources and the technical knowledge of eco-agriculture to farmers through various channels and forms, enhance the awareness of environmental protection, resource saving and sustainable development, gradually develop a good habit of cleaner production, green consumption and environmental protection, especially guide residents to enjoy the healthy and scientific consumption. Secondly, establish the scientific development view, and conduct the theoretical innovation of eco-agriculture and circular agriculture. Comprehensively use agronomy, economics, ecology, environmentalology and sociology, combine the development and application of science and technology on modern agriculture, quickly form and perfect the theoretical system of modern ecological, low carbon and circular agriculture, promote the sustainable and stable development of eco-agriculture. Finally, establish the scientific accounting system of agriculture, carry out the green GDP statistics policy, implement capitalization management for natural resources, set up cost accounting system and economic evaluation system on agricultural resources and ecological environment, make a quantifiable platform for the efficiency of eco-agriculture.

3.2. Gradually increase the construction input of eco-agriculture, and form the policy system of supporting eco-agriculture development

Firstly, reinforce the support of technology development on eco-agriculture, and gradually improve the technical level of eco-agriculture. Governments must give some policy inclination and essential support in some aspects such as investment, credit, taxes and subsidy, actively broaden the channels of
agricultural investment, increase the investment of the ecological engineering in large agriculture, the demonstration area of eco-agriculture, the reserve construction on agricultural resources. Secondly, form the incentive mechanism of eco-agriculture construction. Actively advocate and encourage enterprises to contract and rent wastelands, barren hills and desolate beaches, carry out the activities of tree-planting, water and soil conservation and the comprehensive development in agriculture, improve the system of rewards and punishments in agricultural ecological environment. Last, intensify the protection of agricultural ecological environment, and effectively control the environmental pollution.

3.3. Reinforce the support of technology development on eco-agriculture, and gradually improve the technical level of eco-agriculture

On the basis of increasing national finance investment in the technical development of eco-agriculture, attract social fund to develop and promote the science and technology of eco-agriculture, gradually form and improve the mechanism which investment and earnings link together, build a multiple investment system of science and technology, provide the necessary material and technical conditions for the technical innovation of eco-agriculture. Secondly, actively absorb the technical essence of traditional eco-agriculture, and promote the technology innovation of modern eco-agriculture. Modern eco-agriculture is more in need of the support of high technology, the high technology and informationization of eco-agriculture contained the technologies of modern ecological engineering, biology, information and remote sensing to the eco-agricultural construction, it is well worth learning and using for reference to promote the development of modern eco-agriculture and circular agriculture through high technology.

Acknowledgment

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