

Development Experience and Reference of Green Agriculture in Developed Countries

Xiang Li

Cooperative Economics Research Center, Anhui University of Finance and Economics, Bengbu
233030, China

Abstract

This article summarizes the experiences and lessons learned by developed countries in the process of coordinated development between agriculture and the environment. In the process of coordinating agricultural and environmental development, both the United States and the European Union are committed to improving the knowledge and skills of agricultural producers through the formulation of environmental regulations and legislation, green procurement and green payments, establishment of sound information systems, education and training, etc., in order to solve the problems of externalities, information asymmetry, and matching of agricultural producer capabilities in agricultural production. China should learn from experience and accelerate the establishment and improvement of environmental protection laws and regulations.

Keywords

Developed Countries; Externalities; Information Asymmetry.

1. Introduction

Since the mid-20th century, the United States and EU countries have gradually embarked on the path of developing green agriculture due to serious environmental pollution and ecological imbalances caused by traditional agriculture. Currently, the concept of green development has become an international consensus, and the experience gained by the United States and the European Union in the development of green agriculture production has important reference significance for the coordinated development of agriculture and environment in China.

2. Externality

In order to address the negative externalities in agricultural development, the United States and the European Union each take measures that are beneficial to them. The methods adopted by the United States include environmental regulation and legislation, green payments, green procurement, and green technology exports.

2.1. The United States Adopts Relatively Strict Environmental Regulations and Actively Promotes the Legislative Process

Its purpose is to internalize negative externality costs through this action. The agricultural ecological problems in the United States emerged relatively early and began to gradually erupt from the mid-19th century. At the same time, the United States has formulated relevant laws and regulations. The Federal Pesticide Act of 1947 provided detailed regulations on the various components of pesticides and their production processes, and provided clear explanations for any violations or illegal activities that may occur during agricultural production. The environmental laws in the United States have distinct levels and strong targeting. Corresponding legal sanctions are imposed on agricultural producers for different degrees of

illegal behavior caused during the production process. Agricultural producers with lighter violations are fined varying amounts, while those with more serious violations are sentenced to imprisonment and high fines. Since the 1970s, the United States has successively introduced a series of laws and regulations, such as the Clean Water Act, which incentivizes farmers to adopt corresponding pollution prevention and control measures, and provides corresponding subsidies and tax reductions to farmers who actively respond to policies. The Presidential Water Quality Act proposes that protecting surface water and groundwater is the responsibility of every agricultural producer, and that environmentally friendly production technologies should be actively adopted.

2.2. Subsidies for Agriculture are Commonly Used Industrial Protection Measures in Developed Countries

This can enhance the international competitiveness of agriculture and expand its agricultural product exports. In the early days, the United States adopted extensive subsidies based on the land area owned by agricultural producers, with the main purpose of increasing agricultural product yield and production efficiency. This approach stimulated farmers' enthusiasm for land reclamation and increased their production enthusiasm, but also brought serious environmental pollution problems. In the early 1990s, the United States began exploring new forms of agricultural subsidies, gradually transforming extensive agricultural subsidies into environmentally friendly green subsidies. The green subsidies in the United States do not restrict the production methods and technologies of agricultural producers, only requiring regular measurements of their soil, air, and water quality, and varying degrees of subsidies or other rewards based on test results. The US government attaches great importance to the development of environmentally friendly technologies and has gradually formed a complete set of innovative models for environmentally friendly technologies. Firstly, the government formulates corresponding guidelines and measures, and federal departments actively promote the implementation of relevant plans and policies. At the same time, the United States implements relevant laws to promote government green procurement. In addition, the United States attaches great importance to environmental diplomacy with developing countries. The United States enhances the benefits of environmental technology innovation by helping developing countries promote environmentally friendly technologies. In the agricultural sector, the United States is promoting sustainable development of more and more environmentally friendly technologies through green technology exports. This measure in the United States not only benefits technology developers, but also agricultural producers.

The EU's solutions to internalizing negative externalities in agricultural production processes include the EU Common Agriculture and Environmental Policy, agricultural environmental service payments and environmental barriers, and green procurement.

2.3. The EU Emphasizes the Synergy between Production and Environmental Protection

Like the United States, the early European Union also aimed to increase agricultural output and production efficiency, actively encouraged production, and did not pay enough attention to environmental protection issues. With the emergence of increasingly serious ecological problems, the European Union has begun to focus on the combination of production and environmental protection. Encourage agricultural producers to reduce the use of pesticides and fertilizers, resulting in a loss of income for farmers, and the government will provide certain subsidies. In addition, the European Union has also established relatively strict environmental provisions, with detailed regulations on pesticide residue standards in food, fertilizer usage, and other aspects. The EU not only implements strict standards within itself, but also actively promotes international environmental cooperation. The EU's agricultural environmental policy system is very advanced and efficient.

2.4. Payment for Agricultural Environmental Services in the European Union

The EU's payment for agricultural environmental services is derived from the development of extensive agricultural subsidies. Its traditional agricultural subsidies are measured by factors such as agricultural product yield and land area. The new type of agricultural subsidy, also known as agricultural environmental service payment, believes that the products produced by agricultural producers should not only include available agricultural products for sale, but also include some services and public goods, such as environmental protection. The non competitiveness and non exclusivity of public goods lead to supply being less than demand, and the government subsidizes agricultural producers for the decrease in profits caused by providing corresponding services and public goods. The EU's payment for agricultural environmental services not only compensates for the increase in positive externalities in agricultural production processes, but also compensates for the decrease in negative externalities in agricultural production processes.

2.5. Environmental Barriers in the European Union

The EU aims to protect the interests of its domestic agricultural producers by setting environmental barriers. The EU itself implements relatively strict environmental standards, and in order to prevent other countries from harming the interests of its agricultural producers, it conducts strict screening of imported products and provides subsidies for the export of domestic products. The implementation of strict environmental barriers by the European Union not only protects the interests of domestic producers, but also promotes the reform of international agricultural product standards. At the same time, the EU encourages green procurement within member countries, which can incentivize agricultural producers to actively use environmentally friendly technologies. The EU has also provided guidelines for green procurement to its member states, urging them to engage in green procurement.

3. Information Asymmetry

The symmetry of knowledge and information is an important condition for ensuring fair competition in the market. The United States has a very complete agricultural product market information system, and the United States has the Agricultural Product Market Service, whose function is to collect and publish complete information on agricultural products. From production to sales, the Agricultural Product Market Service not only ensures the completeness and accuracy of information, but also ensures the timeliness of information, and the information it publishes does not have subjective evaluation, Maintain the neutrality of information. The product has an information tracking system at every stage from production to sales, and a strict recall system is implemented for products with problems. These systems in the United States ensure clear product information, information symmetry avoids consumer adverse selection behavior, and are conducive to the development of environmentally friendly agricultural products. The EU's quality labeling system plays a similar role to the well-established agricultural market information system in the United States. The EU stipulates that its agricultural products must be labeled with complete information, from their place of origin to quality standards. The EU's environmentally friendly agricultural products have a good reputation, and the quality labeling system ensures the interests of agricultural producers.

In addition to a sound agricultural product market information system, the United States has also established strict legislation, standards, and supervision mechanisms. The United States has introduced a series of laws and regulations to ensure the quality and safety of agricultural products, and has advanced quality testing technology to detect pesticide and fertilizer residues in agricultural products. In addition, the United States adopts a full process supervision mechanism for agricultural products, strictly supervises environmentally friendly production,

and recalls problematic food, truly ensuring that there are people responsible before, during, and after production. The accountability mechanism in the United States is very strict and cautious.

Both the United States and the European Union attach great importance to protecting their countries' patents and intellectual property rights, and are committed to the achievement of environmentally friendly technology patents. This initiative has laid a solid foundation for the development of environmentally friendly agriculture and provided reliable technical support for agricultural producers.

4. Ability Mismatch Issue

In the process of agricultural production, the agricultural technology mastered by agricultural producers may not be consistent with the existing technology. In order to enable agricultural producers to update their agricultural technology level in a timely manner, it is necessary to promote agricultural technology to agricultural producers. The rapid development of modern agriculture in the United States cannot be separated from efficient agricultural technology promotion. Agricultural technology promotion in the United States not only relies on the technology market, but is dominated by universities, which are centered around the agricultural colleges of land giving universities in each state. The Agricultural College of the Land Grant University has a cooperative relationship with state governments and agricultural departments, and they collaborate with each other to promote agricultural technology. The promotion of agricultural technology in the United States not only imparts agricultural technology to agricultural producers, but also disseminates knowledge and cultivates their innovative abilities, so that agricultural producers can adapt to modern production and market economy. The promotion of agricultural technology in the United States involves a wide range of people, including the promotion of agricultural production technology for agricultural producers, the promotion of household chores for housewives, and the dissemination of knowledge and skills that benefit children for a lifetime. The United States has a professional agricultural technology promotion team, most of whom have master's and doctoral degrees. The promotion personnel not only bear the responsibility of agricultural technology promotion, but also have the ability of education and scientific research. Each state in the United States is equipped with extension stations that promote knowledge and information to agricultural producers through computer networks, while utilizing efficient satellite systems for real-time monitoring of agricultural production. Almost all agricultural producers in the United States have received good education, and they are able to absorb and master agricultural production knowledge and technology well, and accurately apply them to agricultural production activities. This is also the reason why the modernization level of American agriculture is at a high level.

The EU attaches great importance to providing opportunities for education and training for its domestic agricultural producers. EU countries attach great importance to innovation in agricultural technology, such as the research and development of environmentally friendly technologies, and disseminate and promote them among agricultural producers through distance education or training. Unlike most agricultural producers in the United States who have higher education levels, the European Union places more emphasis on secondary vocational education. Except for agricultural producers who have received higher education levels, all other agricultural producers need to receive corresponding vocational education before being allowed to participate in formal agricultural production activities. By participating in vocational education or training, agricultural producers can obtain corresponding technical titles, which directly relates to their actual interests. Therefore, agricultural producers will actively participate in training. In the late 1980s, due to the large-scale expansion of agricultural production in the European Union, the ecological environment was damaged. EU countries

began to promote moderate scale production in agricultural production, mainly hoping to form an agricultural production industry chain through cooperative networks and form distinctive competitive advantages. Taking France as an example, 90% of agricultural producers in France have joined cooperatives. Cooperatives provide standardized services for agricultural production activities and establish unified quality standards for agricultural products. Cooperatives are also an important carrier for agricultural technology promotion. In the process of technology promotion, the United States mainly relies on the government and agricultural colleges, while private organizations in EU countries have also played an important role in the process of agricultural technology promotion.

5. Experience

Both the United States and the European Union have undergone a transformation from traditional agricultural production models to green agricultural production models, and have achieved significant results. During the transformation process, the main focus is on addressing externalities in the production process, information asymmetry in the market, and the mismatch of agricultural producer capabilities. The policy measures adopted by the United States and the European Union in addressing these issues have both similarities and differences. When addressing externalities, both the United States and the European Union address negative externalities through environmental regulations and legislation, and incentivize positive externalities through green procurement and green payments. However, there are differences between the two. The United States places more emphasis on solving problems through formulating corresponding policies and legislation, while the European Union tends to use subsidy incentives to address externalities. When addressing the issues of information asymmetry and mismatched capabilities, both the United States and the European Union have adopted measures to establish sound information systems, promote agricultural technologies through education and training, and focus on improving the knowledge and skills of agricultural producers; In addition, the United States and the European Union also achieve a win-win situation through the export of environmentally friendly technologies.

The development of environmentally friendly agriculture in the United States and the European Union has provided experience for China's transition from a traditional agricultural development model to a green agricultural development model. At present, China's agricultural development is in a transitional stage, with many drawbacks. The concept of "pollution first, treatment later" still exists in some regions, environmental protection related laws and regulations are not sound, agricultural producers generally have low knowledge and technical levels, and agricultural product information systems are still incomplete. The development of green agriculture in China still faces severe challenges. Drawing on the experience of developed countries, China should accelerate the establishment and improvement of environmental protection laws and regulations, especially increase government funding support for green agriculture, strengthen subsidies to compensate for the losses of agricultural producers, mobilize the enthusiasm of agricultural producers, organize and promote the dissemination of agricultural knowledge and technology among agricultural producers, and improve the ecological and environmental awareness of agricultural producers.

References

- [1] Dale Mackrell, Don Kerr, Liisa von Hellens. A qualitative case study of the adoption and use of an agricultural decision support system in the Australian cotton industry: the sociotechnical view. *Decision Support Systems*, 2009, (2): 34-35.
- [2] Davey A., Furtan H. Factors that affect the adoption decision of conservation tillage in the prairie region of Canada. *Canadian Journal of Agricultural Economics*, 2008, 56(3): 257-275.

- [3] Moser R., Pertot I., Elad Y. Farmers' attitudes toward the use of biocontrol agents in IPM strawberry production in three countries[J]. *Biological control*, 2008, 47(2): 125-132.
- [4] SHIH H. Continued use of a Chinese online portal: an empirical study. *Behavior & Information Technology*, 2008, 27(3): 201-209.
- [5] Somda J., Nianogo A.J., Nassa S., Sanou S. Soil fertility management and socio-economic factors in crop-livestock systems in Burkina Faso: a case study of composting technology. *Ecological Economics*, 2002, 43, 175-183.
- [6] Yu L., Hurley J., Kliebenstein J, Orazen P. A test for complementarities among multiple technologies that avoids the curse of dimensionality. *Economics Letters*, 2012, 116(3): 354-357.