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Experience in applying science and technology to agricultural production of some localities and lessons learned for Phu Tho province

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Abstract

Application of science and technology (S&T) in agricultural production (APP) is a consistent policy of the Party, aiming to create breakthrough developments in productivity, quality, increase the value of agricultural products, promote the rapid, modern and sustainable development of the Agricultural Economy (AEP). This article studies the experience of applying S&T in APP of some localities in the country, From there, draw valuable lessons and apply them flexibly, in accordance with practical conditions to accelerate the application of science and technology in agricultural production in Phu Tho province in the coming years.

Keywords: agricultural production, application of science and technology, agricultural development, Phu Tho province

Introduction

Phu Tho is a province in the Northern Midlands and Mountains region with many potentials and advantages for developing agricultural production. In recent years, this locality has implemented many policies and guidelines to encourage and promote the application of science and technology in agricultural production and achieved positive results. The number of science and technology products applied in production is increasing, the scale of science and technology application is expanding. The quality of science and technology products applied in agricultural production is improved, increasing the productivity of crops and livestock; improving the efficiency of using input factors; the value of agricultural production in the local GRDP is increasing. The structure of science and technology products applied in agricultural production in the province is increasingly diverse and reasonable. Along with thoroughly grasping and applying the viewpoints, guidelines and policies of the Party and State; mobilizing and effectively using internal and external resources, Phu Tho needs to be more active in studying the experiences of typical provinces in applying science and technology in agricultural production in the country. Thereby, promoting the development of local state-owned enterprises in a modern and sustainable direction, actively contributing to socio-economic development and significantly changing the face of agricultural and rural areas in the province.

Experience in applying science and technology to agricultural production of some localities in the country

Experience of Lao Cai province

Lao Cai is a mountainous border province, located in the middle of the Northeast and Northwest regions of Vietnam, with 203 km of border adjacent to Yunnan province (China); tropical monsoon climate, but is influenced by complex terrain factors, so the weather changes somewhat, different over time and space. In recent years, the province has had many policies and strategies to develop agricultural production and brought positive results. According to the Lao Cai Provincial Statistics Office, the value of agricultural production has increased and stabilized, averaging over 6.05% in the period 2016-2020; By 2022, the value of the agricultural, forestry and fishery sector will reach VND 8,637.6 billion (at current prices, accounting for 13.78% of the province's GRDP). There are many different reasons for Lao Cai province's agricultural sector to achieve the above positive results, in which promoting the application of science and technology in production stages is the fundamental cause, specifically: *Firstly*, promote restructuring of agricultural economy, adjust planning, develop concentrated production areas to create

favorable conditions to quickly apply science and technology to local agricultural production. In recent years, Lao Cai province has been promoting the restructuring of the State economy, adjusting planning, developing concentrated, effective and sustainable agricultural production areas according to Project No. 01-DA/TU, dated November 27, 2015 of Lao Cai Provincial Party Committee on Restructuring the agricultural and forestry economy in the period 2016-2020 and Decision No. 3690/QD-UBND, dated October 27, 2016 of Lao Cai Provincial People's Committee on approving the Planning for processing agricultural and forestry products in Lao Cai province to 2020 and vision to 2030. In particular, adjusting planning, developing key crop production areas, is very important to promote the application of science and technology in agricultural production in the locality, specifically: developing concentrated endemic medicinal plant production areas, with 350 hectares, in 6 districts and towns. According to the planning until 2025, the entire area of medicinal plants must have a contract between the enterprise and the producer; 100% of the medicinal plant area of the planned production area must ensure safety; the area of medicinal plant cultivation must ensure the standards of good agricultural and harvesting practices of the World Health Organization (GACP-WHO).

Lao Cai province has adjusted the planning for the development of high-quality tea production areas to quickly bring science and technology products into production, prioritizing the application of advanced technical processes in design, planting, care, and investment in deep processing technology. Developing high-quality temperate fruit tree areas in Bat Xat, Bac Ha, Si Ma Cai districts, Lao Cai city, Sa Pa town; strongly developing specialized vegetable and flower production areas on the basis of applying modern science and technology in production. with more than 390 hectares in areas with special advantages. This is a very important content and measure, creating favorable opportunities for the local agricultural sector to promote the application of science and technology in production, creating high-quality agricultural products with high value in the domestic and foreign markets.

Second, prioritizing the application of high technology (HDT) in production creates momentum to promote the application of science and technology in local agricultural production. In the period of 2016-2020, the Party Committees and authorities of Lao Cai province have strongly led and directed programs and projects to develop HDT agriculture in the locality. According to the Lao Cai Provincial Statistics Office, by 2022, the whole province had 6 HDT agricultural projects, attracting 52 enterprises and cooperatives to invest in developing HDT agricultural production. By 2022, the area of HDT agricultural production in the whole province is estimated at 2,744 hectares, with the value of cultivation reaching 260 million VND/ha/year. Along with that, Lao Cai province is accelerating the implementation of 1 national-level high-tech agricultural zone in Sa Pa town with an area of 200 hectares and 2 provincial-level high-tech agricultural zones in Bac Ha district and Sa Pa town with a total area of nearly 600 hectares.

Third, implementing many mechanisms and policies to encourage the application of science and technology in local agricultural production. Along with promoting the implementation of policies and policies to encourage the development of agricultural science and technology,

especially the implementation of Resolution No. 33 /2015/NQ-HDND, dated December 11, 2015 of the Provincial People's Council on the policy of developing agricultural and forestry production in Lao Cai province in the period of 2016-2020, the locality has effectively organized the implementation of the Plan to implement the Project on Science and Technology Development in Lao Cai province in the period of 2011-2015 and orientation to 2020 in the agricultural sector. In particular, Resolution No. 23/2020/NQ-HDND dated December 4, 2020 of the Provincial People's Council on Promulgating regulations on policies to encourage the application of scientific and technological advances in Lao Cai province has created favorable conditions for local agricultural production entities to quickly bring scientific and technological achievements into production. In addition to receiving domestic and foreign scientific and technological products, the Province has conducted research, accepted many topics, scientific works and transferred and applied them to local agricultural production. In the period of 2012-2020, the Province has implemented 91 topics and projects in the agricultural sector with 54 provincial-level scientific research topics and projects; 32 projects under the policy to encourage the application of scientific and technological advances and 05 projects under the Central Rural and Mountainous Areas Program (Lao Cai Provincial Statistics Office, 2023).

The policies that have been developed in detail, specifically and implemented consistently have created opportunities for entities to have more opportunities to access, mobilize and effectively use investment resources, apply scientific and technological achievements to production, and promote the development of local economic sectors. In particular, the policy of supporting land accumulation and the policy of supporting loan interest rates are of particular importance. The policy of supporting loan interest rates is strictly regulated in terms of supported subjects, loan limits and interest rate support periods, support conditions, support mechanisms, etc. Large-scale agricultural, forestry and fishery farms using high technology will receive 100% support for loan interest rates in the districts of Bac Ha, Muong Khuong, Si Ma Cai, Sa Pa town; 50% support for loan interest rates in the districts of Bao Thang, Bao Yen, Bat Xat, Van Ban, Lao Cai city.

In addition, the locality has mechanisms and policies to encourage and promote the extensive application of information technology and digital technology; develop models of "Agricultural Market 4.0", e-commerce trading floors, OCOP product trading floors... According to the Lao Cai Provincial Statistics Office, by 2022, the whole province will have 50% of enterprises and agricultural cooperatives applying digital technology in management, operation and participating in e-commerce; 80 enterprises and agricultural cooperatives will exploit and use 3 software applications to manage the electronic traceability information system for agricultural products with 283 products attached with QR-Code; 118 enterprises, cooperatives, and agricultural production establishments will participate in introducing and promoting products on the system to support trade promotion of agricultural products with 193 product lines...

With the right mechanisms and policies, along with drastic direction and appropriate methods for practical conditions, Lao Cai has accelerated the process of applying science and technology to production, contributing to the local economy's

new development steps, actively contributing to the socio-economic development process and moving towards the successful implementation of the goal of industrialization and modernization of agriculture and rural areas in the locality.

Second, the experience of Bac Giang province

Bac Giang Province is located in the Northeast region of Vietnam, with a natural area of 3,895.9 km², with many potentials and strengths for the development of the agricultural sector. In recent years, the Province has concretized and implemented the policies of the Party and the State; strengthened leadership and direction to promote the application of science and technology in production, contributing to making the local agricultural sector always take the lead in the provinces in the Northern Midlands and Mountains; in 2022, the total value of the agricultural, forestry and fishery sector of the Province reached 12,282 billion VND (Bac Giang Provincial Statistics Office, 2023). Thereby, leaving behind many valuable practical lessons:

Firstly, promoting the restructuring of the agricultural sector to create conditions to accelerate the application of science and technology in local agricultural production. Implementing the project to restructure the agricultural sector of Bac Giang province towards increasing added value and sustainable development in the period of 2015 - 2020, it has emphasized: " Promoting the application of science, technology, especially high technology and mechanization to increase productivity and quality of agricultural products; focusing on post-harvest technology stages such as preservation, processing, especially deep processing to increase added value; promoting the application of safe production techniques according to VietGAP standards..." Thereby, it has created a premise for the subjects to mobilize all resources to apply science and technology in local agricultural production in the past time.

The restructuring of the province's agricultural sector is being comprehensively implemented in all areas and types of production and business in local agriculture. In particular, the overarching goal is to strongly shift from extensive development with quantity as the target to improving quality and efficiency expressed in value and profit ; at the same time, it is clearly stated: " Determining science and technology as a consistent solution in the restructuring process, creating a breakthrough in productivity, quality standards, hygiene and safety of agricultural products, contributing to increasing added value and sustainable development,...; actively supporting farmers to connect and access research services, transfer and application of technical advances ". In particular, in Plan No. 685/KH-UBND, dated December 23, 2021 of the Provincial People's Committee on Restructuring the Agricultural Sector for the 2021-2025 period, it was affirmed: "Promoting the transfer and application of science and technology, high technology, digital technology, information technology in all stages of the value chain... encouraging enterprises to invest in research, application and transfer of science and technology in accordance with the market mechanism. Developing the agricultural technology market on the basis of ensuring intellectual property rights..."

Implementing the above Project and Plan, the locality has reviewed, revised, completed and supplemented many support policies, increased investment attraction for research activities and transfer of science and technology; in the period

of 2021-2025, the Province strives to increase the investment budget for local scientific research and agricultural extension by 10% per year. This is an important resource to promote research, transfer and application of science and technology in agricultural production in the locality, which has been effectively implemented in recent years.

Second, supplement and perfect the mechanism and policies to encourage comprehensive application of science and technology in local agricultural production, especially high technology. Plan No. 211/KH-UBND, dated September 30, 2016 of the People's Committee of Bac Giang province on promoting the application of high-tech agriculture in agricultural production in the province in the period of 2016 - 2020, has provided very detailed and specific contents associated with the functions and tasks of each department, branch, and local authorities that need to review and supplement mechanisms and policies for compatibility and suitability. Thereby, it has encouraged entities, especially enterprises, cooperatives, and farm owners to apply advanced technology and CNC in agricultural production; at the same time, build and replicate models of high-tech agriculture in production. Apply digital technology, artificial intelligence (digital economy) to develop smart, modern agriculture... Up to now, the locality has built over 800 agricultural models of high-tech agriculture and effective production (Bac Giang Provincial Statistics Office, 2023).

In order to orient the long-term and sustainable development of the province's agricultural sector on the basis of applying science and technology, especially bringing high-tech products into production; at the same time, creating a basis for authorities at all levels and functional agencies to build and supplement appropriate mechanisms and policies to encourage and promote this process, the Provincial Party Standing Committee issued Resolution No. 130 NQ/TU, dated August 16, 2016 on Promoting the application of science and technology in agricultural production, period 2016-2020, with the goal: " Developing agricultural production of the province in a modern and sustainable direction based on the foundation of application of science and technology, food safety and environmental protection. Forming models of applying modern science and technology in the production of key local agricultural products, with the participation of cooperation and association of economic sectors... Strive to increase productivity by 20%-30% by 2020, and increase added value by 20%-30% compared to 2016. With this goal, it requires agricultural production and business entities to mobilize maximum resources, focus on accelerating the application of modern science and technology in all stages of the agricultural production process in the locality.

Third, develop forms of cooperation, association and large-scale production models to promote the application of science and technology in agricultural production. From the results achieved in the application of science and technology in agricultural production in Bac Giang province, it can be seen that the policy of cooperation, association of production according to sustainable value chains and development of new agricultural production models is reflected throughout the resolutions, strategies, programs and plans for agricultural economic development of the locality. To apply science and technology quickly and comprehensively, it is necessary to have the participation of all types of economic production and business in agriculture on the basis of close association and

cooperation from production to consumption of agricultural products between farmers and cooperatives, cooperative groups; cooperative unions with enterprises... In which, the locality always identifies enterprises as playing a core role, especially in concentrated production areas, specializing in key products, in order to create products of uniform quality on the basis of uniformity in varieties and technical processes and production technology. With those efforts, currently in the whole province, there are 66 enterprises operating in the fields of agriculture, forestry and fishery, an increase of 53.5% compared to 2016; there are 585 agricultural cooperatives, of which 20% participate in product consumption linkage activities according to the value chain, 48 cooperatives apply high-tech in production, along with thousands of cooperatives, production linkages and 427 farms (Bac Giang Provincial Statistics Office, 2023). This is a large-scale agricultural production and business model, with strong resources, is the core part promoting cooperation, linkage and pioneering in applying science and technology to agricultural production in the province.

Fourth, actively train human resources for the application of science and technology in agricultural production in the locality. Clearly aware of the position and significance of human resource quality will determine the success of the industrialization and modernization process of agriculture and rural areas, as well as the application of science and technology in agricultural production in the locality. Bac Giang province has implemented many training and vocational training programs and projects to improve the qualifications of human resources in agriculture and rural areas. According to the Department of Statistics of Bac Giang province, in the period from 2011 to 2020, the whole province recruited and trained more than 321,200 rural workers (including rural youth and farmers directly involved in agricultural production), contributing to increasing the rate of trained workers in Bac Giang from 33.5% in 2010 to 72% in 2021. Of which, the number of workers with certificates reached 27.6%; 100% of workers participating in agricultural vocational training groups find jobs and earn high incomes based on the application of scientific and technological advances to family production or participating in joint ventures, production and agricultural business associations with many effective production models.

With the right policies and methods suitable to actual conditions, Bac Giang has created new breakthroughs in the application of science and technology in agricultural production, promoting the development of the province's agricultural economy towards large-scale, modern, efficient, sustainable commodity production and increasingly deep integration. In 2022, the value of local agricultural, forestry and fishery production is estimated at more than 23.2 trillion VND (at current prices), the highest among the provinces in the Northern Midlands and Mountains, accounting for 14.9% of the local GRDP (Bac Giang Provincial Statistics Office, 2023).

Lessons learned for phu tho province

To promote the application of science and technology in agricultural production, based on the experience of the above localities, according to the author, it is necessary to implement the following solutions:

Firstly, promoting the role of Party committees and authorities at all levels in leading and directing the application of science and technology in agricultural production in localities.

Experience from localities shows that the role of Party committees and authorities at all levels in applying science and technology to agricultural production is very important. Because they are the subjects that plan guidelines, strategies and build programs, plans, and propose mechanisms and policies to promote the application of science and technology to agricultural production in accordance with the actual conditions of the locality. This is a lesson that Bac Giang province has implemented very successfully. Accordingly, to make good use of this experience, first of all, Party committees and authorities at all levels of Phu Tho province need to develop and issue specialized resolutions to lead the task of applying science and technology to agricultural production so that the government and departments, branches and sectors can develop programs and plans to mobilize resources to successfully carry out this task. Along with that, further promote the role of direction, organization, implementation and management of the government system and functional agencies to accelerate the application of science and technology to agricultural production in each locality in the province; effectively perform the role of the "State" in the "5-house" linkage. Phu Tho needs to consider this an important task, requiring the participation with great determination of relevant forces.

Second, proactively research, review, supplement, and perfect mechanisms and policies to promote the application of science and technology in agricultural production in accordance with local realities.

From the experience of applying science and technology to agricultural production of the above provinces, it can be seen that the construction, supplementation and completion of mechanisms and policies to mobilize and maximize the use of resources and create a favorable environment to promote the application of science and technology to agricultural production is very important. To make good use of this experience, Phu Tho province needs to closely follow the guidelines and policies of the Party and State, legal regulations and experiences of localities, conduct reviews, promptly detect shortcomings to build, supplement and complete a synchronous system of mechanisms and policies for the application of science and technology to agricultural production. In particular, it is necessary to Supplement and perfect the financial mechanism and policies in research, transfer and application of science and technology in agricultural production on the basis of concretizing Circular No. 01/2017/TT-BKHCCN, dated January 12, 2017 of the Ministry of Science and Technology detailing a number of articles of Decree No. 54/2016/ND-CP, dated June 14, 2016 of the Government regulating the autonomy mechanism of public science and technology organizations; Circular No. 32/2017/TT-BTC, dated April 20, 2017 of the Ministry of Finance regulating the implementation of the financial autonomy mechanism of public science and technology organizations, in order to ensure openness, convenience, and create the best conditions for scientists to maximize their research ideas to create many useful science and technology

products. On that basis, create conditions for agricultural production and business entities in the Province to have many opportunities to cooperate, access and select scientific and technological products to apply in production.

Third, training and improving the quality of human resources for applying science and technology to agricultural production in the province.

In both theory and practice, the quantity and quality of human resources play a decisive role in the results of applying science and technology to agricultural production, as well as in all other socio-economic fields. Therefore, all policies and strategies for research, development and application of science and technology in agriculture must first of all start from and be closely linked to the policy of training and developing human resources in agriculture. This is also a lesson that localities, especially Bac Giang, have successfully implemented in the past. Applying this lesson, Phu Tho province needs to supplement and perfect the planning of training and developing human resources to suit the labor needs of the agricultural sector in general and for the application of science and technology to agricultural production in particular in each specific period. The planning of training and developing human resources in agriculture needs to have a roadmap and appropriate steps, in order of priority closely linked to the strategy and project of restructuring the agricultural economy of the province.

Along with that, it is necessary to closely combine training and retraining of human resources for the application of science and technology in agricultural production in the province with appropriate contents and forms. Training must be conducted regularly and continuously with many levels and fields of study to meet the rapidly increasing demand for human resources for the application of science and technology in agricultural production, especially highly qualified human resources; at the same time, closely link training with use, research with production to limit the waste of human resources in the agricultural sector. Strengthen training, attract and build a team of leading technical experts in agriculture to effectively organize and implement research activities, transfer and application of science and technology in agricultural production in the locality...

Fourth, mobilize and effectively use investment capital sources for applying science and technology to agricultural production in the province.

Applying lessons learned in mobilizing investment capital for the application of science and technology in agricultural production of localities, Phu Tho needs to develop a plan to mobilize capital from many different channels, including: capital from the central and local budgets; investment capital from domestic and foreign enterprises; capital from the people and loans from credit institutions and banks to create abundant capital for investment in the application of science and technology in agricultural production in the locality.

Fifth, build and develop forms of cooperation, association and innovation of production models to facilitate the acceleration of the application of science and technology in agricultural production in the province.

This is a lesson learned that many localities in the region have successfully implemented. Therefore, in order to apply science and technology to agricultural production in the

province more and more synchronously and comprehensively, localities need to develop forms of cooperation and linkage both vertically and horizontally between types of agricultural production and business, from seed production to care, cultivation, harvesting, preservation, promotion and consumption of agricultural products; linkage between direct agricultural production entities and agricultural material supply establishments (animal feed, fertilizers, pesticides, veterinary drugs) and product consumption units... In the context of Vietnam's agricultural sector integrating more and more deeply, localities need to promote the construction of linkage models between households - cooperatives (unions of cooperatives) - enterprises in the agricultural production process; taking agricultural enterprises as the core, regularly guiding and assisting households, cooperatives and farm and family economy in production, business and technology transfer. On that basis, quickly apply science and technology into production to promote the development of the province's state economy in the direction of integration, efficiency and sustainability.

Sixth, effectively implement the project of restructuring the State economy; supplement the planning for the development of concentrated production areas, applying science and technology, creating momentum to accelerate the application of science and technology in local agricultural production.

This experience has been successfully implemented by some localities, especially Lao Cai province has promoted restructuring associated with supplementing the planning of production areas for endemic crops and livestock; Bac Giang province has implemented a comprehensive restructuring project for the agricultural sector with the goal of shifting from increasing quantity to quality, from developing in breadth to depth... On that basis, localities have mobilized and focused all investment resources, accelerated the application of science and technology in production, prioritized modern and high-tech applications to create agricultural products of good quality, with typical brands of each locality in the province.

To make good use of this lesson, Phu Tho province needs to continue to effectively implement the Action Plan to implement the project "Restructuring the agricultural sector towards increasing added value and sustainable development" and implement the Planning for the development of agriculture, forestry and fishery in Phu Tho province to 2020; Plan for the development of agriculture, forestry and fishery for the period 2021-2025, with a vision to 2030 to create new premises to accelerate the application of science and technology in production.

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