

Original Article

Factors Affecting Fruit Production Development in Tuyen Quang Province, Vietnam

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Abstract: The study surveyed 60 fruit farmers and 30 government officials, experts, and scientists, and used a number of economic research methods to analyze the factors affecting fruit production in Tuyen Quang province. Research results show that the factors of natural conditions, socio-economic conditions of the production area, input factors for production, linkages in fruit production and sale, and market factors affect the development of fruit production in Tuyen Quang province. The study has identified the favorable factors and the remaining problems and difficulties from which to propose solutions to develop fruit production in Tuyen Quang province in the coming time.

Keywords: Fruits, Production, Farms, Influencing Factors, Tuyen Quang, Marketing.

I. GOAL AND METHOD OF RESEARCH

A) Research Goals:

Analyze the factors affecting the production of some main fruits in Tuyen Quang province, from which there are grounds to propose solutions to develop fruit production in the following years.

B) Research Object:

Factors affecting the production of some major fruit trees in Tuyen Quang province such as oranges, grapefruits, bananas, and some other fruit trees.

C) Research Scope:

The data to assess the state of fruit production in Tuyen Quang province was collected in the period of 2019 - 2021. The study was conducted in Tuyen Quang province, an focused on 3 districts: Ham Yen, Yen Son, and Chiem Hoa with the criterion of being the districts with the largest area of fruit trees in Tuyen Quang province.

D) Research Methods

Secondary data has been collected from statistical yearbooks, agricultural industry summary reports, fruit production and consumption reports, research projects, monographs, the internet, articles, and documents related to fruit production and marketing of Tuyen Quang province.

Primary data was investigated, surveyed by questionnaires and in-depth interviews with fruit farms; State officials; scientists, economic experts; organizations and individuals who purchase and consume fruit... to collect information and documents to synthesize and analyze factors affecting fruit production in Tuyen Quang province.

To process information and data, analyze and synthesize results, the study used the following methods: Statistical method; Participatory Rural Appraisal (PRA); In-depth interview.

E) Subject And Samples of Survey

Statistics on the area of fruit trees in the province show that: In 2020, the total area of fruit trees in the province was 20,062 ha. In which the area of key fruit trees was: 8,653 ha of oranges, accounting for 43.1%, distributed mainly in Ham Yen district; 5,200 ha of pomelo, accounting for 25.9%, distributed mainly in Yen Son district; 2,173 hectares of bananas, accounting for 10.8%, are grown mainly in Chiem Hoa district; Other fruit trees were scattered in the districts and cities in the province, each tree has an insignificant area: longan 4.6%; lemon 2.1%; litchi 1.6%; custard apple 1.4%; persimmon 1.3%; dragon fruit 1.1% ... [1].

Based on the number of farms and the area of fruit trees distributed in the province, the study conducted sampling and surveying the farms by stratification method. The number of survey questionnaires is distributed as follows: The total of 60, of which 20 orange farms are surveyed in Ham Yen district; 15 pomelo farms in Yen Son district; 10 banana farms in Chiem Hoa

district; 15 other fruit farms (persimmon, custard apple, longan, litchi, mango, dragon fruit ...) in district/city in Tuyen Quang province.

In addition, the study collected the opinions of 30 experts, including scientists; economic experts; local officials in the agricultural sector such as district agricultural departments; Department of Agricultural and Rural Development; Department of Planning and Investment; Department of Science and Technology; Ham Yen Fruit Tree Center; leaders of enterprises, farms, and cooperatives; leaders of districts, communes, villages ... These are people who have knowledge about fruit tree production development in the province. The survey method was to build a questionnaire on issues related to the development of fruit tree production in Tuyen Quang province such as development programs and policies; advantages, difficulties, opportunities, and challenges in developing fruit production in the study area; solutions to reduce risks, improve economic efficiency and sustainably develop of fruit production in Tuyen Quang province.

II. RESEARCH RESULTS AND DISCUSSION

A) *Natural Conditions Of Fruit Production Areas*

a. **Geographical Location and Topography:**

Tuyen Quang is a northern mountainous province, located between the Northwest and Northeast of Vietnam. Tuyen Quang is located in the center of the Lo River basin. The natural area of the province is 586,790 ha, of which 70% is mountainous. Along with the northern mountainous provinces, Tuyen Quang is the green roof of the Northern Delta. With an area of 369,621 hectares of forest (accounting for 63.08% of the natural area), the province has played a great role in ecology and watershed protection in the Gam and Lo rivers and regulating water sources for Tuyen Quang hydropower project and some other hydropower projects will be built in the near future [2]. The topography of the province is complex, divided by dense river systems, hills and deep valleys forming different types of terrain. The rugged high mountains are mixed with low mountains, rolling hills, narrow valleys and fields along rivers and streams. As a mountainous province, the economy is still underdeveloped and the infrastructure is poor. Due to being deep inland, far from ports, border gates and key economic centers of the country, the exchange of goods and economic links with other provinces still face many difficulties. This is a limiting factor to the development of fruit farms in the province.

b. **Climate:**

Tuyen Quang has a tropical monsoon climate, influenced by the continental climate of North Asia, China, with two distinct seasons a year: cold - dry winter; Summer is hot and humid - lots of rain. This climate feature is suitable for the growth of tropical crops such as citrus, grapefruit, longan, litchi, persimmon, and custard apple... Total annual average radiation is 80 - 85 kcal/cm². , the average annual heat is 8000 - 8500oC. The average temperature in the year ranges from 22-24oC, the average highest temperature is from 33-35oC, and the average lowest temperature is from 12-13oC. The coldest months are December and January causing frost. Rainstorms concentrate from May to August and often cause flash floods. Phenomena such as hails and whirlwinds often occur in the rainy season. The average annual rainfall is from 1,500 to 1,800 mm and is quite stable. The average annual humidity is 85%, very suitable for tropical forest trees, green all year round. Rain and heat regimes are suitable for the development of fruit trees, especially orange trees [3]. To develop fruit tree production in the province, it is necessary to select plants suitable to the soil and climatic conditions of the region. At the same time, there are measures to prevent risks caused by extreme weather phenomena such as flash floods, hail, whirlwinds, and hoarfrost...

c. **Water Resources:**

Tuyen Quang has a fairly dense system of rivers and streams, distributed relatively evenly among regions, with a very large surface water source, 10 times higher than the current demand for water for agricultural production and daily life. The annual rainfall is quite large along with water from the basins of Lo River, Gam River, Pho Day River and many large and small streams. The province has newly built Na Hang and Chiem Hoa hydropower reservoirs, plus nearly 2,000 ponds and lakes with water all year round, which has created abundant water resources for the province, about 5.5 billion m³/year. On average, for every 1 ha of natural land, there are 9m rivers and streams and 9,375 m³ of water [3]. The groundwater is abundant, available throughout the province and of good quality, meeting the standards for daily living. The groundwater level is not deep and relatively stable, which is convenient for exploitation, even simple exploitation in people's daily life. However, groundwater is not evenly distributed according to geological composition. In order to develop fruit production, it is necessary to build an irrigation system to exploit abundant underground water sources for production and daily life of farms, especially in high mountainous areas with steep slopes.

d. **Biological Resources:**

Tuyen Quang has a diverse forest flora system, the province has about 760 species of 349 genera, 126 families belonging to 8 branches of higher plants, including many rare and precious plant species. Tuyen Quang has a number of special-use forests, valuable for scientific research and for eco-tourism in the future [3]. Tuyen Quang province has a large

forest area compared to the natural area. The land is suitable for many fruit trees including orange trees. The province has conditions to build a system of protection forests and create high-value commodity economic forests. Developing fruit production in the province should focus on plants that are adapted to the ecological environment, while conserving biodiversity, in association with building protection forests and developing eco-tourism.

B) Socio-Economic Conditions of Fruit Production Areas

a. Land:

Of the total natural land area of the province, the area of agricultural and forestry land accounts for 92.07%. Up to now, the province has formed concentrated agricultural production areas including 8,735 ha of tea, 10,380 ha of sugarcane, 5,092 ha of peanuts, 4,430 ha of oranges and 129,000 ha of material plantations [4]. With land resources quite diverse in groups and types, the province has many agro-forestry ecological sub-regions suitable for many types of crops. As for the area of land suitable for the development of fruit trees, orange is the dominant crop. According to the results of soil classification for fruit trees, the area of land suitable for growing oranges in the province is 5,726 ha, distributed in two districts of Ham Yen and Chiem Hoa. This land area has been included in the planning of concentrated orange production areas of the province [5]. However, in fact, people in many communes outside the planning area have planted 2,340 hectares of oranges, this area also gives the same yield and quality of oranges as the communes in the planning area.

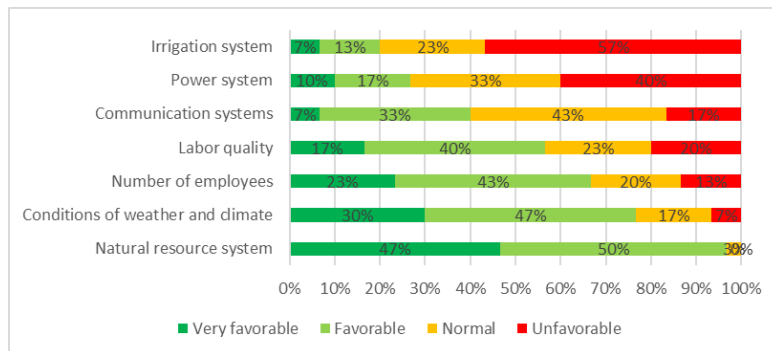
b. Population:

Currently, Tuyen Quang province's population is 773,512 people, with 198,175 households, of which the rural population accounts for 86.3%, the population density is 131.8 people/km². In the province, there are 23 ethnic groups living together, the Kinh ethnic group is the largest, accounting for 48.21%; Ethnic minorities include Tay, Dao, San Chay, Mong, Nung, San Diu,... Population is unevenly distributed, the highest population density is concentrated in Tuyen Quang city with 810.6 people/km², while some mountainous districts have very low population density such as Na Hang (51.8 people/km²) and Lam Binh (40.5 people/km²). The average number of people is the lowest in Tuyen Quang city (3.4 people/household), while some mountainous districts have the highest average number of people, such as Na Hang (4.3 people/household) and Lam Binh (4.6 people/household) [4]. The proportion of female population in the province accounted for 51.1%, higher than the proportion of male population of 48.9%. The proportion of rural population in the province accounts for 86.3%, so only 13.7% of the urban population. Most of the mountainous districts have a rural population of over 90%, especially Lam Binh district with 100% of the rural population.

c. Labor:

According to statistics of Tuyen Quang province, the labor force aged 15 and over is 483,502 people, accounting for 63% of the province's population. Most are laborers working in the agro-forestry sector, accounting for 88.07% of the total number of employees. The rate of trained workers is 15.7% (male of 18.21%, female of 13.26%). The rate of employees working is 63% [4]. The statistics show that Tuyen Quang province has an abundant labor source, which is a great potential for the development of fruit production areas in particular and the development of the agricultural industry in general. However, the quality of the labor force is still low and the unemployment rate is still high. It is necessary to have a strategy to train and use this workforce for socio-economic development of the province.

The study conducted a survey of experts, scientists, and local officials about the favorable level of natural - economic - social conditions that affect the development of fruit production in the province. The summary of the survey results is shown in Chart 2.2.



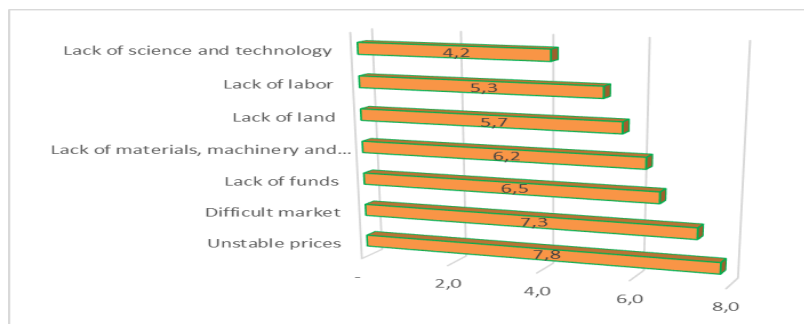
Source: Surveyed data in 2022

Chart 2.2. Opinions on the natural, economic and social conditions affecting the development of fruit production in Tuyen Quang province

The data show that factors have varying degrees of favoritism. The most favorable factor is that the province has a system of natural resources such as soil, land, and ecological environment that is favorable and suitable for the growth of some surveyed fruit trees, up to 97% of opinions rate this factor as favorable and very favorable. The second favorable factor is weather and climate conditions, with the rate of favorable and very favorable comments being 77%. These are also factors that help the production of fruit tree farms in Tuyen Quang province achieve high productivity and quality. Regarding the labor factor, 66% of the respondents rated the large number of employees who are willing to participate in fruit production and marketing activities when the farms have a need to hire. However, the quality of labor is rated lower, with 13% saying that the quality of labor is not favorable for the development of fruit farms. The factors of infrastructure conditions serving fruit production areas are assessed as facing many difficulties, with 17% of opinions saying that the communication system is not favorable; 40% said that the power system is not favorable; In particular, up to 57% of comments assessed that the irrigation system serving fruit farms in the province is still limited.

C) Input Factors For Fruit Production

The study surveyed the opinions of 60 farmers about difficulties in fruit production. Using a scale from 1 to 10, the higher the score, the more difficult it is to evaluate, then calculate the average score for each assessment content, the data are presented in Chart 2.3.

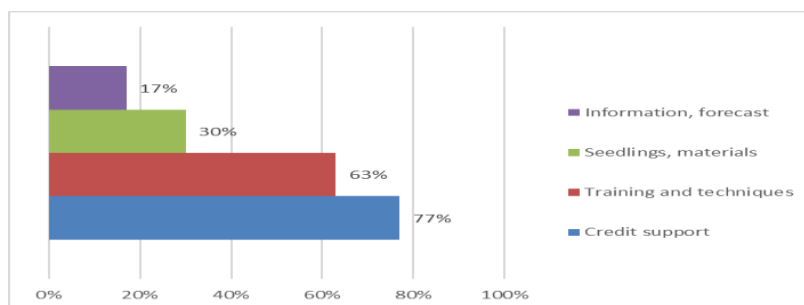


Source: Surveyed data in 2022

Chart 2.3. Difficulty level of factors related to Production and business conditions of fruit farms

The surveyed farms have the most difficulty in selling products, with the most difficult scores being unstable selling prices (7.8/10) and difficult selling markets (7.3/10). Lack of capital, lack of materials, machinery and equipment are assessed as difficult, having limited influence on the development ability of surveyed farms. The factors of land area, labor, science and technology are also shortcomings and limitations that need to be resolved to develop fruit farms.

The study surveyed how experts assessed the technical, capital, and information support provided by local authorities to fruit farmers. A summary of good and very good ratings is presented on Chart 2.4.



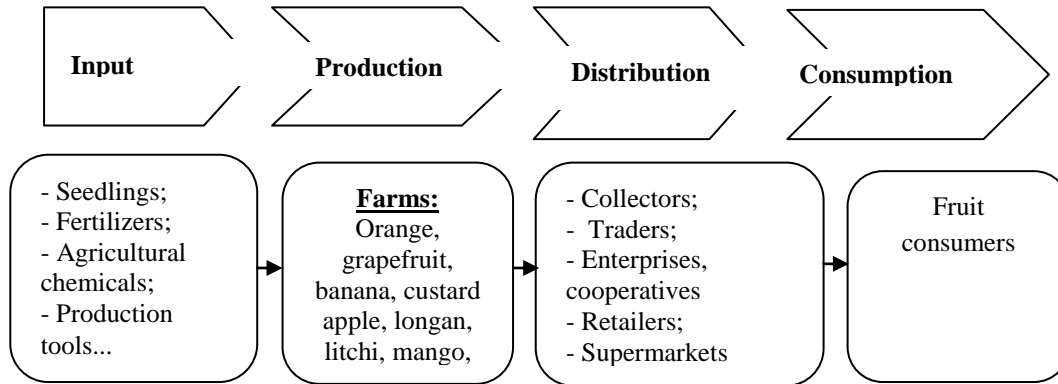
Source: Surveyed data in 2022

Chart 2.4. Percentage of opinions on local government support to develop fruit production in Tuyen Quang province (rating: good or very good)

The data shows that the local government has a fairly good level of support for credit activities with a rating of good and very good of 77%. Next is the quality of technical support through training and transfer of science and technology, with a rating of good and very good of 63%. Activities to support the supply of seedlings, materials and inputs for the production of the farms are assessed at a low level, only 30% of the reviews are responsive. For the support of local authorities in providing market information, forecasting possible risks for fruit farmers which is rated at the lowest level of support, when only 17% reviews that the farm owners received this support from the local government.

D) Linkages between Takeholders In Fruit Production And Marketing

Through the survey, the takeholders participated in the value chain of fruit of the province include: farmers, suppliers, collectors, businesses, cooperatives, traders, retailers, and consumers.



Source: Surveyed data in 2022

Diagram 2.1. Tuyen Quang province’s fruit supply chain

Distribution channels have been formed. However, the linkages in fruit marketing for farms are still few and not tight. There are very few fruit sales contracts. The collection, transportation, supply and sale of fruit still go through many intermediary stages, going through many stages of loading, unloading, carrying and transporting, leading to a high loss rate. This poses a risk to the stakeholders involved in the production and marketing of fresh fruit. The province's fruit supply chain is undeveloped. In fact, there is no factory to preserve, process or export fruit. Therefore, the fruit is consumed entirely in the form of fresh fruit in the domestic market. Only bananas are exported to the Chinese market through small-scale traders, and there are no export contracts.

The study conducted a survey of experts' opinions: "According to you, in order to develop fruit production in Tuyen Quang province, which linkage relationship should be strengthened between stakeholders in the fruit value chain?" (Arranged in order of priority from 1 to 5). The survey results are summarized in Table 2.1.

Table 2.1. Opinions on the strengthening of linkages in fruit production and marketing

Linkages	Priority levels (Priority descends from 1 to 5)					Total
	1	2	3	4	5	
Farm – Farm	33%	27%	33%	7%	0%	100%
Farm – Supplier	27%	27%	30%	10%	7%	100%
Farm – Enterprise, cooperative	37%	33%	30%	0%	0%	100%
Farm – Government	0%	7%	10%	43%	40%	100%
Farm – Scientist	0%	7%	3%	40%	50%	100%

Source: Surveyed data in 2022

The survey results show that, in the linkages of fruit production and marketing of farms, most experts say that the strongest need to strengthen is the linkage relationship "Farm - Enterprise, Cooperative", with the percentage of opinions at priority 1 and 2 being 70%. Next is the need to strengthen the linkage relationship "Farm - Farm" to create a concentrated fruit production area, uniform in quality, design, price, and meet domestic fruit standards, and aims for export markets. The "Farm-Supplier" relationship is rated the third most important in the linkages, with the percentage of opinions rated at a priority level of 1 and 2 is 54%.

E) Market Factors

The study investigated the market factors that affect the production and sale of fruit by farmers. Depending on the type of fruit, there are different harvest seasons and consumption markets.

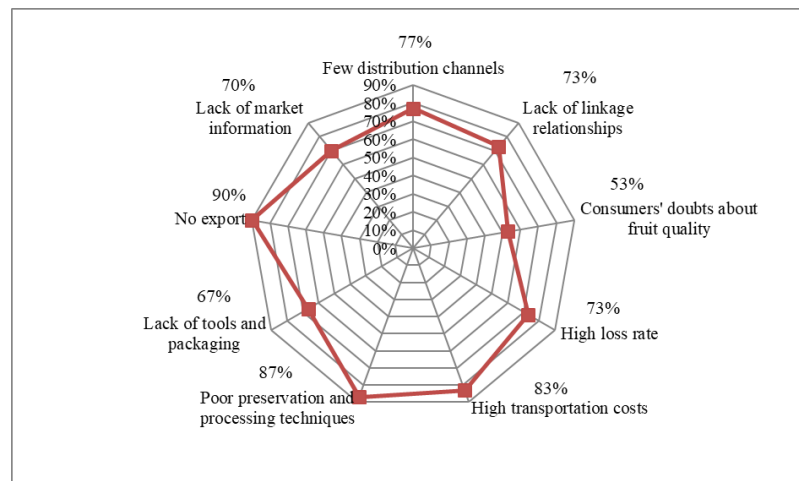
For oranges, typically Ham Yen oranges, channels for purchasing, transporting and distributing products have been established, but only in the domestic market. Up to 87% of Ham Yen orange output is sold through the following channels: Orange farms => Long distance traders => Provincial wholesale markets => Retailers => Domestic consumers [6]. In October 2020, the National Office of Intellectual Property signed a decision to certify the registration of geographical indications for the

product "Ham Yen orange". This is an important step in the journey of building a brand for the oranges of Tuyen Quang province. The local government has established and promoted the activities of Ham Yen Orange Cooperative, Ham Yen Orange Association, and Ham Yen Orange Joint Stock Company to strengthen linkages in the production and marketing of Ham Yen oranges. The government also creates conditions for these units to use the brand "Ham Yen orange" to advertise, promote and sell products. Up to now, these units have connected and put Ham Yen oranges for sale at supermarkets such as BigC, Coopmart, Metro, and Fivimart... [7]. However, the volume of oranges put into the supermarket system is still very small, accounting for only about 5% of the total harvested orange output. Thus, to promote orange production and marketing activities, in addition to maintaining traditional sales channels, it is necessary to exploit new distribution channels with great potential. The establishment of a factory to preserve, process, and export oranges is necessary in order to develop orange sales channels in the domestic market and towards export.

For pomelo, the farms are concentrated in Phuc Ninh, Xuan Van, Thang Quan, Tu Quan, and Tan Long communes of Yen Son district - Tuyen Quang province. In 2015, traders cut pomelos in the garden and paid the farm gate price of 18,000 - 20,000 VND/fruit. The high price of pomelo brings great economic efficiency, leading to the situation of "hot growth". People expanded the area planted to pomelos, causing a sharp increase in output, and a sharp drop in the price of pomelo until 2019. The National Office of Intellectual Property has recognized the trademark for Phuc Ninh Specialty Grapefruit. The province has established Phuc Ninh Agriculture and Forestry Cooperative to support pomelo production for farms. The cooperative has distributed 3,000 product labels and made packaging out of carton boxes for members of the cooperative. The local government has carried out advertising, introduction and product quality assurance activities, and has implemented policies to support farmers in training techniques in planting, caring, harvesting, and preserving pomelos. There have been many training courses, and science and technology transfer in pomelo production, and many models of pomelo production with high economic efficiency have been built. However, the collective label of Phuc Ninh Specialty Grapefruit has not fully expressed the specific characteristics and quality of pomelo grown in Phuc Ninh commune, Yen Son district. Therefore, it is necessary to register a geographical indication for Phuc Ninh pomelo, which helps to fully represent the characteristics, geographical indications and specialty brands of the pomelo growing region.

As for other fruits, because the production scale is still fragmented and small, the volume of fruit produced is still small, so the local authorities have not yet built up trademarks and geographical indications for this fruit. Particularly, bananas with a relatively large output have been purchased by traders for export to the Chinese market through unofficial channels. However, there are no purchase contracts, the price is unstable and depends heavily on the policy changes of the importing country and the decisions of the traders. Other fruits such as jackfruit, custard apple, persimmon, longan, lychee, and mango ... have small production output, so the farms themselves produce, harvest and sell the fruits mainly in the local market.

The study surveyed opinions about the difficulty of market factors affecting the development of fruit production in Tuyen Quang province, the results are presented in Chart 2.1.



Source: Surveyed data in 2022

Chart 2.1. Percentage of opinions assessing the difficulty of market factors for fruit production development in Tuyen Quang province

The survey results show that among the market factors, the most difficult thing is that the province's fruit cannot be exported, with a rate of 90% of the opinions. Next is the difficult problem of poor preservation and processing techniques, with an assessment

rate of 87%. The third most difficult factor is the high cost of fruit transportation and distribution. More than 70% of the respondents said that the development of fruit production still faces difficulties at the market stage. When information about the market is lacking. Distribution channels are few. The linkages in fruit production and marketing are weak and unsustainable. The rate of fruit damage and loss is high during harvesting and distribution. In addition, there are some other difficulties such as a lack of tools and packaging in harvesting, transporting, and selling fruits. Consumers still have doubts about the quality, food safety, and origin of fruits, so they are not ready to buy or pay low prices. These are difficult issues to be solved to promote the development of fruit production in Tuyen Quang province.

III. CONCLUSION

The study analyzed the factors affecting the development of fruit production in Tuyen Quang province, identifying favorable factors and remaining problems and difficulties. On that basis, to propose solutions to develop fruit production in Tuyen Quang province. Some suggestions are as follows:

Select fruit trees suitable to the soil and climate conditions of the region, and at the same time take measures to prevent risks caused by extreme weather phenomena such as flash floods, hail, whirlwinds, and hoarfrost. ...

To build irrigation systems to exploit abundant underground water sources for production and daily life of farms, especially in high mountain areas with steep slopes.

Focusing on fruit trees that are adapted to the ecological environment, while conserving biodiversity, in association with building protection forests and developing eco-tourism.

Having a strategy to train and use agricultural labor force to serve the development of concentrated fruit production areas of the province.

Invest in infrastructure to serve fruit production areas, focusing on traffic, electricity, communication, and irrigation systems, and build factories to collect, preserve, process, and export fruits.

Support farmers to sell fruits; market expansion; support capital, materials, tools, and machines for production; provide market information; forecast possible risks for fruit tree farmers.

Strengthen training and transfer of science, techniques, and technology to the growers in the province.

Strengthening the 4-party linkage relationship: State - Scientists - Farmers - Entrepreneurs, through seminars, conferences, signed minutes, and business cooperation contracts on fruit production and marketing.

Assess the market, find business partners, and negotiate and sign contracts to bring the province's fruits into the system of supermarkets, domestic fruit shops, and fruit export businesses.

Acknowledgments: This study was supported by Tan Trao University.

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