

Factors Influencing the Development of Lychee Production According to Gap Standards: A Study in Bac Giang Province, Viet Nam

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Abstract

Bac Giang's GAP-compliant lychee production has expanded in both area and output value throughout the years. There have been projects in the design of safe lychee and hi-tech planning policies, including lychee, as well as State support for production and consumption, trade promotion, and consumption of lychee in the nation. conscious. The process of developing lychee production areas in accordance with GAP standards still faces numerous difficulties and obstacles, such as the following: policies are not synchronised and effective; planning is not tight and stable; infrastructure and supply of materials have not met production requirements; production equipment and tools are limited; tree care, pest control, and plant protection are not in accordance with the production process and have not met the requirements for grocer certification. The qualifications and quality of the labour force are still inadequate; production and consumption of lychee are not closely linked, and there is equivalence between regular and GAP lychee; Lychee has a brand identity, but the market is still challenging. Households have not yet properly adhered to the GAP-required procedure for producing lychee, which makes exporting lychee fruit difficult and GAP-compliant lychee production risky and unpredictable. The study identified and studied the influence of the following elements: planning, infrastructure, market considerations, production resources, application of science and technology with beneficial effects, and fostering the growth of fabric manufacturing, less than GAP requirements. The development of lychee production in accordance with GAP standards is hindered by a number of negative factors, including temperature, rainfall, infrastructure, the execution of legislation, and producers' access to their capacity and resources.

Keywords: lychee production, development, GAP standards.

1. Introduction:

Agriculture is a material production industry that supplies items for human consumption; therefore, it holds a significant position in every nation and at every stage of development. Agricultural production (Agricultural production) occurs on a large scale and has direct environmental effects. In

addition, agricultural products have a direct impact on human health, prompting many industrialised nations to implement stringent rules governing the production and quality of agricultural products.

In recent years, the Party and State of Vietnam have paid special attention to the development of GAP-compliant production in

order to fulfil the increasing expectations of customers and to enhance exports in order to increase the industry's value. agriculture (Luu Hoai Chuan, 2012). In order to achieve the aforementioned policy, the Ministry of Agriculture and Rural Development (MARD) published the VietGAP production process for several agricultural production enterprises in Vietnam and gradually upgraded selected crops to GlobalGAP and standards (Huynh Truong Vinh, 2012).

Bac Giang is a mountainous region that provides a number of advantages for cultivating fruit trees, especially lychee. Although the overall area of fabric reduced somewhat from 2016 to 2019, the structure of manufacturing types shifted in the direction of enhancing safety. Specifically, in 2019 the total area was 28,318 hectares and the output was 155 thousand tonnes; the area of lychee produced according to VietGAP standards increased from 12,800 ha in 2016 (representing 43 percent) to 14,300 ha in 2019 (representing 50.5%) and was produced in accordance with good agricultural practise standards. GlobalGAP is responsible for the maintenance of 218 hectares (Bac Giang Province People's Committee, 2019).

Thus, it is evident that the development of lychee in accordance with GAP standards in the province of Bac Giang is essential for the development and expansion of lychee production in accordance with GAP standards, and is also an essential source of documents for establishing lychee quality. The evolution of fruit trees in the future. The purpose of the project is to address the following research questions: What is involved in developing lychee production in

accordance with GAP standards? What is the present status of GAP-compliant lychee production development in Bac Giang province? What are the primary elements influencing the growth of lychee production in Bac Giang province in accordance with GAP standards? What are the primary solutions to be adopted in the near future to develop lychee production in accordance with GAP standards in the province of Bac Giang?

2. Literature review, Theoretical framework and Methods:

(i) Clearly present the research overview and related theoretical background; According to the framework of analysis, the research on developing lychee under GAP standards is (i) growth in production scale and structural change; (ii) changes in the forms of production organization and linkages; (iii) improvement in productivity and output; (iv) organize the consumption of lychee according to GAP standards; (v) evaluate the results and efficiency of lychee production according to GAP standards. Along with that, the research focuses on 7 groups of factors affecting the development of lychee according to GAP standards.

Methods of regression analysis

The thesis uses the Frontier functions to determine the technical efficiency of lychee grower households in order to reflect the synthesis of technical factors that affect the lychee yield of the household as well as other factors. factors affecting their acceptance of growing lychee according to VietGAP and GlobalGAP procedures. The author uses the stochastic marginal production function model to determine the technical efficiency,

which is estimated on the software Frontier 4.1 (Tim, 2017).

The stochastic marginal production function model is as follows:

$$Y_i = f(X_{ij}; B_j) \text{Exp}(V_i - U_i) \quad (1)$$

In which: V_i is the random error, $V_i \sim N(0, \sigma_v^2)$

U_i is the part of the technical inefficiencies.

The above model reflects the actual values (Y_i) bounded by the line :

$$Y^* = f(X_{ji}; B) \text{Exp}(V_i). \quad (2)$$

The technical efficiency is then determined as follows:

$$\begin{aligned} TE_i &= Y_i / Y_i^* = f(X_{ji}; B) \text{Exp}(V_i - U_i) / f(X_{ji}; B) \text{Exp}(V_i) \\ &= \text{Exp}(-U_i). \end{aligned} \quad (3)$$

In this study, we use a Cobb Douglass production function (double log or log-log). As follows:

$$\ln(Y) = B_0 + B_1 \ln X_1 + B_2 \ln X_2 + B_3 \ln X_3 + B_4 \ln X_4 + B_5 \ln X_5 + B_6 \ln X_6 + B_7 \ln X_7 + B_8 \ln X_8 + B_9 \ln X_9 + B_{10} \ln X_{10} + V_i - U_i \quad (4)$$

In which: Dependent variable: $\ln(Y)$ with Y : lychee yield (ton/ha);

Independent variables: Amount of nitrogen fertilizer (X_1), amount of phosphate fertilizer (X_2), amount of potassium fertilizer used (X_3), amount of manure (X_4), volume of microbial fertilizer (X_5), volume of foliar fertilizer (X_6), quantity of fruit fertilizer (X_7), amount of lime (X_8), amount of pesticide use (X_9) and number of labor (X_{10}).

Technical efficiency is determined as follows:

$$TE = \frac{\text{Actual yield}}{\text{Potential yield (theoretical highest yield)}} = e^{-u_i} \quad (5)$$

After determining the technical efficiency, the study uses a regression model to determine the factors affecting the technical efficiency of households in lychee production. The model is as follows:

$$TE = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \gamma_1 D_1 + \gamma_2 D_2 + \varepsilon \quad (6)$$

Dependent variable: TE (technical efficiency of each household); Independent variable: area (Z_1 , the higher the area, the higher the ability to achieve technical efficiency thanks to specialization), the education level of the household head (Z_2 - the owner with a higher degree will be more favorable). more for applying science and technology, and increasing technical efficiency); number of years of growing lychee by the household (Z_3 households with more experience are likely to achieve higher technical efficiency); training participation status in 2018 ($D_1 = 1$ if participating) (households participating in training are likely to achieve higher technical efficiency through the application of techniques in production); households participating in production according to GAP standards ($D_2 = 1$ if GAP is applied) (GAP participating households are likely to achieve higher technical efficiency by applying GAP criteria).

3.4.6. Quantification of influencing factors

The thesis uses a binary logit model to determine the factors affecting households' decision to participate in production according to GAP standards.

The binary logit regression model has the form:

$$G(Z) = \frac{e^Z}{1 + e^Z} \text{ with}$$

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{15} X_{15} + \varepsilon \quad (7)$$

In which: $G(Z) = 1$ for households engaged in lychee production according to GAP standards;

Independent variables include: $X_1=1$ is the household's perception of profit benefits when participating in GAP; $X_2=1$ is the household with awareness of competitive benefits when participating in GAP; $X_3 = 1$ is a household with cost-benefit awareness; $X_4 = 1$ is a household with awareness of safety for producers; $X_5 = 1$ is the household's awareness of safety for consumers; X_6 : Fabric production area of the household; X_7 : Age of household head; X_8 : Number of years of schooling of the household head; X_9 : Number of years of experience in fabric production of the household head; $X_{10} = 1$ means that the household is aware that the production of lychee according to GAP standards is due to customer requirements; $X_{11} = 1$ is a household in the GAP production area planning; $X_{12} = 1$ is the participating household to receive material support; $X_{13} = 1$ is a household participating to receive consumption support; $X_{14}=1$ is the household to receive technical support; $X_{15} = 1$ is the

participating household to receive the certificate.

The marginal effect represents the marginal effect of the independent variables X_j to Z (applicability or not of GAP in lychee production), and is calculated according to the following formula:

$$\text{Marginal Effects} = \frac{\partial G}{\partial X_j} = G(\beta_0 + \sum \beta_j X_j) \beta_j$$

3. Results and discussion:

3.1. Situation of development of lychee production according to gap standards in Bac Giang province

3.1.1. Growth in production scale and structural change

During the period 2015-2019, total lychee output in Bac Giang province declined from 185,219 tonnes to 155,818 tonnes at an average annual rate of 4.23 percent. In 2017, the total production of lychee was less than half of what it was in 2015, primarily due to a decline in land area and weather-related crop failure. GlobalGAP lychee production decreases by 1.77 percent, while NonGAP lychee production decreases by 8.3 percent. Particularly, VietGAP lychee production expanded at a rate of 0.68 percent over the years.

Although the total area and output of lychee in Bac Giang province fell between 2015 and 2019, the area and output of lychee produced in accordance with Good Agricultural Practice (GAP) standards tend to improve marginally. in addition to being more stable than NonGAP fabric. In addition, there has been a positive shift in crop structure, but the area and yield of GAP early-ripening lychee tend to fluctuate and decline with time.

The structure of lychee varieties has shifted in the direction of increasing production and quality, and is now conducive to farmers' efforts at propagation. This demonstrates that the trend of developing lychee in Bac Giang province in accordance with GAP standards is a sensible one, consistent with the development of the agricultural sector as a whole, which is to develop production in the direction of goods, ensuring food safety and hygiene, and being environmentally friendly and export-oriented.

3.1.2. Change the form of production organization and form of association

In Bac Giang, a big number of cooperative groups and cooperatives produce lychee in order to comply with GAP production regulations. In 2015, there were 1,410 cooperative groups and 159 cooperatives in the province; by 2019, there were 1,623 cooperative groups and 196 cooperatives, and by 2019, a number of cooperative groups had been issued production certificates in accordance with the criteria. 558 GAP requirements have been met by 149 recognised cooperatives. Although the number of cooperative groups and cooperatives producing lychee in Bac Giang has increased, the number of cooperative groups and cooperatives that have not yet received a certificate of production in accordance with GAP standards is very high (1,065 organisations). cooperatives and 47 cooperatives). Therefore, in the near future, in order to promote the development of lychee production according to GAP standards, local authorities at all levels will require solutions to support groups of cooperatives and cooperatives that have not yet been granted certificates and need to focus on production in

accordance with the correct process, as well as completing the documents and procedures to apply for a certificate.

The organisation of lychee production in Bac Giang in accordance with GAP criteria is rapidly transitioning from cooperative groups to cooperatives. Certified homes produce more lychee than unlicensed families because they are familiar with the procedures for caring for, documenting, and monitoring the lychee production process. However, the territory and output of cooperative groups and cooperatives that have not been certified to produce lychee is still quite considerable. These are the obstacles that exist in the development of lychee production in accordance with GAP standards. In the next years, local authorities will need to find a solution, such as establishing better relationships with enterprises in the areas of product traceability, labelling, and export protection.

Improve productivity and quality of lychee according to GAP standards

GAP lychee production showed similar variations with a fall of roughly 3.1 to 3.2 tonnes in 2017, but soon recovered to approximately 8 tons/ha the following year, which was much higher than the average level of NonGAP lychee (6.3 tons/ha). In addition to excellent weather conditions in 2018, the implementation of GAP methods played a significant influence in boosting the lychee yield of VietGAP households relative to NonGAP households. After many years of applying skilled and experienced skills when applying the GAP process to production, the household's lychee growing techniques, such as trimming, spraying, tending, and harvesting, etc., have been applied to

production very effectively. Farmers in Bac Giang province have considerably improved lychee productivity, as well as the quality and beauty of lychee fruit, as a result of the techniques of rooting, pruning, and the transmission of experience and care practises through extension training courses.

Consumers are becoming increasingly interested in lychees with labels and certificates of food hygiene and safety, according to a survey of the selection criteria for lychees on local and international markets. When asked why customers choose to use lychee according to GAP standards, they respond that lychee according to GAP standards has a delicious flavour and is healthy. However, customers do not concur with the available reasons to purchase, therefore the domestic market remains a target for lychee producers. Therefore, prospects for cultivating lychee in accordance with GAP criteria are progressively emphasised.

Organization of lychee consumption according to GAP standards

In accordance with GAP and Non-GAP criteria, lychee consumption from 2015 to 2019 demonstrates a downward trend of about 10,5 percent in domestic consumption and an upward trend of 3,6 percent in exports. The province's total product consumption declined by more than 4 percent, although not because of a decline in export demand.

In recent years, the export market has exhibited an upward tendency; in 2019, export lychee will account for 55 percent of the market, while domestic lychee will account for 45 percent. The Chinese market is the traditional market for lychee exports, accounting for 98 percent of total sales

(Appendix 3.4). Prior to 2018, all shipments to China were conducted informally. Following the signing of the Memorandum of Understanding, Bac Giang lychee was exported through official channels to China in 2019, achieving the norms and quality requirements. The production and consumption of lychee made a significant contribution to the country's economic growth. Create circumstances and encourage the development of production, businesses, and supplementary services concurrently (Department of Agriculture and Rural Development, 2019).

In Bac Giang province, there are 6 main consumption channels, of which 3 are consumed with domestic consumers and 3 are consumed with foreign consumers.

Research on the supply chain map of lychee consumption according to GAP criteria in Bac Giang province (Figure 4.2) indicates that, from 2016 to the present, lychee exports have not only relied on the Chinese market, but have also been exported to a number of discerning markets (USA, Australia, Japan, ...). 85 percent of GAP-compliant lychee is consumed via collection/wholesale activities, while 5 percent is consumed via cooperatives to domestic supermarkets. The remaining 10% of lychee volume is used by firms serving markets with stringent quality standards.

3.2. Factors affecting the development of lychee production according to GAP standards in Bac Giang province

4.2.1. Production planning and policy system

According to the survey, surveyed households highly appreciate the information and communication system in lychee

production according to GAP standards with over 80% of households rating it as good and very good.

According to the actual investigation, in addition to the agricultural extension of the commune closely monitoring the pest situation, the routine care and harvesting process is also announced directly by the commune over the loudspeaker system in the villages and communes, so that both the farmers and the pests are aware of the process. This information is available to all farms that adhere to GAP and Non-GAP standards. In addition, the direction, inspection, and oversight of the GAP process by the employees of the Department of Agriculture and Rural Development and the Department of Agricultural Extension are essential for strict household compliance. This work is also assessed relatively favourably by households, with almost fifty percent of families holding positive or excellent ratings. With more than 63 percent of households classed as average, poor, or extremely poor, efforts to promote connectivity and public services have been largely unappreciated.

Observably, Bac Giang province's policies to boost lychee production in accordance with Good Agricultural Practices (GAP) focus mostly on the production stage; there are no innovative policies to attract firms to participate in processing and lychee consumption. In the near future, the absence of a master plan and vision for the development of lychee production in accordance with GAP standards throughout the period 2020-2030 may have an impact on the province's focus on agricultural product development.

4.2.2. Infrastructure system

Bac Giang's infrastructure for the growth of lychee production in general and lychee production according to GAP standards is now quite insufficient and unable to meet the people's production development needs. To encourage the development of lychee production according to local GAP standards in the near future, the province of Bac Giang requires specific solutions to upgrade and renovate the infrastructure system, particularly the transportation system and the electricity system, in areas that plan to develop lychee production according to local GAP standards. Since then, GAP-compliant lychee growing sites have been constructed progressively, while infrastructure has been developed and enterprises have been enticed to participate in GAP-compliant lychee production and consumption.

4.2.3. Market factors

4.2.3.1. Input market factors

Bac Giang's fertiliser and pesticide sector is now exceedingly difficult to regulate. On the market, there are still fertilisers and herbicides of inferior quality. Consequently, many cooperatives and cooperative groups have trouble determining whether the purchased fertilisers and pesticides are of comparable quality to those purchased by homeowners. According to handling number 492/QĐ-XPVPHC dated March 17, 2020 on the act of producing fertilisers without certificates of production fertiliser eligibility, even well-known businesses such as Greefam and Ha Bac fertiliser continue to breach the law. In addition, many homes trading in fertilisers and plant protection medications purchase fertilisers that do not satisfy quality standards and pack them on their own, which has a

direct impact on the productivity of lychee-growing families. People believe that the quality of pesticides and fertilisers used to grow lychee cannot be assured.

4.2.3.2. Output market factors

There are now over 20 lychee-growing countries in the world, of which Asian countries have the highest acreage and production, accounting for around 95% of the entire world lychee production; China and India account for approximately 57% and 24% of the total lychee production, respectively. Vietnam's production amounts for around 6% of the global total and ranks third in terms of output. The predicted global lychee production for 2015 is 2,6 million tonnes per year. Large numbers of lychees are harvested from May to July in the Northern Hemisphere, primarily in major producing nations such as China, India, Vietnam, Thailand, and Taiwan. Less lychee is produced in the Southern Hemisphere, primarily in Australia, South Africa, Madagascar, and Mauritius, from November to February (Vietnam Trade Office in Australia, 2015). In instance, the lychee season in Vietnam corresponds with that of China, Taiwan, Thailand, India, and the United States. However, lychee from Vietnam is today considered to be of high quality and inexpensive compared to lychee from other nations.

When exported, Vietnamese lychee goods can compete with those of other nations. As previously discussed, however, Vietnam's post-harvest preservation technology and logics are still inadequate, and it can take up to four days to freeze fresh Vietnamese lychees for export. Similarly to the findings of An Hien (2020), transportation

costs from Bac Giang to Ho Chi Minh City are very expensive (about 80 million VND), thus the cost of exporting fresh lychee products to other markets is rather high. It is challenging for other markets to compete with foreign cloth items, particularly those from China. This has slowed the development of Bac Giang's GlobalGAP-compliant lychee production in recent years, while Vietnam has exported lychee to numerous countries other than China.

Bac Giang lychees are available in over 30 countries worldwide, primarily in frozen form, with the Chinese market accounting for 90 percent of the yearly export volume. Currently, the Chinese market is also more stringent, requiring a planting area code for all Vietnamese fruit goods that wish to be shipped to this market. In addition, lychee fruits imported into this country must be trimmed to a length of less than 15 centimetres, the leaves must be left intact, and the box must not exceed 38 centimetres in height. In addition, the cloth containers have sufficient labels with product, packing facility, exporter, importer, etc. information. Customs clearance will be denied if the producer does not match the requirements.

As previously discussed, exporting to high-demand countries such as the United States, Europe, or Japan is challenging due to issues in preservation and high domestic transit costs; hence, few companies are interested in selling to these areas. Via air, lychee is transported at a cost of up to \$3 per kilogramme; by sea, the cost is approximately \$50 per tonne less. According to Thanh Tam (2019), the cost of lychee shipped to Europe in 2018 was 192 thousand VND/kg (Figure 4.1), making it challenging for Vietnam's

lychee to compete with that of China. The second problem of this industry is that products must be irradiated, and there are strict criteria for factory standards, raw material quality, and product quality. Therefore, Bac Giang lychee must implement Israel's most cutting-edge processing technology, bringing frozen lychee products to the world's most demanding markets. It is also a strategy for Bac Giang to improve the international standing of Vietnamese lychee.

4. SOLUTIONS FOR DEVELOPMENT OF LICENSE PRODUCTION BY GAP STANDARDS IN BAC GIANG PROVINCE

Encourage the development of linkage and cooperation models in lychee production and consumption according to GAP standards

Taking families as the fundamental agricultural unit, it is vital to concentrate on assisting households to develop their gardens and boost their production of safe, high-quality textiles. In addition, service zones are urged to supply inputs: materials, fertilisers, etc., and forms of cooperation throughout fruit harvesting, processing, and packing stages. Particularly for plant varieties that are the property of seed production facilities, households are required to sign contracts to purchase production types and manage them with strictness. Open programmes, conferences, and model demonstrations for households to aid one another in production, share production capital, and exchange production experiences.

On the basis of households, it is necessary to continue to expand the types of farm economy, produce goods under contract, have a high level of commodity production, a

large number of goods, and be able to apply applying technical and technological advances to the production of safety lychee.

It is necessary to form soon in the area a number of production and consumption service organizations, such as fertilizer and pesticide material service companies, quality assurance, trading companies in charge of lychee fruit product consumption, agricultural banks provide loans for lychee production in the area, becoming a concentrated safe agricultural production area.

Actively collaborating with companies to establish a sustainable production chain. The connection between firms and farmer households in cooperative groups/cooperatives will foster the growth of lychee production under GAP. This connection will offer advantages for both parties: enterprises with sufficient financial resources and management capabilities to maintain and expand the market... Farm households play a crucial part in the manufacturing of goods. In order to meet GAP standards, it is necessary to organise large-scale production in conjunction with chain enterprises, assisting in the creation of products and goods that meet the requirements of supplying to supermarkets and for export; have a cooperative attitude in business and seek links; maintain a good reputation and adhere to cooperation contracts so as to avoid contract breaches.

(2) Building and completing the lychee consumption network according to GAP standards

For local fruit products, the province and district must have a marketing strategy, cooperative organisations and production farmers must understand the market and have

specialised solutions for promotion and advertising.

Organize information activities on the market, organize market forecast, to help concentrated lychee production households have conditions to consume fruit products.

Having policies to encourage companies, businesses, and private businesses to purchase and sign contracts with farmers and purchase fruit products in the locality.

Attracting processing enterprises to invest in processing factories or to purchase lychee to turn into quality lychee products such as bottled lychee juice, lychee vinegar, etc. to diversify products. from lychee, both to reduce the burden on fresh fruit consumption, thereby increasing the value of lychee production according to GAP standards.

Consumption of lychee products occurs through indirect means. Therefore, it is vital to arrange for farmers in the district to have access to the consumer market and to learn about consumer psychology in cities outside of the province and surrounding areas. Through the launch of products, contracts for the production and consumption of lychee will be established.

Luc Ngan's lychee products have been granted a certificate of geographical indication by the State, which is an advantage to boost competitiveness and expand the consumption market to the international market. The first is to expand lychee production and export food-safe lychee.

(3) Develop a market information system and trade promotion for lychee areas according to GAP standards

Effectively directing the implementation of Decision 80/2002/QĐ-TTg dated June 24, 2002. Promote trade

promotion, construct processing facilities, and construct and safeguard product brands. It has been demonstrated that trade promotion activities have a favourable effect on the growth of lychee production in accordance with GAP criteria. However, according to the perspective of GAP producers, the inconsistent output of GAP products continues to pose significant challenges for product consumption. The state has taken beneficial initiatives in the past, such as organising trade fairs and customer conferences and sponsoring stamps and identifying labels for businesses to promote and market their products. Developing a website to promote lychee items related with ecotourism in the region.

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Appendix:

Table 1. Lychee production of Bac Giang province in the period of 2015-2019

Targets	Output (tons)					TDPT BQ (%)
	2015	2016	2017	2018	2019	
1. Early ripening lychee	40.125	42.852	40.000	43.740	38.760	99,14
VietGAP	5.374	5.569	4.106	4.521	3.932	92,49
NonGAP	34.751	37.283	35.894	39.219	34.828	100,06
2. Main season lychee	145.094	108.670	51.821	156.716	117.058	94,77
GlobalGAP	1.524	1.565	700	1.744	1.419	98,23
VietGAP	71.186	60.459	35.894	104.575	74.718	101,22
NonGAP	72.384	46.646	15.227	50.397	40.921	86,71
3. Total	185.219	151.522	91.821	200.456	155.818	95,77
GlobalGAP	1.524	1.565	700	1.744	1.419	98,23
VietGAP	76.559	66.028	40.000	109.096	78.650	100,68
NonGAP	107.135	83.929	51.121	89.616	75.749	91,70

Source: Bac Giang Statistical Office (2020), Bac Giang Department of Agriculture and Rural Development (2020)

Table 2. Forms of organization of lychee production according to GAP standards in the period of 2015 -2019

Organizational form of production	Unit	Number of units					TDPTBQ (%)
		2015	2016	2017	2018	2019	
1. Cooperation group	Group	1410	1446	1468	1518	1623	103,58
Certified	%	32,7	32,6	33,1	32,4	34,4	104,89
Uncertified	%	67,3	67,4	66,9	67,6	65,6	102,92
2. Cooperative	Cooperative	159	174	179	193	196	105,37
Certified	%	73,6	74,1	73,7	75,1	76,0	106,23
Uncertified	%	26,4	25,9	26,3	24,9	24,0	102,85

Source: Bac Giang Department of Agriculture and Rural Development (2020)

Table 3. Lychee yield according to GAP and NonGAP standards by harvest time period 2015 - 2019

Targets	Yield (quintal/ha)					TDPTBQ (%)
	Year 2015	Year 2016	Year 2017	Year 2018	Year 2019	

1. Early ripening lychee	69,42	71,42	66,67	72,90	64,60	98,22
VietGAP	71,65	74,25	68,43	75,35	65,54	97,80
NonGAP	69,09	71,02	66,47	72,63	64,50	98,30
2. Main season lychee	57,44	46,28	23,43	70,11	52,91	97,97
GlobalGAP	69,93	71,81	32,10	80,00	65,10	98,23
VietGAP	61,56	50,18	28,95	78,89	55,42	97,41
NonGAP	53,70	41,60	16,03	56,75	48,57	97,52
3. Average	59,67	51,40	32,60	70,70	55,02	98,00
GlobalGAP	69,93	71,81	32,10	80,00	65,10	98,23
VietGAP	62,17	51,59	30,77	78,74	55,85	97,36
NonGAP	57,88	50,98	34,20	62,76	54,04	98,30

Source: Bac Giang Statistical Office (2020), Bac Giang Department of Agriculture and Rural Development (2020)

**Table 4. Results of lychee consumption according to GAP and NonGAP standards
period 2015 - 2019**

Targets	Weight (1000 tons)					TDPTBQ (%)
	Year 2015	Year 2016	Year 2017	Year 2018	Year 2019	
1. Domestic	105,95	82,73	44,90	94,70	68,11	89,54
VietGAP	36,07	26,27	15,03	35,87	25,82	91,99
NonGAP	69,88	56,47	29,87	58,83	42,29	88,20
2. Export	70,01	63,03	41,87	98,74	80,85	103,67
GlobalGAP	1,45	1,50	0,66	1,69	1,36	98,49
VietGAP	36,89	37,32	23,04	69,75	49,59	107,68
NonGAP	31,67	24,21	18,17	27,29	29,89	98,57
3. Total	175,96	145,76	86,77	193,44	148,96	95,92
GlobalGAP	1,45	1,50	0,66	1,69	1,36	98,49
VietGAP	72,96	63,59	38,06	105,62	75,42	100,83
NonGAP	101,55	80,67	48,04	86,13	72,18	91,82

Source: Bac Giang Department of Agriculture and Rural Development (2020)

Channel 1



Channel 2

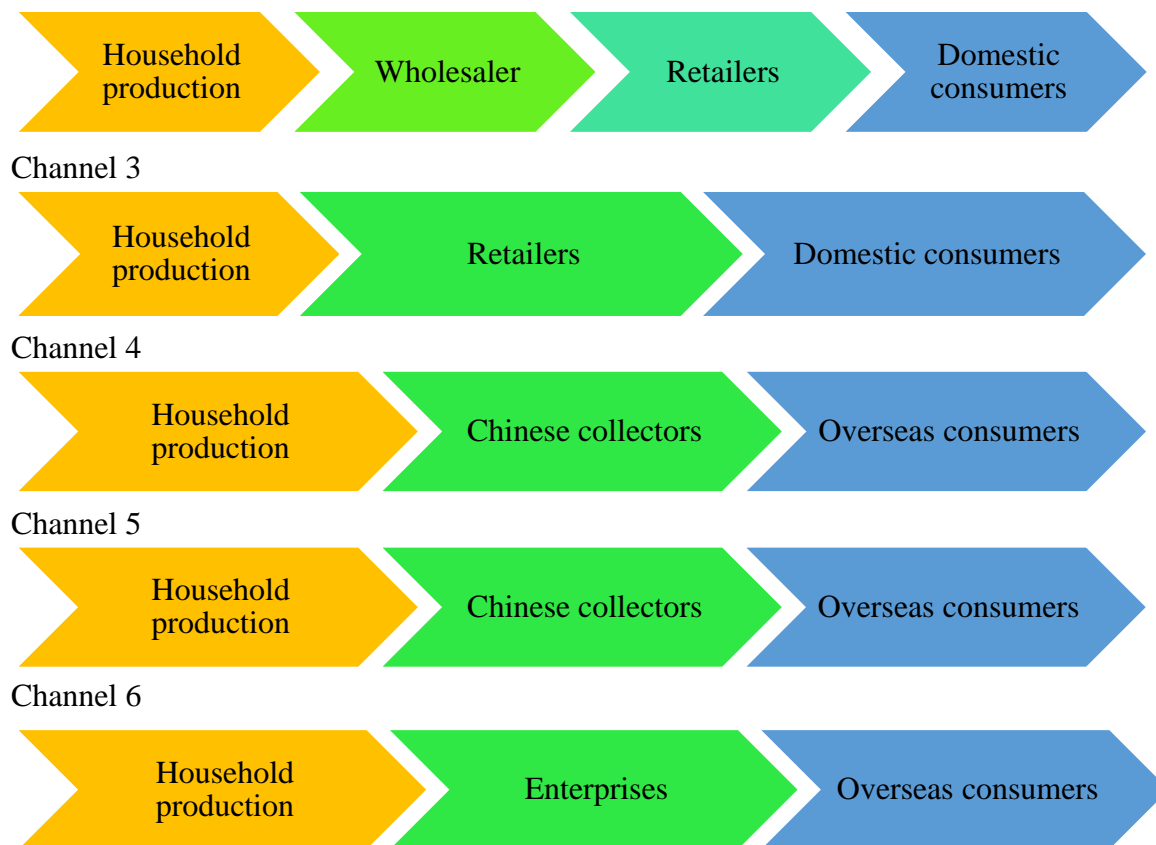


Figure 1. The distribution channel of lychee according to GAP standards in the area of Bac Giang province

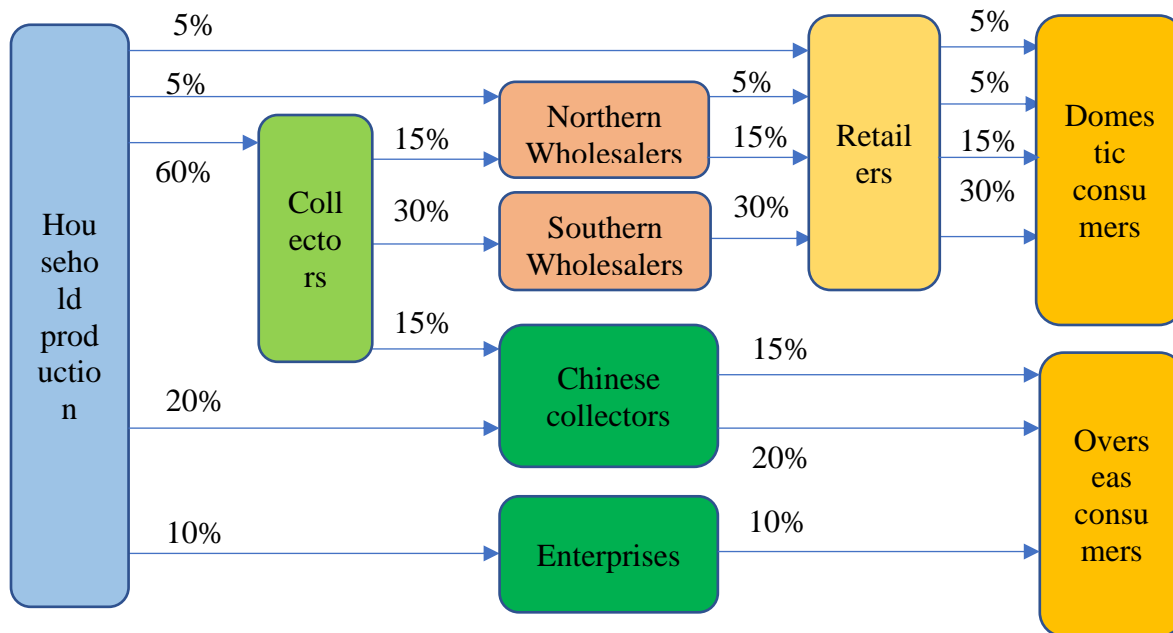


Figure 2. Supply chain diagram for lychee consumption according to GAP standards in Bac Giang province

Table 5. Household's assessment of the State's policy for lychee production according to GAP standards

Unit: %

Targets	GAP Household			NonGAP (n=105)	
	GlobalGAP (n=53)	VietGAP (n=242)	Shared (n=295)		
1. Information and communication					
- Very good	69,81	59,92	61,69	20,00	
- Good	11,32	21,07	19,32	28,57	
- Medium	18,87	18,18	18,31	42,86	
- Poor	0,00	0,41	0,34	7,62	
- Very poor	0,00	0,41	0,34	0,95	
2. Public Service					
- Very good	22,64	7,44	10,17	4,76	
- Good	18,87	29,75	27,80	28,57	
- Medium	50,94	51,65	51,53	54,29	
- Poor	7,55	7,85	7,80	11,43	
- Very poor	0,00	3,31	2,71	0,95	
3. Affiliate support policy					
- Very good	33,96	10,33	14,58	9,52	
- Good	13,21	19,42	18,31	17,14	
- Medium	47,17	60,33	57,97	54,29	
- Poor	5,66	6,20	6,10	12,38	
- Very poor	0,00	3,72	3,05	6,67	
4. Directing, inspecting and supervising					
- Very good	22,64	12,40	14,24	19,05	
- Good	28,30	36,36	34,92	20,00	
- Medium	30,19	35,54	34,58	40,95	
- Poor	18,87	10,33	11,86	8,57	
- Very poor	0,00	5,37	4,41	11,43	

Table 6. Comparison of lychee crops between Vietnam and other countries in the world

Countries	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
<i>Northern Hemisphere</i>												
China												
Taiwan												
Vietnam												
Thailand												

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India												
Israel												
Mexico												
USA												
<i>Southern Hemisphere</i>												
Australia												
South Africa												
Madagascar												
Mauritius												
Brazil												

Source: Vietnam Trade Office in Australia (2015)