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# IMPROVING THE ECONOMIC EFFICIENCY OF GRAPEFRUIT FARMS IN PHUC NINH COMMUNE - YEN SON DISTRICT - TUYEN QUANG PROVINCE

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**Abstract**:

The study surveyed 90 grapefruit farms in Phuc Ninh commune, Yen Son district, Tuyen Quang province and adopted a number of economic research methods to evaluate and analyze factors affecting the economic efficiency of grapefruit production. The results of the study show that grapefruit is a fruit tree with high economic value, a key crop, contributing to income growth, poverty reduction for people in Phuc Ninh commune. In recent years, the area, productivity, and output of grapefruits of farms in Phuc Ninh commune have been constantly increasing. However, the selling price is not stable, the market for products is difficult, leading to the economic efficiency of grapefruit production of farmers is not high and unsustainable. The research results also show that a number of factors positively influence the economic efficiency of grapefruit production of farms, such as production scale, investment capital, VietGap model, age of grapefruit trees, and product-selling time. On that basis, the study proposed a number of solutions to improve the economic efficiency of grapefruit production of farms in Phuc Ninh commune.

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# NÂNG CAO HIỆU QUẢ KINH TẾ CỦA CÁC TRANG TRẠI TRỒNG BƯỞI Ở XÃ PHÚC NINH - HUYỆN YÊN SƠN - TỈNH TUYÊN QUANG

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**Thông tin bài viết**

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*Quả bưởi; Hiệu quả kinh tế; Trang trại trồng bưởi, Bưởi Phúc Ninh; Tuyên Quang.*

**Tóm tắt**

Nghiên cứu đã khảo sát 90 trang trại trồng bưởi ở xã Phúc Ninh huyện Yên Sơn, tỉnh Tuyên Quang và sử dụng một số phương pháp nghiên cứu kinh tế để đánh giá và phân tích các yếu tố ảnh hưởng đến hiệu quả kinh tế trong sản xuất bưởi. Kết quả nghiên cứu cho thấy bưởi là cây ăn quả có giá trị kinh tế cao, là cây trồng chủ lực, góp phần tăng thu nhập, xóa đói giảm nghèo cho người dân ở xã Phúc Ninh. Những năm gần đây, diện tích, năng suất và sản lượng bưởi của các trang trại ở xã Phúc Ninh không ngừng gia tăng. Tuy nhiên giá bán không ổn định, thị trường tiêu thụ sản phẩm khó khăn dẫn đến hiệu quả kinh tế sản xuất bưởi của trang trại chưa cao và không bền vững. Kết quả nghiên cứu cũng chỉ ra rằng một số yếu tố có ảnh hưởng tích cực đến hiệu quả kinh tế sản xuất bưởi của trang trại như quy mô sản xuất, nguồn vốn đầu tư, mô hình VietGap, độ tuổi của cây bưởi và thời điểm tiêu thụ. Trên cơ sở đó, nghiên cứu đã đề xuất một số giải pháp nhằm nâng cao hiệu quả kinh tế trong sản xuất bưởi của các trang trại ở xã Phúc Ninh.

## Part I – INTRODUCTION

### 1.1. Why is it necessary to study this issue?

Phuc Ninh is a mountainous commune in Yen Son district, Tuyen Quang province, with the main agroforestry economy. The commune has favorable and suitable natural conditions for developing several agricultural products in the direction of commodity production, especially grapefruit (Yen Son District People's Committee, 2021.a). Grapefruit has been grown for a long time and is one of the commune's key crops, with high economic value, bringing high income for farmers, helping to alleviate poverty, creating jobs for countryside laborers. Phuc Ninh commune currently has nearly 1,000 hectares of grapefruits, of which nearly 500 hectares are being harvested. In 2021, the total income from grapefruit of farmers in the commune will reach nearly 180 billion VND (Phuc Ninh Commune People's Committee, 2021.b). To build the brand of ***"Phuc Ninh Grapefruit",*** many goals and plans are being actively implemented by the locality to affirm the brand of clean and safe agricultural products. However, the grapefruit production of farmers in the commune still faces many difficulties in terms of seeds, fertilizers, care techniques, unstable productivity, and difficulty in selling products. The focal point of selling products is mainly traders, the linkage in production and marketing of products is still limited. Grapefruits must be sold immediately after being harvested, harvesting and selling of products are highly seasonal. Economic efficiency in grapefruit production of farmers is not optimal compared to its inherent potential. These are difficult issues that need to be solved to develop grapefruit production to ensure sustainability and bring high economic efficiency for farmers. These are the reasons why this study should be conducted.

### 1.2. Objectives of the study

The study focuses on evaluating and analyzing the economic efficiency in grapefruit production of farmers in Phuc Ninh commune, thereby proposing some key solutions to improve the economic efficiency in grapefruit production of farmers.

**1.3. Object and scope of the study**

- Research object: economic efficiency of grapefruit production of farmers in Phuc Ninh commune, Yen Son district, Tuyen Quang province.

- Research scope: Secondary data were collected in 3 years 2019, 2020, 2021. Primary data were surveyed collected in 2021 and aggregated in 2022.

**1.4. Research Methods**

- Secondary data are collected from reports on socio-economic development of Phuc Ninh Commune People's Committee, Agriculture Department of Yen Son district, DARD of Tuyen Quang province, People's Committee of Tuyen Quang province, research topics, articles Science, monographs, textbooks on the Library of Tan Trao University, and the internet.

- Primary data is surveyed by questionnaires, in-depth interviews with grapefruit farmers in Phuc Ninh commune (90 farmers); And state managers, scientists, and economic experts (30 people). The purpose is to collect information and documents to synthesize, analyze and evaluate the content and economic indicators within the research scope of this study.

- In this study, the following economic research methods were used: statistical method; questionnaire survey; expert method (in-depth interview); and economic accounting method.

**Part II – RESEARCH RESULTS AND DISCUSSION**

**2.1. Overview of production and marketing of grapefruit in Phuc Ninh commune**

Grapefruit is a fruit tree with high economic value in Phuc Ninh commune. In recent years, grapefruit has become a favorite fruit of many consumers, contributing to increasing income and being a rich tree for many farmers in the commune (Phuc Ninh Commune People's Committee, 2021.a). In 2021, the grapefruit growing area of Phuc Ninh commune will reach 995 hectares (24% of the grapefruit area of Yen Son district), of which the grapefruit area for harvest is 600 hectares, with nearly 500 grapefruit growers (Yen Son People's Committee, 2021.b). The fluctuation in area, productivity, output, and value of grapefruit production in Phuc Ninh commune in the period of 2019 - 2021 is summarized in Table 1.

**Table 1. Area, productivity, output, and value of grapefruit production in Phuc Ninh commune in the period of 2019 - 2021**

| No. | Indicators | Unit | 2019 | 2020 | 2021 | 2020/2019 | 2021/2020 | BQ |
|---|---|---|---|---|---|---|---|---|
| 1 | Grapefruit growing area | Ha | 920 | 985 | 995 | 107 | 101 | 104 |
| 2 | Grapefruit harvested area | Ha | 420 | 490 | 600 | 116.7 | 122.4 | 119.5 |
| 3 | Productivity | Thousand fruits/ha | 25.6 | 27.2 | 28.8 | 106.2 | 105.9 | 106 |
| 4 | Quantity | Thousand fruits | 10.752 | 13,328 | 17,280 | 123.9 | 129.6 | 126.7 |
| 5 | Average selling price | 1000VND/fruit | 15 | 13.5 | 9 | 90 | 66.7 | 78.3 |
| 6 | Grapefruit production value | Billions dong | 161.3 | 179.9 | 155.5 | 111.5 | 86.4 | 98.9 |

*(Source: 2021 statistics)*

The figures in Table 2.1 show that the area, productivity and output of grapefruit in Phuc Ninh commune have continuously increased over the years. But when productivity and output increase, the selling price of products decreases, and farm owners have difficulty in selling products. Currently, Phuc Ninh commune has 27.5 hectares of grapefruits produced according to VietGap standards, this model is also being continued to be expanded. The local government has collaborated with scientists to study more about the soil, breeding techniques, and the process of caring for, harvesting and preserving grapefruit to develop grapefruit production effectively and sustainably. The investment in intensive farming, pest control, application of scientific and technical advances to production is being focused on by farmers, so the quality and design of grapefruits have been improved. The yield of grapefruit increased

from 25. 6 thousand fruits/ha in 2019 to 28.8 thousand fruits/ha in 2021. However, there are still many farm owners who have not paid attention to care techniques such as pruning, garden cleaning, care procedures, fertilizing, watering, and pest control for grapefruit in a reasonable way. There are farmers who use only inorganic fertilizers leading to shortened plant life, soil degradation, and reduced product quality. Following the direction of the local government, the area of grapefruit in the whole commune is expected to expand further and increase the grapefruit growing area according to VieGap standards (DARD of Tuyen Quang province, 2021). However, the further expansion of the grapefruit production area needs to be associated with the planning on preservation, processing, and expansion of the consumption market, otherwise, it will lead to a situation of "good harvest but low price" like many fruit-producing regions of Vietnam.

Grapefruit harvest is mainly done by hand, not yet applied mechanized machines. To ensure that the grapefruit is not crushed, scratched, causing rot or damage, is required the harvester rows up the tree to pick fruits or use homemade long-handled racquets or long handle scissors (2m - 3m) to cut each fruit. Then they are put in boxes, bags and carried from the garden to the place of collection. Fresh grapefruits are easily damaged due to bumps and scratches, while there are no activities to preserve and process grapefruits. In grapefruit orchards planted on sloping land, at high altitudes, far from roads, transportation is mainly by sacks and carriers, leading to high labor costs.


**Figure 2.1. Some pictures of Phuc Ninh grapefruit production and marketing**

*(Photo: http://dacsantuyenquang.com.vn)*

For grapefruits after harvest, only 16.7% of farmers use foam nets and foam boxes to pack grapefruits for selling. The rest, mainly grapefruits are collected and then packed, carried, and rushed to the gathering point for delivery to traders. Through the survey, 100% of grapefruits farmers do not use any preservatives for grapefruits, this ensures food safety and protects consumers' health. Consumption of grapefruits is entirely in the form of fresh fruit, which has not been preserved or processed and is consumed entirely in the domestic market, without any export activities. The survey shows that there are currently no businesses involved in the production and marketing of grapefruits for farmers. The production of grapefruit in the commune is not large enough, the output of grapefruit is not much for businesses or investors to build factories, cold storage to preserve, process, and export grapefruit. After harvesting, grapefruits must be sold immediately at low and unstable prices and consumed in a short period, so seasonality in harvesting and selling is high.

Regarding product trademark registration, the National Office of Intellectual Property has recognized the trademark Grapefruit specialty of Phuc Ninh. The commune has established Phuc Ninh Agriculture and Forestry Cooperative engaged in grapefruit production and trading. The cooperative has been put into operation, has supported the grapefruit farmers, and has distributed 3,000 product labels, printed packaging in carton boxes for members of the cooperative, associated product promotion and warranty.

The local government has also implemented a policy to support training on techniques for growing, caring, harvesting, and preserving grapefrui. Currently, more than a thousand farmers have benefited from training and transfer of science and technology in grapefruit production. The commune has built many models of grapefruit production with high economic efficiency.

### 2.2. Evaluation of economic efficiency of farmers' grapefruit production in Phuc Ninh

#### *2.2.1. General characteristics of surveyed grapefruit farms*

The surveyed grapefruit farms have characteristics such as age, education level, experience, demographics, labor, planted area,... that affect economic efficiency in grapefruit production of farmers, summarized in Table 2 below:

**Table 2. Basic characteristics of surveyed grapefruit farms**

| No. | Indicators | Unit | The average value |
|---|---|---|---|
| 1 | Number of surveyed farms | farm | 90 |
| 2 | The average age of farm owner | age | 46.3 |
| 3 | Educational level of farm owner | class | 8.7 |
| 4 | Number of years of experience growing grapefruit | year | 8.9 |
| 5 | The average number of people | person/ farm | 4.7 |
| 6 | The average number of employees | person/ farm | 2.55 |
| 7 | The average area of grapefruit orchard | ha/ farm | 1.3 |
| 8 | Percentage of farmers borrowing capital for grapefruit production | % | 54 |
| 9 | Income from growing grapefruit/Total income of the farm | % | 81 |

*Source: Survey data in 2021*

The survey data shows that the basic characteristics of grapefruit farms are as follows: the average age of the farm owners is 46.3 years old, this is the ripe age, converging the factors on intelligence, physical strength, experience, capital as well as social relationships, attachment and long-term cooperation of the farm owners with other actors involved in the production and business of grapefruit.

The average educational level of the farm owners is 8.7/12 classes, this is the low average level of education and is one of the factors limiting the absorption of science and technology application into production and marketing. However, the number of years of grapefruit growing experience of them is relatively high, reaching an average of 8.9 years, which is a favorable factor, reflecting the accumulation of knowledge, experience, and techniques in grapefruit production of the farm owners.

The average number of people per farm is 4.7 people/farm, which shows the characteristics of a multi-generational rural family in Vietnam, while the average number of employees is 2.5 people/ farm, meaning a high proportion of elderly, children, followers. The low number of workers also creates the need for associations in hiring seasonal workers.

The average area for grapefruit orchards is 1.3 ha/ farm, this area is also eligible for farmers to develop production and business into grapefruit concentrated, large-scale farms. Up to 54% of surveyed farmers borrow capital for grapefruit production. The main income of the surveyed farms is from grapefruit, accounting for 81% of the total annual income of the farm. These data show that farms in the study area have focused their resources on grapefruit production in the direction of specialization. These are also necessary conditions for the development of grapefruit production in the direction for export, improve economic efficiency in grapefruit farmers.

#### *2.2.2. Cost for grapefruit production*

The production and business costs of grapefruits of farmers are accounted for in two stages:

**** Basic construction stage:***

The cost for the basic construction stage is relatively large, including the cost of seedlings, materials, labor to take care of and improve the land, etc. This period lasts about 3 years. Survey data on the cost of growing grapefruit in the basic construction stage is summarized in Table 3.

**Table 3. Grapefruit production cost in the basic construction stage**

*(Calculated for 1 hectare of newly planted grapefruit)* *(Unit: 1000 VND)*

| No. | Expense items | Newly planting | 1st-year care | 2nd-year care | 3rd-year care | Total |
|---|---|---|---|---|---|---|
| **1** | **Breed** | **9,000** | **900** | **-** | **-** | **9,900** |
| **2** | **Supplies** | **28.064** | **22,730** | **28,090** | **34.284** | **113.168** |
| 2.1 | Manure | 17,254 | 12,963 | 15.120 | 17.854 | 63,191 |
| 2.2 | Nitrogen | - | 972 | 1.296 | 1,530 | 3,796 |
| 2.3 | Phosphorus | 1.626 | 1.294 | 1.634 | 2,160 | 6.716 |
| 2.4 | Potassium | 1.134 | 1.234 | 1.358 | 1.518 | 5.244 |
| 2.5 | Lime powder | 80 | 95 | 95 | 95 | 360 |
| 2.6 | Soil treatment drugs, chemical drugs | 513 | 250 | 300 | 300 | 1.368 |
| 2.7 | Pesticides | 735 | 735 | 1.110 | 1,470 | 4,050 |
| 2.8 | Borrowed capital | 2.484 | 4.687 | 6,947 | 8.857 | 22,975 |
| 2.9 | Other expenses (land improvement) | 4.238 | 500 | 500 | 500 | 5,838 |
| **3** | **Labor cost** | **30,623** | **14,173** | **16.858** | **19,960** | **81,614** |
| | **Total cost** | **67,687** | **37.803** | **44,948** | **54,244** | **204.682** |

*Source: Survey data in 2021*

In this stage, the grapefruit orchard has not been harvested yet, and the grapefruit grower has not had any revenue to cover the cost. In economic accounting, costs incurred in the basic construction phase are aggregated into the value of fixed assets, which will be gradually allocated to production and business cost throughout the business period through garden fixed asset depreciation. The average estimated time of harvest period of the surveyed farms is 15 years, the average amortization is 13,645,400 VND/year. However, in the production of grapefruit, the optimal harvest period is 10 years, so it is necessary to apply a reasonable depreciation method to increase the depreciation of grapefruit orchards into the annual cost. This is essential for farmers to soon recover their investments and plant new ones to achieve productivity, product quality and improve economic efficiency in the grapefruit production of farmers.

** Business stage (grapefruit harvest):*

The items of production costs incurred during the business period are summarized in Table 4. In which the cost items account for a large proportion that the grapefruit grower must invest in, including material costs, labor costs, and orchard depreciation.

**Table 4. Grapefruit production costs in the business period**

*(Calculated for 1 hectare of grapefruit in harvest period)*

| No. | Cost items | Production cost (1000 VND) | | | Compare (%) | | |
|---|---|---|---|---|---|---|---|
| | | 2019 | 2020 | 2021 | 2020/2019 | 2021/2020 | BQ |
| **1** | **Cost of materials** | **44.378** | **47.812** | **50,191** | **107.7** | **104.9** | **106.3** |
| 1.1 | Manure | 19,260 | 20.214 | 21.074 | 110.1 | 104.1 | 107.1 |
| 1.2 | Nitrogen | 3.536 | 3,808 | 4.080 | 107.7 | 107.1 | 107.4 |
| 1.3 | Phosphorus | 3.172 | 3.362 | 3.483 | 106 | 103.6 | 104.8 |
| 1.4 | Potassium | 3,744 | 4.032 | 4,320 | 107.1 | 107.7 | 107.4 |
| 1.5 | Soybean | 7.890 | 8.160 | 8,350 | 103.4 | 102.3 | 102.8 |
| 1.6 | Lime powder | 333 | 350 | 350 | 105.2 | 100 | 102.6 |
| 1.7 | Herbicide | 494 | 520 | 547 | 105.3 | 105.3 | 105.3 |
| 1.8 | Pesticides | 5.245 | 6.625 | 7.207 | 126.3 | 108.8 | 117.5 |
| 1.9 | Other costs | 704 | 741 | 780 | 105.3 | 105.3 | 105.3 |
| **2** | **Labor costs** | **30.122** | **31,892** | **32.758** | **105.9** | **102.7** | **104.3** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.1 | Pesticide spraying | 7.008 | 7.379 | 7.656 | 103.1 | 105.3 | 104.2 |
| 2.2 | Fertilization | 4,936 | 5.185 | 5.232 | 105 | 101 | 103 |
| 2.3 | Sprinklers | 1,592 | 1.697 | 1,793 | 106.6 | 105.6 | 106.1 |
| 2.4 | Manual weeding | 1,984 | 1,992 | 2.083 | 100.4 | 104.6 | 102.5 |
| 2.5 | Spray herbicides | 1.473 | 1.493 | 1.552 | 101.4 | 103.9 | 102.6 |
| 2.6 | Prune branches, create a canopy | 815 | 850 | 882 | 104.3 | 103.8 | 104 |
| 2.7 | Harvest | 9.887 | 10,632 | 10,796 | 107.5 | 101.5 | 104.5 |
| 2.8 | Garden cleaning | 1.389 | 1.472 | 1.481 | 106 | 100.6 | 103.3 |
| 2.9 | Other | 1.038 | 1.192 | 1.283 | 114.8 | 107.6 | 111.2 |
| **3** | **Other costs** | **24,217** | **24.094** | **23.835** | **99.5** | **98.9** | **99.2** |
| 3.1 | Depreciation of orchards | 13,645 | 13,645 | 13,645 | 100.0 | 100.0 | 100.0 |
| 3.2 | Depreciation of machinery | 1.378 | 1.378 | 1.378 | 100.0 | 100.0 | 100.0 |
| 3.3 | Tools and equipment cost | 1.342 | 1.491 | 1.624 | 111.1 | 108.9 | 110 |
| 3.4 | Electricity, water, services purchased from outside | 750 | 770 | 840 | 104 | 109.1 | 106.5 |
| 3.6 | Loan cost | 5.843 | 5.474 | 4,834 | 93.7 | 88.3 | 91 |
| 3.7 | Other costs | 1.259 | 1.334 | 1.514 | 106 | 113.5 | 109.7 |
| **Total cost** | | **98.717** | **103,798** | **106.784** | **105.1** | **102.9** | **104** |

*Source: Survey data in 2021*

The figures show that there is a tendency to increase costs over the years, the average growth rate of material costs is 6.3%, labor cost is 4.3%, but other costs are little changed due to fixed costs such as the depreciation of orchards, amortization of machinery and equipment, and at the same time, the cost of loans is gradually reduced because the farm has revenue from grapefruit to gradually pay back the loan for investment in the new planting stage. Costs increase due to rising input prices and increased investment in production by farms. The average total production cost per year of the surveyed grapefruit farms is 103.1 million VND/ha, which is a relatively large cost compared to the farm's financial capacity and compared to other crops. With high and increasing production costs, farmers need to take measures to increase productivity, quality, and product selling price to offset costs and improve economic efficiency in grapefruit production.

*2.2.3. Economic efficiency in grapefruit production of farmers*

The economic efficiency indicators for grapefruit production of the surveyed farms over 3 years are presented in Table 5. The figures show that the average yield of grapefruits increased by 6.1% per year, however, the selling price of grapefruits in 3 years continuously decreased at the rate of 21.9/ year, resulting in a decrease in sales of grapefruits per hectare by 17.5%/year.

**Table 5. Economic efficiency of grapefruit production of farmers in the period of 2019 - 2021**

*(calculated for 1 hectare of grapefruit in harvest period)*

| No. | Indicators | Unit | Value | | | Compare (%) | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2019 | 2020 | 2021 | 2020/2019 | 2021/2020 | Ave. |
| **1** | **Production results** | | | | | | | |
| 1.1 | Average yield | fruit/ha | 25.545 | 27,345 | 28,659 | 107.4 | 104.8 | 106.1 |
| 1.2 | Average selling price | million VND/ha | 15,045 | 13,740 | 8,940 | 91.3 | 65 | 78.1 |
| 1.3 | Sales of grapefruits (DT) | million VND/ha | 384.3 | 375.7 | 252.7 | 97.8 | 67.3 | 82.5 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.4 | Intermediary Cost (IC) | million VND/ha | 78.7 | 82.4 | 84.8 | 104.7 | 102.9 | 103.8 |
| 1.5 | Value Added (VA) | million VND/ha | 305.6 | 293.3 | 167.9 | 96 | 57.2 | 76.6 |
| 1.6 | Labor cost (CL) | million VND/ha | 31.3 | 32.4 | 33.8 | 103.5 | 104.3 | 103.4 |
| 1.6 | Total cost (TC) | million VND/ha | 98.7 | 103.8 | 106.8 | 105.1 | 102.9 | 104 |
| 1.8 | Mixed-Income (MI) | million VND/ha | 285.6 | 271.9 | 145.9 | 95.2 | 53.6 | 74.4 |
| **2** | **Economic efficiency** | | | | | | | |
| 2.1 | DT/IC | time | 4.8 | 4.5 | 2.9 | 93.7 | 64.4 | 79 |
| 2.2 | VA/IC | time | 3.9 | 3.5 | 2 | 89.7 | 57.1 | 73.4 |
| 2.3 | MI/IC | time | 3.6 | 3.3 | 1.7 | 91.6 | 51.1 | 55.8 |
| 2.4 | VA/TC | time | 3.1 | 2.8 | 1.6 | 90.3 | 57.1 | 73.7 |
| 2.5 | DT/TC | time | 3.9 | 3.6 | 2.4 | 92.3 | 66.6 | 79.4 |
| 2.6 | MI/TC | time | 2.9 | 2.6 | 1.4 | 89.6 | 53.8 | 71.7 |

*Source: Survey data in 2021*

With all production cost items increasing, the selling price of grapefruits dropped sharply, leading to a sharp decrease in the economic efficiency indicators of grapefruit production of farmers. From 2019 to 2021, the VA/TC index was decreased by 26.3%/year, the revenue/TC index was decreased by 20.6%/year, the MI/TC index was decreased by 28.3%/year.

In 2021, the average production cost of the farm is 106.8 million VND/ha, the average grapefruit yield is 28,659 fruits/ha, so the unit cost of a product is 3,726 VND/fruit. The survey showed that in 2021, due to the outbreak of the Covid-19 epidemic during the grapefruit harvest, the selling price dropped sharply to an average of 8,940 VND/fruit. Thus, the added value of grapefruit farms is VND 5,214/fruit, accounting for 58.3% of the selling price. Compared with other fruits such as oranges, mangoes, custard apple, longans, lychees, etc., Phuc Ninh Grapefruit gives a higher income. Specifically, in 2019, Phuc Ninh Grapefruit gave an average income of 1 hectare of VND 271.9 million, while Ham Yen oranges gave income of VND 68.4 million/ha (Tran Thi Dien, 2019).

### *2.3. Analysis of factors affecting the economic efficiency of grapefruit production of farmers*

#### *2.3.1. Scale production*

The area of the grapefruit orchard, the level of investment and costs, and the number of employees directly involved in the production are indicators to assess the scale and production capacity of the grapefruit growers. The aggregated data in Table 6 analyze the influence of production scale on the economic efficiency of grapefruit production of groups of farms.

**Table 6. Effect of production scale on the economic efficiency of grapefruit farms**

| No. | Indicators | Number of farms | Ratio (%) | Yield (1000 fruit/ ha) | Output (1000 fruit/ farm) | Income (M.VN/ farm) | IC (M. VND/ farm) | MI (M.VND/ farm) |
|---|---|---|---|---|---|---|---|---|
| **1** | **Grapefruit orchard area** | | | | | | | |
| 1.1 | Small scale (under 1 ha) | 34 | 37.8 | 25.5 | 33.4 | 520.2 | 102.3 | 302.8 |
| 1.2 | Medium size (from 1 to 2 ha) | 35 | 38.9 | 27.2 | 35.7 | 556 | 107.1 | 304.6 |
| 1.3 | Large scale (over 2 hectares) | 21 | 23.3 | 28.8 | 36.8 | 573.2 | 110.2 | 306.5 |
| **2** | **Investment cost** | | | | | | | |
| 2.1 | Under 150 million/year | 33 | 36.7 | 25.5 | 33.3 | 518.6 | 102.3 | 302.9 |
| 2.2 | From 150 - 300 million/year | 36 | 40 | 27.2 | 35.8 | 557.6 | 108.2 | 304.5 |
| 2.3 | Over 300 million/year | 21 | 23.3 | 28.8 | 36.8 | 573.2 | 109.1 | 306.5 |
| **3** | **Labor of the farm** | | | | | | | |
| 3.1 | Under 3 people | 48 | 53.3 | 25.5 | 34.2 | 532.7 | 104.3 | 303.2 |
| 3.2 | From 3 people or more | 42 | 46.7 | 28.8 | 36.7 | 571.6 | 108.9 | 305.1 |
| | **General** | **90** | **100.0** | **27.2** | **35.3** | **438.7** | **106.5** | **304.7** |

*Source: Survey data in 2021*

The figures show that the larger scale, the higher the economic efficiency. The area of grapefruit orchards with a scale of over 2 hectares accounts for 23.3% of the total number of farms surveyed, this is the group of farms with the highest investment in production costs, but also achieves the highest productivity, output value, and income compared to the groups of medium and small size farms.

Regarding investment costs, it shows that the group of farms with the highest investment of over 300 million VND/year also achieved the highest economic efficiency compared to the group of farmers with lower investment costs.

Regarding the labor scale, the group of farms with more than 3 employees/farm accounted for 46.7%, these are also the workers directly involved in grapefruit production. The larger scale of laborers, the higher the economic efficiency will be because the farms will save the cost of hiring outside workers. At the same time, family workers are often proactive and flexible in effectively solving problems arising in the process of production and business.

*2.3.2. Loans*

The figures in Table 7 show the situation of borrowing capital for grapefruit production and the effect of loans on the economic performance of grapefruit growers.

**Table 7. Effect of loan on the efficiency of grapefruit growers**

| Indicators | Number of farms | Ratio | Costs (million VND/ha) | Revenue (million VND/ha) | Mixed-income (million VND/ha) |
|---|---|---|---|---|---|
| farm with a loan (1) | 51 | 56.7 | 105.6 | 340.7 | 235.1 |
| farm without a loan (2) | 39 | 43.3 | 101 | 334.5 | 233.5 |
| **Difference (1) and (0)** | 12 | 13.4 | 4.6 | 6.2 | 1.6 |
| **General** | **90** | **100%** | **103.1** | **337.5** | **234.4** |

*Source: Survey data in 2021*

Among the 90 surveyed grapefruit farms, 51 farms borrowed capital from banks, credit institutions, acquaintances, relatives, etc., accounting for 56.7%. The majority of farms borrow loans for the purpose of improving the land, buying seeds, planting new ones, and investment costs in grapefruit production such as purchasing machinery, equipment, materials, and application of science and technology for production, applying VietGAP model... so the use of loans has brought more economic efficiency for farmers. Compared with non-borrowed farmers, the farm owners that borrowed capital had a higher production cost of 4.6 million VND/ha, but the revenue from selling grapefruits and their income, respectively, were higher at 6.2 million VND/ha and 1.6 million VND/ha, so farm owners in the loan group have higher economic efficiency than other.

*2.3.3. Grapefruit production model according to VietGAP standards*

The survey of farms involved in grapefruit production according to the VietGAP model shows that most of these farms have large-scale production, actively participate in training courses, and actively apply scientific and technological advances to production. The survey data are summarized in Table 8.

**Table 8. Influence of production model on the economic efficiency of farms**

| Indicators | Unit | Traditional production model (0) | VietGAP production model (1) | Difference (1) and (0) | General |
|---|---|---|---|---|---|
| Number of farms | farm | 75 | 15 | (60) | 90 |
| Ratio | % | 83.3 | 16.7 | (66,6) | 100 |
| Production cost | million VND/ha | 100.9 | 108.7 | 7.8 | 103.1 |
| Productivity | Fruit/ha | 26,210 | 28,185 | 1,975 | 27,183 |
| Average selling price | 1000 VND/ fruit | 12,330 | 13,798 | 1.468 | 12,575 |
| Value of commodity production/ha | millions /ha | 316.6 | 365.5 | 48.9 | 341.8 |
| Mixed-income/ha | millions /ha | 215.5 | 256.8 | 41.3 | 234.5 |
| Value of commodity grapefruit/farm | millions /farm | 411.6 | 475.1 | 63.5 | 438.7 |
| Mixed-income/farm | millions /farm | 280.1 | 333.8 | 53.7 | 304.7 |

*Source: Survey data in 2021*

The survey data shows that 16.7% of farms participate in VietGAP grapefruit production, this group of farms has a higher production cost than the group of farms with traditional production methods of 7.8 million VND/ha, due to higher investments in seeds, materials, irrigation water, care,... However, the grapefruit yield of this group is higher than the other was 1,975 fruits/ha. At the same time, the quality of fruit was better, the design was more beautiful, so it is easier to sell. With the Phuc Ninh Grapefruit brand, the average selling price of fruit is higher than others was 1,468 VND/fruit. Combining VietGAP production model with other factors such as the size of area, loan support,... makes the indicators to evaluate the economic efficiency of grapefruit production of the group of farms producing VietGap model higher than other groups. Those are the grounds for proposing solutions to replicate the grapefruit production model according to VietGAP standard in Phuc Ninh commune.

*2.3.4. Age of grapefruit tree*

The figures in Table 9 show that 80% of the area of grapefruit for harvest is over 7 years old.

This group of farms has long-term experience in growing grapefruit and has participated in many training courses and technical guidance. There are 20% of farms that harvest grapefruits with trees under 7 years old, most of these farms have little experience in growing grapefruit and receive less training.

**Table 9. Effect of grapefruit tree age on farmers' economic efficiency**

| Indicators | Number of farms | Ratio (%) | Selling price (VND/fruit) | Yield (fruit/ha) | Revenue (VND/ha) | Mixed-income (VND/ha) |
|---|---|---|---|---|---|---|
| Grapefruit under 7 years old (0) | 18 | 20.0 | 12,435 | 25.339 | 315.090.465 | 216,465.183 |
| Grapefruit 7 years old or older (1) | 72 | 80.0 | 12,610 | 27,644 | 348,590.840 | 239,058.935 |
| The difference (1) - (0) | 54 | 60 | 175 | 2.305 | 33,500.375 | 22,593,752 |
| **General** | **90** | **100** | **12,575** | **27,183** | **341,826.225** | **234.540.220** |

*Source: Survey data in 2021*

The survey data show that the group of farms with grapefruit orchards from 7 years old and older have an average yield of 2,305 fruits/ha, with better fruit quality, the average selling price is VND 12,610/fruit, which is 175 VND/fruit higher than another group. The economic efficiency indicators of the group of farms growing grapefruit with the age of tree was 7 years or more were higher than another group. In addition to the reasons that the farmer has more experience and training, the old grapefruit garden often gives better quality fruit, better selling price. While the costs of care, fertilizer, and depreciation were reduced. These have made the indicators reflecting the economic efficiency of this group of farms were higher. This is the basis for proposing solutions to improve economic efficiency for grapefruit farmers.

*2.3.5. Time to sell grapefruit*

Phuc Ninh Grapefruits produce one crop per year, in which early ripening sugar grapefruits are harvested from September (August full moon of the lunar calendar), late-ripening Dien Grapefruit varieties are harvested from December (close to the Lunar New Year) to February next year. Harvest time is from the time of succulent grapefruit until it is ripe (or physiologically ripe). Depending on the purchasing situation and the selling price, the farm owners decide when to sell.

**Table 10. Effect of time of sale on farmers' economic efficiency**

| Targets | Number of farms | Ratio (%) | Selling price (VND/fruit) | Revenue (VND/ha) | Mixed-income (VND/ha) |
|---|---|---|---|---|---|
| Farms harvesting in the main season (0) | 46 | 51.1 | 12,470 | 337,909,000 | 233,109,000 |
| Early or late harvest farms (1) | 44 | 48.9 | 12,680 | 343.890,468 | 239,090,000 |
| Difference (1) - (0) | 2 | 2.2 | 210 | 5.981,468 | 5,981,000 |
| **General** | **90** | **100** | **12,575** | **341,826.225** | **234.540.220** |

*Source: Survey data in 2021*

The figures in Table 10 show that 51.1% of farms harvest the main crop and mainly sell whole orchards for traders. This group of farms usually produces on a large scale, with a large amount of commercial grapefruit. There are 48.9% of the farms that harvest grapefruit early or late, they flexibly based on the price and demand in the market to make decisions to sell when the sell price is good.

The survey results show that the average selling price is 12,680 VND/fruit for the group of farms that harvest early or late. While the group of farms that harvest the main crop has a lower selling price of 210 VND/fruit.

With a small production scale, farms can flexibly decide to harvest and sell to get a better price. The figures show that the average economic efficiency per hectare of this group of farms is higher than that of the group of farms that harvest and sell in the main season only. Thus, in order to improve the economic efficiency of grapefruit production for farmers, it is necessary to have technical solutions, select varieties or measures to preserve and process to prolong the harvest season, stabilize the selling price of products. Strengthen linkages in marketing so that farmers can focus their resources on production.

## Part III – CONCLUSION

Phuc Ninh commune has natural - economic - social conditions suitable for the growth and development of grapefruit production. However, the economic efficiency of farmers' grapefruit production is not high and unsustainable. Evaluating the economic efficiency of grapefruit growers showed that the grapefruit production of farmers in Phuc Ninh commune in recent years has continuously increased in the area, productivity, and output of commercial grapefruits. However, the selling of grapefruits is still difficult. The sale price of grapefruit was not stable, leading to the economic efficiency accounting indicators of grapefruit production continuously decreasing in the past 3 years. Analysis of factors affecting the economic efficiency of grapefruit growers shows that a number of factors have positive effects, if increasing these factors will increase the revenue and income for farmers such as production scale, loan, VietGAP grapefruit model, the age of the grapefruit tree, grapefruit selling time. In order to improve the economic efficiency of grapefruit production, it is necessary to carry out the following solutions: improving cultural standards and increasing training for farm owners; adopting policies to promote land accumulation, expanding the area of grapefruit orchards; encouraging and creating favorable conditions for farmers to borrow capital, increase the level of investment for grapefruit production; replicating VietGAP grapefruit model; developing the concentrated grapefruit areas and have synchronous support policies for farmers; strengthening the linkages in grapefruit production and marketing.

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