



Assessing the Economic Efficiency of Transitioning from Conventional to Organic Methods for Orange Cultivation among Farms in Tuyen Quang Province, Vietnam

Do Hai Yen

Economic and Business Administration Faculty, Tan Trao University, Tuyen Quang, Viet Nam

This study aimed to assess the economic efficiency of transitioning orange cultivation from conventional to organic methods among orange farms in Tuyen Quang Province. Descriptive and comparative statistics were employed alongside surveys and interviews conducted with 60 orange farms. This sample comprised 30 farms utilizing conventional production methods and another 30 farms using organic methods. These methods were used to assess and compare the economic efficiency of organic orange cultivation with traditional approaches. The research findings reveal that using organic methods for orange cultivation yields superior economic efficiency compared to conventional approaches. Farms utilizing organic methods generate an income of 101,7 million VND per hectare per year, whereas those employing conventional methods earn only 63,6 million VND per hectare per year. Consequently, cultivating organic oranges proves to be 1.6 times more profitable than using conventional methods. Moreover, the study suggests several solutions for scaling up the organic orange cultivation model throughout Tuyen Quang province.

Keywords: Economic efficiency, Organic farming, Organic oranges, Oranges production, Tuyen Quang Province

Received May 7, 2024

First Decision Made May 16, 2024

Accepted May 27, 2024

Corresponding Author

Do Hai Yen

Faculty of Economics and Business
Administration, Tan Trao University, Tuyen
Quang Province, Vietnam
E-mail: dhien@tqu.edu.vn

INTRODUCTION

Organic agricultural production entails a method of farming that minimizes or eliminates the use of chemical substances such as pesticides, chemical fertilizers, herbicides, and growth regulators in both crop cultivation and livestock farming (Lockeretz, 2007). Organic agricultural production is gaining momentum globally and in Vietnam, driven by the demand for food safety, improved human health, and environmental sustainability (Huber et al., 2011).

In Vietnam, the Government is actively working to foster the growth of sustainable, environmentally friendly agriculture, aiming to enhance productivity and competitiveness of agricultural products, including those of organic origin. As of 2023, 34 out of 63 provinces and cities nationwide have already initiated organic agricultural production and are transitioning their production methods towards organic practices. The total area of organically cultivated land has reached 237 thousand hectares in Vietnam, representing approximately 1.1%

of the total agricultural land area. This places Vietnam at the 32nd position globally and 2nd in Southeast Asia, following Indonesia, in terms of organic cultivation (Nguyen, 2021). At present, organic agricultural products are primarily consumed domestically and exported to various international markets, including Japan, England, Korea, Singapore, and Russia (Phat, 2022).

Situated in the northern mountains of Vietnam, Tuyen Quang province boasts favorable natural conditions and climate, presenting significant potential for the expansion of organic agricultural practices. The transition from conventional to organic agriculture is gaining traction in Tuyen Quang, reflecting a positive trend. In recent years, both local authorities and numerous households have made concerted efforts to convert orange production areas to organic farming practices. By 2023, Tuyen Quang Province has implemented three farming models using organic agricultural methods, focusing on oranges (cultivated in Ham Yen and Yen Son), green tea (grown in Son Duong and Na Hang), and grapefruit (cultivated in Yen Son). The cumulative converted area represents 6.3% of the total area occupied by these three types of trees across the entire province (Department of Agriculture and Rural Development of Tuyen Quang Province, 2021). Despite their relatively small scale, these farming models have yielded promising results over the years, with products gradually meeting standardized requirements to enhance their value and quality. In the case of organic oranges, the province has actively facilitated the establishment of traceability stamps, ensuring the continuous application of 100% traceability QR stamps. Despite its potential, the organic orange cultivation model in the province encounters several challenges. Production remains small-scale, irregular, and spontaneous. Organic oranges lack significant market penetration, with limited awareness among consumers about local organic orange products. Moreover, there is a scarcity of businesses and cooperatives engaged in production and consumption or establishing linkages with farmers through contracts. Additionally, trade promotion efforts and market exploration for these products are constrained by numerous limitations (Dao, 2022).

Assessing the economic efficiency of transitioning from conventional to organic methods for orange cultivation is imperative. This evaluation serves as the cornerstone for advocating the replication of this model, delineating development pathways, and proposing essential policies to enhance organic agricultural production, with a specific focus on orange products, in Tuyen Quang province.

LITERATURE REVIEW

Consumers consistently seek clean, safe, and nutritious food options. As outlined by the International Federation of Organic Agriculture (IFOAM), organic agricultural production aligns with sustainable development principles, emphasizing environmental friendliness and minimizing the utilization of fertilizers, pesticides, which in turn reduces pollution of air, soil, and water. Moreover, it prioritizes the well-being and health of both producers and consumers (IFOAM, 2008).

Organic agricultural production proves to be economically beneficial for farmers. Despite the fact that organic production models typically yield lower product productivity compared to conventional methods, the increased profitability stems from higher selling prices and the assurance of product consumption (Thu, 2020).

Organic farming strictly limits producers to the use of organic fertilizers and mandates weed and pest control through manual methods or biological solutions. Consequently, this approach demands a substantial labor investment, making it challenging to implement on a large scale (Jouzi et al., 2017). As a result, organic agricultural production is better suited for households with smaller farming areas and access to sufficient family labor resources (Lapple, 2010). However, there are studies that propose an alternative perspective, suggesting that households with larger farming areas are inclined to embrace organic agriculture due to their ample land resources and financial capacity, which facilitate a smoother transition to organic production methods (Genius et

al., 2006).

Reganold and Wachter (2016) concluded that while organic farming systems may yield lower quantities compared to conventional agriculture, they are more profitable and environmentally friendly. Additionally, they found that organic farming provides equally or more nutritious foods with fewer or no pesticide residues compared to conventional farming methods. The development of organic agricultural production requires a diverse range of policy tools and synchronized coordination across all levels of government, from the central to the local levels. Furthermore, fostering awareness among households is crucial for this endeavor (Reganold & Wachter, 2016).

Previous research in different countries has demonstrated the significant influence of technical training factors on agricultural production. Findings from these studies indicated that farmers who undergo training were more likely to transition from traditional to organic farming methods compared to those who did not receive such training (Doanh et al., 2016; Karki et al., 2011; Métouolé Méda et al., 2018). As emphasized by Madau (2007), successful conversion to organic agricultural production necessitates farmers possessing the appropriate technical expertise and professional skills. This implies that farmers should not only receive training in organic farming techniques but also acquire the knowledge and ability to effectively apply these teachings in practical organic farming processes.

The transition to organic agricultural production may also be impacted by various characteristics of the household head, including age, gender, ethnicity, years of agricultural production experience, and educational background. However, as noted by Sapbamrer and Thammachai (2021), existing studies have not yet revealed a consistent trend in the influence of these factors. This lack of clarity may stem from the fact that household head characteristics can vary significantly depending on the specific living area and the diversity of the surveyed subject groups. The income factor can also positively influence on the transition to organic farming (Wynen, 2006).

RESEARCH METHOD

Sampling and the data collection

Primary data was gathered through a survey method employing questionnaires. The study targeted 60 orange farming households, comprising 30 households employing organic methods and 30 households using conventional methods for orange cultivation.

Data Extraction and Analysis

The primary analytical methods employed in this study include descriptive statistics, comparative analysis, and economic accounting.

- Descriptive statistical methods are utilized to evaluate the efficacy of transitioning orange cultivation towards organic agriculture, encompassing the analysis of trends in area development, productivity, and yield of organic oranges, as well as monitoring changes in product prices and consumption revenue over time. The use of both absolute and relative data ensures a comprehensive understanding of the analysis content, facilitating clear insights into observed trends. Additionally, the comparative analysis method is employed to assess the level of variation in analytical indicators, including planted area, productivity, output, product prices, and sales revenue of oranges produced using organic agriculture compared to those produced using conventional methods.
- The economic accounting method was utilized to track production costs over each period, determining the outcomes and efficiency of orange production under the organic agriculture approach. To account for results and production efficiency, the following steps were taken:

1. Calculate the actual yield of organic oranges harvested per unit of land area planted during the business period of the household under investigation.
2. Synthesize the collected data to calculate indicators evaluating production results and efficiency, including:
 - Gross output (GO): Total revenue generated from the sale of organic oranges.
 - Intermediational costs (IC): Expenses incurred during the production process, such as labor, materials, and equipment.
 - Value added (VA): The difference between production value and intermediate costs, representing the added value created during production.
 - Mixed income (MI): Additional income generated from sources other than the main agricultural activity, if applicable.

These indicators provide a comprehensive assessment of production outcomes and efficiency in transitioning to organic orange cultivation methods.

FINDINGS AND DISCUSSION

Current status of Organic Orange Cultivation in Tuyen Quang Province

Since 2018, the Department of Agriculture and Rural Development, in collaboration with relevant units, has been actively promoting the transition of orange-growing households from conventional methods to organic practices. The introduction of organic orange cultivation models initially commenced in Ham Yen district, specifically targeting three communes: Tan Thanh, Tan Yen, and Nhan Muc, with a combined organic orange cultivation area of 30.2 hectares. By 2023, this initiative is projected to encompass 772.5 hectares across the entire province. Notably, all these areas have obtained certification for organic production in accordance with Participatory Guarantee System standards (Department of Agriculture and Rural Development of Tuyen Quang Province, 2021).

The most significant distinction from the conventional orange cultivation model lies in the complete absence of chemical fertilizers, pesticides, or growth stimulants. Care, fertilization, and pest control processes for oranges are meticulously guided and overseen by staff and members of the organic orange team. Participating households undergo training in organic production methods, covering everything from plant care to pest prevention measures utilizing organic techniques. Presently, organic groups have established connections with several businesses to market organic orange products, with a guaranteed purchase price of 25,000 VND per kilogram for organic oranges.

Table 1 presents data on the average planted and harvested area of surveyed households, categorized by orange variety. The survey reveals three primary orange varieties cultivated by the households: Ham Yen citrus sinensis, Vinh citrus sinensis, and V2 citrus sinensis. Ham Yen citrus sinensis emerge as the most prevalent variety among surveyed households, with an average planting rate exceeding 86% across both household groups. Particularly noteworthy is the organic household group, where the planting rate of Ham Yen citrus sinensis reaches 94.12%. The average growing area for Ham Yen citrus sinensis among the two household groups is considerable, particularly notable is the organic household group, with an average of 1.53 hectares per household, surpassing the regular household group by 0.26 hectares. Conversely, the ownership proportion of Vinh citrus sinensis and V2 citrus sinensis is relatively modest, standing at 17.65% and 23.53% respectively. The average growing area for Vinh citrus sinensis is 0.33 hectares per household, while for V2 citrus sinensis, it is 0.7 hectares per household. Conversely, within the regular orange-growing households, 55.56% engage in cultivating Vinh citrus sinensis, with an average area of 1.05 hectares per household, while 24.44% opt for V2 citrus sinensis cultivation, averaging 0.41 hectares per household.

Table 2 provides insights into the orange harvest volume among surveyed households, revealing notable discrepancies in yield and selling price between regular and organic oranges. Regular oranges exhibit an average yield of 13 tons per hectare, surpassing organic oranges by 2.2 times, which yield 6 tons per hectare. This difference

Table 1. Panel unit root tests' results

Citrus sinensis Types	Conventional orange growers			Organic orange growers		
	Planting Area (ha)	Harvesting Area (ha)	Percentage of households planting (%)	Planting Area (ha)	Harvesting Area (ha)	Percentage of households planting (%)
1. Citrus sinensis (Ham Yen)	1,32	1,30	86,67	1,64	1,53	94,12
2. Citrus sinensis (Vinh)	1,14	1,05	55,56	0,33	0,33	17,65
3. Citrus sinensis (V2)	0,72	0,41	24,44	0,7	0,7	23,53

Source: Data collection from households, 2023.

Table 2. Orange Harvest Volume among Surveyed Households (Calculated on average per hectare)

Indicators	Unit	Conventional orange growers (1)	Organic orange growers (2)	Compare (2-1)
Quantity	Kg	13.141,86	6.023,41	-7.118,45
Prices	1000vnd/kg	7,64	24,33	16,69
Total revenue	1000vnd	100.403,81	146.549,57	46.145,76

Source: Data collection from households, 2023.

can be attributed to the transition of households from conventional to organic farming methods. Trees previously reliant on inorganic fertilizers and pesticides necessitate an adaptation period when transitioning to organic farming, involving the replacement of these inputs with organic fertilizers and biological products. Although organic products may not be as effective as inorganic ones in stimulating plant growth and pest control, organic orange products command a significantly higher average selling price of 24.3 thousand VND per kilogram, three times higher than that of regular orange products.

Table 3 presents information on where households sell organic oranges and the challenges encountered in the process. A significant majority (76.47%) of households in the organic orange group reported selling oranges to businesses such as Tam Dat and Ba Lanh. The second most common sources of sales for organic orange growers are collectors/wholesalers and direct consumers. Additionally, some clean food stores, such as Bac Tom, have directly purchased organic orange products at the farm. Moreover, some households have established their own sales channels to sell organic orange products through platforms like Facebook. Cooperatives are the least popular sales channel for organic orange-growing households, with only 5.88% of households selling organic oranges through this channel.

Among households growing oranges using conventional methods, the primary consumption channel is through collectors/wholesalers, with 93.33% of households utilizing this avenue. The second most common channel is local retailers, with 17.78% of households, followed by businesses, with 11.11% of households. Only 4.44% of households reported selling products directly to consumers, while none of the households consume oranges through cooperatives (Table 3).

When questioned about difficulties in selling orange products, 86.67% of households growing oranges using conventional methods reported facing challenges, particularly citing relatively low selling prices. Meanwhile, in the group of households growing oranges using organic methods, this figure rises to 91.67%. All households express concerns about the current selling price of oranges being relatively low and unstable, often experiencing a decline in prices even during favorable seasons. Despite the higher price of organic oranges compared to regular oranges, households acknowledge that the production process is more demanding and labor-intensive.

Table 3. Current status of orange consumption among surveyed farms

Unit: %

Indicators	Conventional orange growers	Organic orange growers
1. Orange consumers		
- Cooperative	0,00	5,88
- Collector/wholesaler	93,33	17,65
- Local retailer	17,78	11,76
- Direct consumers	4,44	17,65
- Enterprise	11,11	76,47
2. Difficulties in consumption:		
- Price instability	73,33	16,67
- Relatively low price	86,67	91,67
- Difficulty in reaching traders	24,44	8,33
- Limited road traffic	15,56	8,33
- Limited awareness of organic oranges	0,00	16,67

Source: Data collection from households, 2023.

The results and production efficiency of organic orange cultivation in Tuyen Quang Province

Table 4 furnishes essential insights into household heads among the surveyed households. In terms of household head gender, a substantial majority across both orange cultivation groups are men, comprising over 88%. Notably, the regular orange cultivation group typically exhibits a slightly higher proportion of male household heads compared to the organic orange cultivation group, although this variance is not deemed significant. Household heads in both orange cultivation groups represent three ethnicities: Kinh, Tay, and Dao, with the Kinh ethnic group comprising the majority. In the organic orange cultivation group, the Dao ethnic group holds the second position with 29.41%, while the Tay ethnic group constitutes the smallest percentage at 5.88%. Conversely, in the regular orange cultivation group, the Tay ethnic group holds the highest percentage at 26.67%, followed by the Dao ethnic group at 2.22%.

The heads of households in both groups fall within the middle-aged bracket, with an average age of 47.65 years for those engaged in organic farming and 52.18 years for those in conventional farming. This indicates an average age difference of 4.53 years between the two groups.

The household heads in both groups of orange cultivators exhibit an average schooling duration exceeding 8 years. However, within the organic orange cultivation group, the percentage of household heads with high school or higher qualifications is relatively low, with only 5.88% possessing high school credentials, and none holding college or university degrees. Conversely, among the regular orange cultivators, 15.56% of household heads have attained high school education, 8.89% hold college degrees, and 6.67% have obtained university degrees. Despite their lower levels of experience and expertise compared to conventional orange growers, organic orange cultivators, typically younger, are keen to explore innovative production methods and enhance their skills. Organic agricultural production represents a pioneering direction, attracting these growers who are ready to embrace new approaches and learning opportunities.

In terms of household labor force, while both groups of orange growers maintain an average of around 4 individuals per household, the number of agricultural workers is relatively low, averaging approximately 2 workers per household. Given the heightened care demands of organic orange production compared to conventional methods, households engaged in organic farming typically employ a greater number of agricultural workers.

Organic fertilizers, including buffalo manure, chicken manure, and pig manure, are typically distributed door-

Table 4. Basic information of surveyed households

Indicators	Unit	Conventional orange growers	Organic orange growers	Average
1. Ratio of male household head	%	95,56	88,24	93,55
2. Average age of household head	year	52,18	47,65	50,94
3. Ethnic group				
+ Kinh		71,11	64,71	69,36
+ Tay	%	26,67	5,88	20,97
+ Dao		2,22	29,41	9,68
4. Years of schooling	year	8,62	8,88	8,69
5. Qualifications of the household head				
+ Highschool	%	15,56	5,88	12,91
+ College level (3 years)	%	8,89	0,00	6,45
+ Bachelor (4 years)	%	6,67	0,00	4,84
5. Family size	person	4,22	4,12	4,19
6. Family labor work at farm	person	1,96	2,18	2,02
7. Years of agricultural production experience	year	26,8	24,71	26,23

Source: Data collection from households, 2023.

Table 5. Input costs for orange production per hectare among surveyed households

Unit: 1000vnd

Indicators	Conventional orange growers	Organic orange growers	Average
1. Fertilizer			
Organic fertilizer	3.957,68	8.811,39	5.288,54
Compost (corn, soybeans)	0,00	9.393,82	2.575,72
Phosphate fertilizer	690,03	5.600,26	2.036,38
Potassium	244,73	4.832,35	1.502,63
Protein	976,86	0,00	709,01
Pickled fish	0,00	3.719,85	1.019,96
NPK fertilizer	6.264,53	0,00	4.546,84
Microbial fertilizer	1.888,24	0,00	1.370,50
2. Pesticides			
Pesticides	11.191,10	0,00	8.122,57
Probiotic	7,33	4.135,29	1.139,19
Total	25.220,52	36.493,98	28.311,63

Source: Data collection from farms, 2023.

to-door by private traders. Organic orange production mandates the use of solely organic fertilizer products and biological substitutes for inorganic fertilizers and pesticides. Therefore, organic orange growers utilize composted manure, corn compost, soybean compost, kitchen ash, pickled fish, and biological products derived from ginger, garlic, and chili.

Table 5 presents certain input costs for orange production among the surveyed households, calculated on average for 1 hectare of orange cultivation. Survey data reveals that the total input costs for organic orange-growing households exceed those for conventional orange-growing households. Specifically, the input cost for organic orange production averages 36.5 million VND per hectare, whereas the input cost for conventional orange production

Table 6. Family labor input among surveyed households (Calculated on average per hectare)

Indicators	Conventional orange growers	Organic orange growers	Average
Digging and Soil preparation	4,25	3,68	4,09
Pruning and Canopy management	10,28	15,82	11,80
Fertilization	8,29	20,38	11,61
Weed Management	8,54	36,29	16,15
Irrigation	0,91	2,47	1,34
Pest and Disease Control	8,23	8,82	8,39
Harvesting and Transport	15,46	16,65	15,79
Total labor	55,96	104,12	69,17

Source: Data collection from households, 2023.

stands at 25.2 million VND per hectare. Organic orange producers allocate more investment to various inputs such as organic fertilizer, compost, and pickled fish, while households engaged in conventional orange production tend to invest more in pesticides and NPK fertilizers.

The process of tending to orange crops encompasses seven primary activities: Digging and Soil Preparation, Pruning and Canopy Management, Fertilization, Weed Management, Irrigation, Pest and Disease Control, and Harvesting and Transport. Table 6 presents the family labor input for 1 hectare of orange cultivation. Upon examining the data, it becomes evident that the group cultivating organic oranges employs a significantly larger labor force, averaging 104 workers per hectare within a single production cycle, which is 1.86 times greater than the group cultivating regular oranges, where the average stands at 56 workers per hectare. Organic orange production entails greater family involvement compared to growing regular oranges, particularly in tasks such as fertilization and weeding. This heightened involvement is attributed to the extensive use of manure and compost in organic farming, requiring substantial manual labor for application, and the absence of herbicides, necessitating increased efforts in weed management compared to conventional orange cultivation.

Given the average household labor force of approximately 2 workers, households often need to hire additional labor. Table 7 outlines the labor rental costs per hectare of orange cultivation for surveyed households. Specifically, the cost of labor rental for the regular orange household group amounts to 8.57 million VND per hectare, whereas for the organic orange household group, it is 3.34 million VND per hectare. Significantly, there is a notable contrast between harvesting and pesticide spraying costs for the two household groups. Harvesting and transportation expenses rank highest among labor costs for both groups, attributed to the challenging terrain on which orange trees are cultivated, necessitating considerable effort during harvesting. Due to the lower yield of organic oranges compared to regular oranges, the harvesting costs for the organic group are comparatively lower.

In organic orange production, most activities demand more family labor compared to growing conventional oranges, particularly in fertilizing and weeding. This is primarily due to the extensive use of manure and compost in the production process, requiring significant labor input for their application. Additionally, the absence of herbicides in organic orange cultivation necessitates more frequent and thorough weeding compared to conventional orange cultivation methods. The results and economic efficiency from growing oranges using organic methods are shown in Table 8.

Overall, the group of households producing regular oranges demonstrates markedly lower production value, added value, mixed income, intermediate costs, and labor compared to the group of organic producers. To assess the economic efficiency of growing oranges using organic methods, we evaluate two efficiency indicators: cost efficiency and labor efficiency.

Table 7. Labor rental costs incurred by surveyed households (Calculated on average per hectare)

Unit: 1000vnd

Indicators	Conventional orange growers	Organic orange growers	Average
Digging and Soil preparation	160,00	82,35	138,71
Pruning and Canopy management	117,78	0,00	85,49
Fertilization	788,89	1.294,71	927,58
Weed Management	584,22	0,00	424,03
Irrigation	35,56	94,12	51,62
Pest and Disease Control	2.434,44	536,24	1.913,97
Harvesting and Transport	4.453,11	1.302,94	3.589,35
Total amount	8.574,00	3.337,35	7.138,14

Source: Data collection from households, 2023.

Table 8. Outcomes and Economic Performance of Orange Farming Households (Calculated on average per hectare)

Indicators	Unit	Conventional orange growers	Organic orange growers	Average
I. Results				
1.1 Gross Output (GO)	1000vnd	97.418,28	141.555,6	109.520,44
1.2 Intermediate costs (IC)	1000vnd	25.220,52	36.493,98	28.311,63
1.3 Value added (VA)	1000vnd	72.197,76	105.061,59	81.208,81
1.4 Mixed income (MI)	1000vnd	63.623,76	101.724,24	74.070,67
1.5 Family labour	labor	55,96	104,12	69,17
II. Efficiency				
2.1 Cost efficiency				
GO/IC	Times	3,86	3,88	3,87
VA/IC	Times	2,86	2,88	2,87
MI/IC	Times	2,52	2,79	2,60
2.2. Labor efficiency				
GO/family labour	1000vnd/labor	1.740,86	1.359,54	1.636,30
VA/ family labour	1000vnd/labor	1.290,17	1.009,04	1.213,08
MI/ family labour	1000vnd/labor	1.136,95	976,99	1.093,09

Source: Data collection from households, 2023.

In terms of cost efficiency, the group of households producing organic oranges exhibits slightly higher cost efficiency indices for production value, added value, and mixed income compared to the group producing conventional oranges. Specifically, for every VND spent on intermediate costs, the organic household group generates 3.88 VND of production value, 2.88 VND of added value, and 2.79 VND of mixed income. In contrast, the conventional orange household group typically recovers 3.86 VND of production value, 2.86 VND of added value, and 2.52 VND of mixed income for every dong spent on intermediate costs (Table 8).

In terms of labor efficiency, the organic orange farming households exhibit lower efficiency indicators compared to those of the conventional orange farming households. Specifically, for every unit of family labor invested, the organic households generate 1.4 million VND in production value, 1 million VND in added value, and 977 thousand VND in mixed income. In contrast, the conventional orange farming households yield higher returns for each unit of family labor, recovering 1.7 million VND in production value, 1.3 million VND in added value, and 1.1

Table 9. Challenges in transitioning from conventional orange cultivation to organic methods

Indicators	Quantity (n = 30)	Proportion (%)
1. Rigorous adherence to organic production regulations	18	60
2. Organic orange prices do not reflect labor input	18	60
3. Initial lack of production capital during the conversion phase	10	33,33
4. Shortage of labor due to the demanding nature of organic production	9	30
5. Absence of a consistent consumer market	5	16,67
6. Absence of established centralized production areas	4	13,34

Source: Data collection from households, 2023.

million VND in mixed income.

Overall, both regular orange production and organic orange production yield high economic efficiency for producing households. Organic producers tend to utilize costs more effectively, whereas conventional producers tend to optimize labor usage. As farmers have remarked, the outcomes of organic orange production are quite favorable, yet they still feel that the results do not fully reflect the effort invested.

Challenges in transitioning from conventional orange production to organic methods

An examination of 30 households engaged in organic orange production revealed that the primary challenge faced during the transition from conventional to organic farming is the stringent regulations governing organic production, coupled with a shortage of input investment. Particularly notable is the limited availability of supplies for organic fertilizer and biological products within the area (Table 9).

Specifically, the scarcity of manure sources poses a significant challenge, as organic orange production demands a substantial quantity of manure. For instance, cultivating 1 hectare of organic oranges necessitates 10-20 tons of manure. Moreover, it is imperative that the manure originates from organic sources, as manure sourced from industrial (non-organic) farms is unsuitable for use. Recently, provided organic manure sources has become increasingly challenging, with limited availability of guaranteed quality manure sources. Furthermore, suppliers of biological products in the area currently operate as near monopolies, leaving households with few options, uncertain quality, and difficulty in procurement. Many households encounter challenges in mastering the techniques required for organic production, often feeling perplexed when applying organic farming processes. Additionally, the pricing of organic oranges poses a significant obstacle for households. A considerable number of households perceive that the current selling price does not adequately reflect the labor and effort invested in organic orange cultivation.

CONCLUSION AND RECOMMENDATION

The transition to organic methods has been accompanied by a notable increase in income for households engaged in organic orange cultivation. Comparative analysis reveals that households adopting organic methods yield higher economic returns compared to those adhering to conventional practices. Specifically, organic orange growers report an average income of 141.555,6 million VND/ha/year, surpassing the earnings of households employing conventional methods, which stand at 97.418,28 million VND/ha/year. This substantial difference highlights the economic viability of organic orange cultivation. Moreover, organic orange production demonstrates superior environmental sustainability compared to conventional methods. By eschewing the use of chemical fertilizers, pesticides, and herbicides, organic farming minimizes environmental degradation and promotes soil health. The results and production efficiency of organic orange cultivation in Tuyen Quang province underscore its potential to

foster economic efficiency, environmental stewardship, and consumer satisfaction. As organic agriculture continues to gain momentum, concerted efforts to support and expand organic farming practices are imperative for realizing sustainable development goals and ensuring a thriving agricultural sector in the province.

To facilitate the transition to organic agriculture in Tuyen Quang province, the following recommendations are proposed:

- Increase awareness and provide technical training for farmers on organic agricultural practices. Local authorities should assess challenges faced by farmers and formulate supportive policies. Conduct hands-on technical training directly in farmers' gardens, supplemented by expert-led sessions and peer-to-peer learning.
- District-level authorities should assess current agricultural production, formulate strategic plans for organic production, and prioritize eco-tourism and leveraging natural advantages. Emphasize large-scale, uniform development of organic production.
- Foster collaboration among various departments to establish distinctive trademarks for Tuyen Quang's organic oranges and grapefruits. Support trade promotion, facilitate market connections, and showcase organic products on official provincial platforms and national television channels.

Acknowledgment

This research was supported by Tan Trao University, Tuyen Quang, Viet Nam. We are grateful to the organic and non-organic households who provided us with sources of information and interviews that were very valuable during the conduct of this research.

REFERENCES

- Dao, T.-V. T. (2022). *Organic farming in the process of maintaining momentum*. Retrieved June 13, 2022 from <https://nongsanviet.nongnghiep.vn/nong-nghiep-huu-co-van-dang-giai-doan-chay-da-d325284.html>.
- Department of Agriculture and Rural Development of Tuyen Quang Province (2021). *Report on results of agricultural, forestry-fishery production and rural development in 2021; Orientations and Tasks in 2022* (Report No 512/BC-SNN on 17/12/2021). Tuyen Quang, Vietnam: Author.
- Doanh, N. K., Hang, B. T., & Huyen, N. T. (2016). Current status of transition to organic agriculture in green tea cultivation in Thai Nguyen Province. *Journal of Economics & Development*, 226(4), 83-89.
- Genius, M., Pantzios, C. J., & Tzouvelekas, V. (2006). Information acquisition and adoption of organic farming practices. *Journal of Agricultural and Resource Economics*, 31(1), 93-113.
- Huber, M., Rembiałkowska, E., Średnicka, D., Bügel, S., & van de Vijver, L. P. L. (2011). Organic food and impact on human health: Assessing the status quo and prospects of research. *NJAS - Wageningen Journal of Life Sciences*, 58(3-4), 103-109.
- IFOAM. (2008). *Principles of organic agriculture*. Retrieved November 20, 2020 from <https://www.ifoam.bio/why-organic/shaping-agriculture/four-principles-organic>.
- Jouzi, Z., Azadi, H., Taheri, F., Zarafshani, K., Gebrehiwot, K., Van Passel, S., & Lebailly, P. (2017). Organic farming and small-scale farmers: Main opportunities and challenges. *Ecological Economics*, 132, 144-154.
- Karki, L., Schleenbecker, R., & Hamm, U. (2011). Factors influencing a conversion to organic farming in nepalese tea farms. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*, 112(2), 113-123.
- Läpple, D. (2010). Adoption and abandonment of organic farming: An empirical investigation of the Irish drystock sector. *Journal of Agricultural Economics*, 61(3), 697-714.
- Lockeretz, W. (Ed.). (2007). *Organic farming: An international history*. Wallingford, UK: CABI.
- Madau, F. A. (2007). Technical efficiency in organic and conventional farming: Evidence from Italian cereal farms. *Agricultural Economics Review*, 8(1), 5-22.

- Métouolé Méda, Y. J., Egyir, I. S., Zahonogo, P., Jatoe, J. B. D., & Atewamba, C. (2018). Institutional factors and farmers' adoption of conventional, organic and genetically modified cotton in Burkina Faso. *International Journal of Agricultural Sustainability*, 16(1), 40-53.
- Nghia, N. D., Minh, N. T., & Thao, P. P. (2016). *Technology trend analysis report: Trends and development of organic agriculture and cleaning agricultural products production in Vietnam*. Ho Chi Minh City, Vietnam: Center for Science & Technology Information and Statistics.
- Nguyen, D. H. (2021). *Vietnam's organic agriculture: A remarkable leap forward*. Retrieved February 24, 2021 from [https://nhachannuoi.vn/viet-nam-nam-o-dau-tren-ban-do-nong-nghiep-huu-co-toan-cau/#:~:text=Vi%E1%BB%87t%20Nam%20x%E1%BA%BFp%20th%E1%BB%A9%2032,th%E1%BA%A5p%20\(7%2C5%20%25\)](https://nhachannuoi.vn/viet-nam-nam-o-dau-tren-ban-do-nong-nghiep-huu-co-toan-cau/#:~:text=Vi%E1%BB%87t%20Nam%20x%E1%BA%BFp%20th%E1%BB%A9%2032,th%E1%BA%A5p%20(7%2C5%20%25)).
- Phat, C. T. (2022). *Organic farming: Current situation and development directions in Vietnam*. Retrieved February 21, 2022 from <http://tapchimatran.vn/kinh-te/nong-nghiep-huu-co-thuc-trang-va-mot-so-huong-phat-trien-tai-viet-nam-43780.html>.
- Reganold, J. P., & Wachter, J. M. (2016). Organic agriculture in the twenty-first century. *Nature Plants*, 2, 15221.
- Sapbamrer, R., & Thammachai, A. (2021). A systematic review of factors influencing farmers' adoption of organic farming. *Sustainability*, 13(7), 3842.
- Thu, D. (2020). *Converting organic production towards sustainable agricultural development*. Retrieved January 1, 2020 from <http://yenson.tuyenquang.gov.vn/tin-tuc-su-kien/kinh-te/chuyen-doi-san-xuat-huu-co-huong-phat-trien-nong-nghiep-ben-.html>.
- Wynen, E. (2006). Economic management in organic agriculture. In P. Kristiansen, A. Taji, & J. Reganold (Eds.), *Organic Agriculture: A global perspective* (pp. 231-244). Wallingford, UK: CABI.



일반 농법에서 유기농법으로 전환하는 것의 경제적 효율성 평가: 베트남 투엔꽁성 농가 사례를 중심으로

Do Hai Yen

Economic and Business Administration Faculty, Tan Trao University, Tuyen Quang, Viet Nam

이 연구의 목적은 투엔꽁 성에서 오렌지 농업의 전환 효율성을 평가하는 것이었습니다. 이를 위해 기술적 및 비교 통계를 사용하였으며, 60개 오렌지 농장을 대상으로 설문조사와 인터뷰를 실시했습니다. 이 샘플에는 전통적인 생산 방법을 사용하는 농장 30개와 유기농 방법을 채택한 농장 30개가 포함되었습니다. 해당 방법을 사용하여 유기농 오렌지 재배의 경제적 효율성을 평가하고 비교하였습니다. 연구 결과에 따르면, 유기농 방법을 사용한 오렌지 재배는 전통적인 방법보다 더 뛰어난 경제적 효율성을 보입니다. 유기농 방법을 사용하는 농장은 연간 헥타르당 101.7백만 베트남 동(VND)의 수익을 올리는 반면, 전통적 방법을 사용하는 농장은 연간 헥타르당 63.6백만 VND의 수익을 창출합니다. 따라서 유기농 오렌지 재배는 전통적 방법보다 1.6배 더 수익성이 높다는 것을 입증하였습니다. 또한, 연구는 투엔꽁 성 전역에서 유기농 오렌지 재배 모델을 확대하는 여러 가지 해결책을 제안합니다.

주제어: 경제적 효율성, 유기농 농업, 유기농 오렌지, 오렌지 생산, 투엔꽁 성

논문접수일 May 7, 2024

논문수정일 May 16, 2024

게재확정일 May 27, 2024

Corresponding Author

Do Hai Yen

Faculty of Economics and Business
Administration, Tan Trao University, Tuyen
Quang Province, Vietnam
E-mail: dhyen@tqu.edu.vn

저자

Do Hai Yen

Tan Trao University, VIET NAM Doctor of Development Economics Email: dhyen@tqu.edu.vn Dr. Do Hai Yen is a lecturer at the Faculty of Economics and Business Administration at Tan Trao University. She completed her Ph.D in development economics. Her research interests lie in the area of agriculture economics, organic farming benefit, marketing, agricultural value chain, sustainable development, forestry and enhancing livelihoods for forest communities. She has presented and served as an Invited Speaker for some International Conferences and Webinar held in Thailand, Philippines, Indonesia, Malaysia; being invited as a blind reviewer for various national and international Scientific Journals. (dhyen@tqu.edu.vn)