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RESEARCH ARTICLE

Increasing Agricultural Productivity, Quality and Quantity of Coffee and Tea Crops Planting and Marketing Mix Solutions - Methods of Eliminating Coffee Berry Borer and Insects in Vietnam

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ABSTRACT

In Vietnam, esp. In the northwest region, tea and coffee crops have been increasing in both quality and quantity and scientists are trying to find ways to increase productivity, as well as eliminate damaging insects and coffee berry borer, etc in order to reduce damages for farmers. The fact in agriculture is that when farmers are in good crops, the coffee price is going down and vice versa.

In our last paper, we have mentioned coffee berry borer, and until this paper, we will explore new issues of increasing productivity, quality and quantity for both tea and coffee crops in Vietnam, esp. in the northwest area. Among results is relating to coffee seeds and technique planting of farmers with suitable land area and the solutions and ways for farmers to earn profits after they invest into coffee and tea crops.

Our paper can be foundations for suggesting and setting agriculture development policies as well. For instance, we recommend that Completing the equivalent system of food hygiene and safety regulations/standards market in developed countries. Additional regulations on safety inspection and supervision food straight from the field. Last but not least, we proposed marketing solutions for farmers to expand exporting markets to other countries.

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Introduction

Ngo Thi Hong Hanh (2012) focuses on comparing and evaluating the economic efficiency of varieties of tea (midland tea and branch tea). Research results show that tea branches have higher criteria than midland tea trees, effective in production activities.

The production of tea branches brings higher economic efficiency than midland tea.

New planting, investment in renovating old tea, switching to intensive farming on Kinh tea area Business is being carried out by farmers at all levels. However, in fact the process. This transformation is still facing many challenges that need to be solved, especially for tea growers.

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Nguyen Thi Phuong Thao, Do Thuy Linh (2015) research on the participation of the poor into the tea value chain. Research results show that the poor difficult to join the chain and receive negligible benefits. The poor are productive, yield per unit of cultivated area and total product income tea is lower than that of the average and well-off households. Cause of the problem due to poor households lack of production conditions or harvested tea is only preliminary processed for sale, Meanwhile, well-off households have conditions to invest in tea production at all stages more effective.

Then, Waterhouse and Norris (1989) also mentioned that CBB attacked and has caused 96% losses in coffee crop in Africa.

In this paper we will explore not only strengths, weakness, opportunities and threats of Coffee (and tea) growing in the northwestern region of Vietnam, but authors also would suggest that Tay Bac provinces need to have both medium term and long term strategies in agriculture development esp. When Vietnam enter free trade agreements such as EVFTA and UK agreements.

Our paper organized with introduction, literature review, methodology, main results, discussion and conclusion.

Literature Review

Regarding how to organize and manage production for tea growing households, Tran Quang Huy's research (2010) focuses on assessing the influence of production factors on demand for cooperation (participation in cooperatives - cooperatives and the relationship between cooperatives and cooperative members) of households farmers produce and consume tea in key tea areas in Thai province Original. Nguyen Huu Tho and Bui Thi Minh Ha (2013) discuss the role of cooperatives in bringing added value to tea growing households. Do Thi Thuy Phuong (2014) Research on production and business activities of cooperatives in Thai Nguyen province including tea production and trading cooperatives. These studies are indicate the meaning and relationship between the relations of production (cooperatives) in accordance with the nature, presentation, level of productive forces (market power, competition and integration), thereby confirming determine the role of cooperatives in organizing tea growers to take advantage of production production to scale, increase bargaining power, meet the requirements of the market economy market, international economic integration.

Researching on enterprises in the tea industry, VBCSD (2015) focuses on analyzing, assessment of the competitiveness of enterprises with weaknesses in product inputs production (quality of human resources, scale of production capital and science and technology).

Although it is a major exporter in the world market, the output of industrially processed tea. The industry is quite modest, mostly in the form of preliminary processing. People do not have the habit of making raw tea processing. For enterprises, centralized production facilities still tend to mainly for exporting semi-finished tea. Vietnam can process about 15 types of tea. 1 With the concentrated tea growing in the Northern Midlands and Mountains, many challenges arise because this is an area with a very difficult terrain strongly dissected and with steep slope, strong and prolonged rainfall intensity, causing soil erosion and flash floods affecting the yield, yield and quality of tea. Most tea areas are concentrated in poor communes in remote areas especially difficult communes, weak infrastructure, slow-moving commodity-oriented production (Phan Thi Thanh Hoa 2018, Keen 2017, Do Thuy Thu Ninh 2015). The improvement from planting, harvesting to processing has great potential to improve the income and participation in the value chain of tea growers, especially tea farmers with poor households.

The study also pointed out barriers in the business environment for enterprises in the industry.

Next, Agergaard et al (2009) stated that Vietnam is the largest exporter of the world that export Robusta cofee and Daklak province is highly involved and dynamics in coffee market.

Then, Marsh (2007) specified that Compared to Arabica, Robusta is a lower valued crop, often receiving about half the price that Arabica receives per kilogram (kg) at farm gate. However, Robusta can be profitable, if grown intensively, with large inputs of fertilizer, water and labour, to give large yields. Farmers also benefit from the very transparent and competitive Robusta marketing system in Viet Nam, where more than 90 percent of the Free On Board (FOB) price goes to farmers.

And Mendonza (1991) figured out that we can use lured traps (methanol) for coffee berry borer-CBB management because they demonstrate the efficiency of the synergistic effects of this mixture in getting CBB. Silva et al (2006) stated many components such as climate, spacing, shade, cultivar, plant age, wind direction, speed, ect. that affect trapping efficiency. And the studies design of several traps to attract beetle.

Materials and Method

Authors mainly use qualitative analysis, synthesis and inductive methods, combined with historical and dialectical materialism methods.

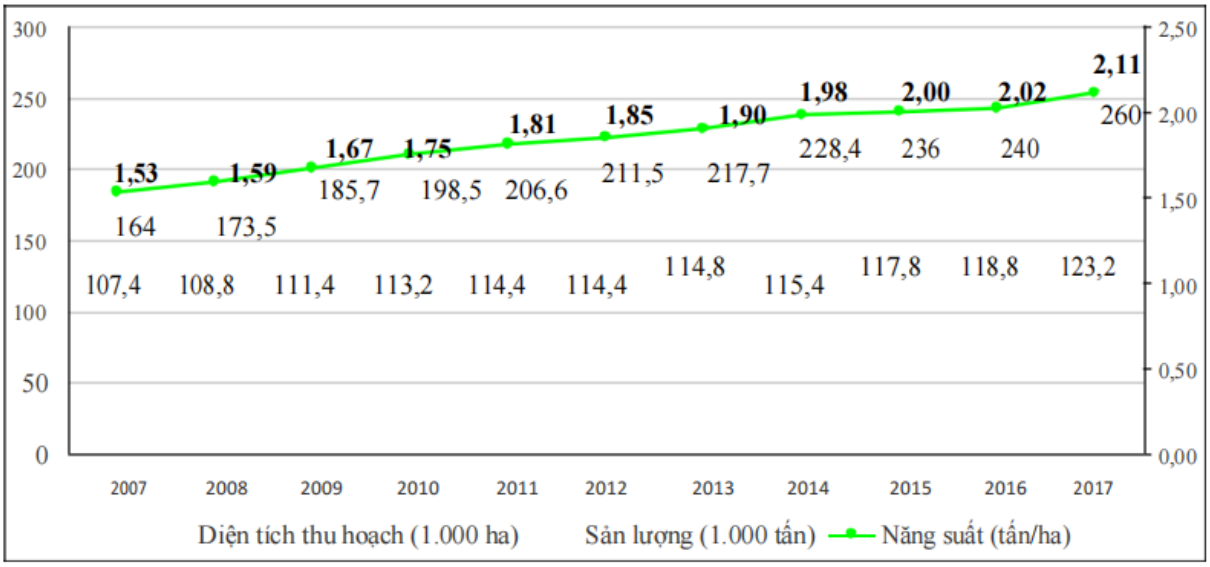
For quantitative analysis, authors use survey in tea industry in Thai Nguyen Province and statistics data analysis.

Main Results

Tea Planting

We has experienced that tea quality of Vietnam during period 2007-2017 in the below chart:

Chart 1. Area and quantity of tea in Vietnam 2007-2017



(source: www.fao.org)

In 2016, the tea growing area in the whole country reached about

132,100 ha but only about 9,300 ha (reaching 7%) with an output of about 790.5

tons produced according to standards certified by VietGAP.

Vietnam's tea production continuously increased in the period 2007 - 2017, at a rate of

4.72%/year and reached 260.0 thousand tons in 2017. Tea yield increased on average

3.27%/year for the past decade. Productivity growth rate is higher than growth rate

of area (1.38%/year) reflects that tea production in Vietnam is gradually entering the

depth, intensive farming.

Coffee Growing

First of all, we perform a SWOT analysis for coffee growing in TAY BAC region of Vietnam as follows:

- ***Strengths***

Dien Bien and Son La provinces of Vietnam has strengths in historical and geographical features and suitable land for growing coffee (and tea), while Thai Nguyen province is specialized for tea growing.

Son La has a system of mountains, esp. Hoang Lien Son in mountainous position, surrounding the basins, plateaus, coffee is grown on the slopes of the foothills of the low mountains or on the hilltops with an altitude of about 600m above sea level. Although the altitude of the coffee areas here is not ideal, Son La coffee is located in the range of 21 to 22 north latitude, hence, Son La coffee area has an equatorial symmetrical position.

- ***Weakness***

We need to expand more consuming markets, take advantages of free trade agreements such as EVFTA to enter big markets in the world, finding outputs for Vietnam farmers, in order to avoid low price when having good crops.

We also need to invest on innovation, science and technologies for post-harvesting of both coffee and tea more.

Tay Bac region of Vietnam also need to set up long term and medium term strategies for good coffee (and tea) crops.

- ***Opportunities***

In 2020-2021 and so on, free trade agreements and EVFTA with European countries and UK agreements will come into effect and open wide routes for our agricultural products such as coffee, tea…Farmers will approach with international standards and expand quantity and markets of coffee, tea and other agricultural products.

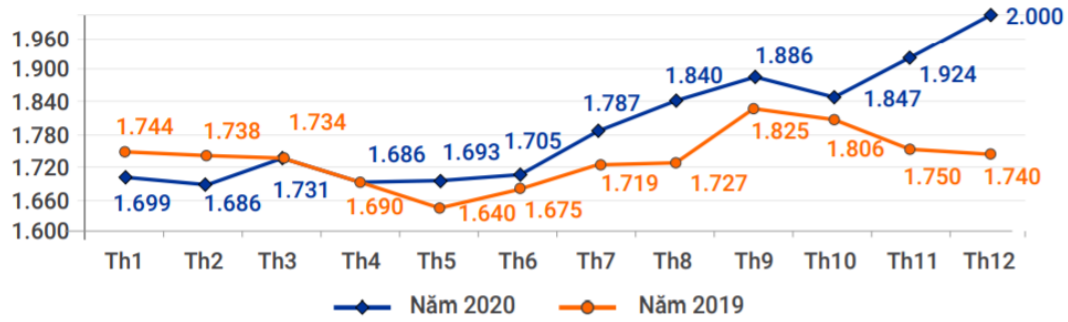
- ***Threats***

Farmers will note low quality of coffee and tea and other agricultural products will not be accepted to enter into the UK, European countries: Sweden, Belgium, the Netherlands, Germany, etc.

Next, In Vietnam we has experienced price of coffee consumed in the market via the below chart:

We figure out price of coffee has been increasing at the end of the year 2020 (2000 USD/ton) and in Sep 2019, and slow down in both May 2019 and 2020 (1.686 USD/ton).

Chart 2. Coffee price varying in 2020

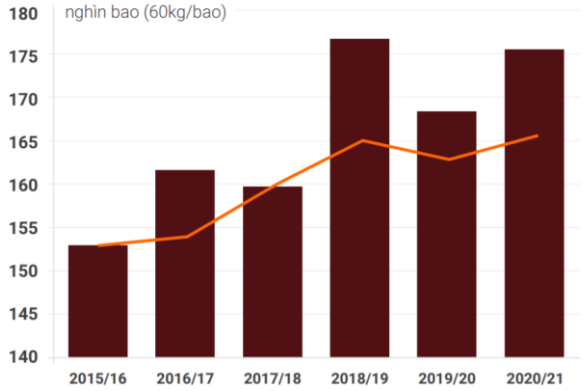


(source: Import-Export Bureau, unit: USD/ton)

Discussion

First we look at general picture of coffee market around the world via the below figure:

Chart 3. Coffee quantity consumed in the world



(source: vietnambiz.vn)

We has experienced that the world Coffee quantity tends to increase till 2018-2020 period from the above chart. This creates a trend for coffe products in the global scope.

Next in order to increase productivity of coffee (and tea) we need solutions to eliminate damaging insects.

Eliminating Damaging Insects and Coffee Berry Borer - CBB

We may use or design various traps to attract beetle a nd kill damaging insects.

On the other hand, Bui Thi Suu, Dinh Tran Ngoc Huy et al (2021) also stated that there is, in average number, by difference release rates of Methanol: Ethanol (1:1) shown in number is 0, 452, 715, 868 and 1050 mg day-1., presenting a statistically-significant difference of adult CBB caught weekly per trap.

They also mentioned that among solutions to to prevent and avoid the coffee berry borer (Stephanoderes hampei Ferrari), as known CBB has been affecting significantly and negatively, and has suggested to perform intergrated pest management on coffee auto-infection trap, together with auto-infection system implemented to explore practical and economic values for controlling pest.

Table 1. Mean number (± SE) of adult coffee CBB

Rate mg day^{-1}	Mean number of adult CBB (CBB/trap/7days)				
	December 5th	December 12	December 19	December 26	Total
1050	40.0 ± 6.6^{bc}	89.3 ± 11.7^{ab}	77.5 ± 16.5^{b}	39.6 ± 9.6^{a}	247.3 ± 11.2^{b}
868	58.4 ± 5.6^{a}	100.1 ± 7.9^{a}	136.3 ± 7.9^{a}	26.7 ± 2.9^{a}	310.4 ± 13.0^{a}
715	43.5 ± 3.6^{ab}	60.1 ± 7.8^{b}	58.6 ± 12.4^{b}	27.7 ± 2.2^{a}	189.9 ± 5.8^{c}
452	23.2 ± 2.6^{c}	68.5 ± 8.5^{ab}	66.7 ± 5.0^{b}	31.2 ± 5.9^{a}	189.9 ± 9.6^{c}
Control (Water)	0.9 ± 0.4^{d}	0.6 ± 0.2^{c}	0.2 ± 0.1^{c}	0.6 ± 0.2^{b}	2.2 ± 0.6^{d}
$F_{4,40}$	119.0	56.9	261.1	65.0	383.6
p	<2e-16	5.66e-16	<2e-16	<2e-16	<2e-16

(source: Bui Thi Suu et al, 2021).

Conclusion

Not only Vietnamese farmers need to pay attention to quantity of coffee and tea, but also focus on how to improve quality of coffee crops and eliminate damaging insects and coffee berry borer.

Last but not least, to serve for Vietnam agriculture sustainability, we also pay attention to apply agricultural quality standards such as VIETGAP or GLOBALGAP, etc.

Solutions for Increasing Tea and Coffee Productivity in Vietnam

A. Production Linkage between Farmer households, between Farmers and Enterprises

Investing in synchronous construction of infrastructure for agricultural production (irrigation, transportation, connection in production and with the market).

In the past period, Vietnam has had many priority policies for development investment industry and has achieved many important achievements. However, to promote food processing industry and agricultural and rural areas, In the next period, Vietnam needs to prioritize investment in infrastructure development for the agricultural sector (connecting roads; irrigation; agricultural product processing zones/groups; review service centers soil, water, agricultural products, etc.). The past few decades have confirmed, Agriculture is an industry with potential advantages and large spillover effects on labor rural areas, especially the poor and ethnic minorities. If interested properly from production, processing, branding to market entry developed countries, the potential contribution of this region to the economy will be high much more than now.

B. Regulation and Enforcement of Production Standards in Agriculture

Completing the equivalent system of food hygiene and safety regulations/standards market in developed countries. Additional regulations on safety inspection and supervision food straight from the field.

There are strong enough sanctions for goods that do not meet hygiene standards Food safety, poor quality imitations Strict enforcement, inspection and supervision related to quality standards quality (food safety, origin information, counterfeit goods).

C. Marketing Solutions for Coffee and Tea Products

In agriculture, we need to do marketing for farmers in term of 4P Marketing strategy: Price - Product - Place - Promotion.

This is what scientists called “marketing mix strategy” in agriculture sector, esp. For tea and coffee finished products.

4P in marketing is a marketing model that includes 4 basic elements: Product (Product), Price (Price), Place (Place), Promotion (Promotion). The level of success at applying the 4Ps in Marketing will strongly affect farmers’ revenues and profits.

Product: Farmers need to carefully select seeds and planting technology to produce good finished outputs

Price: setting competitive price to export

Place: managing better inventory keep them in good quality

Promotion: increase marketing channels and advertising and public relation (PR)

Model for Quality Management of Tea and Coffee and SWOT Analysis

Pham Van Hong, Nguyen Thao Nguyen, Dinh Tran Ngoc Huy et al (2021) also stated SWOT of applying VIETGAP in agriculture of Vietnam as follows:

Table - SWOT analysis of VIETGAP standards

Strength	**Weakness**
VIETGAP for better agriculture will specify, • Production technical standards: specify production techniques from the selection of soil, varieties, and fertilizers to harvest in accordance with specific regulations for each field of cultivation, husbandry and aquaculture. • Food safety: Including measures used to ensure that food is free from chemical contamination or physical contamination when harvested, absolutely safe when reaching the hands of consumers. Working environment: good arable land, adequate water resources to ensure standards to prevent the abuse of labor force of farmers. • Product Traceability: This standard allows the consumer to easily identify a product through the process from seed to finished product and put it on the market. At the same time through traceability, users will know complete accurate information about the manufacturing business. • For consumers, using products with food hygiene and safety quality. • They easily recognize products that ensure food hygiene and safety on the market when there is a VietGAP product certification mark.	• It will cost some money for farmers to follow VIETGAP process. • Some areas have not enough conditions about fertilized land: cannot apply VIETGAP.
Opportunities	**Threats**
• It helps to create products with high quality, stability and absolute safety for the health of users. • Creating competitive advantages, improve manufacturers' brands, process and distribute, create stable consumption markets. • Ensuring the output quality of the product, thus keeping its reputation with customers and increasing sales. • The year 2020 marks the EU (EVFTA). Vietnamese businesses can take advantage of looking up information on import and export of goods, exploiting information about explanations, instructions, frequently asked questions, … • The Vietnam Trade Office in Australia has just launched an application to support export and trade businesses, promote the locality of Vietnam, and connect businesses belonging to industry associations.... • The European Commission has opened the Access2Markets portal to support the import and export activities of European SMEs, at https://trade.ec.europa.eu/access-tomarkets/en/content Portal allowing businesses to look up the following tax information; rules of origin; product requirements; customs procedures; trade barriers; trade statistics.	• It faces challenges from new standards such as GLOBAL GAP. • It receives bad effects from trade war of Covid 19.

Limitation of the Research

We can also expand our research models for deeper analysis on coffee and tea crops in different regions in Vietnam and other emerging markets.

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