

CHAPTER I

INTRODUCTION

1.1 Background of the study

Agricultural sector including agriculture, forestry and fisheries plays an extremely important role in Vietnam economy. The sector is considered as the foundation for economic development and the implementation of national industrialization and modernization. It contributed 26.3 percent to GDP and nearly 40 percent to export earnings, provided jobs for some 24 million workers (70 percent of the labor force) and 80 percent of the 12 million rural households who directly or indirectly depend on agriculture in 1999. The agricultural production grew at a steady yearly average of 4.3 percent between 1990 and 1999 against population growth of 1.8 percent (Ministry of Fisheries, 2001).

Since 1986, Vietnam has progressed economic renovation towards a market economy and gained remarkable achievements. In spite of acceleration in economic growth, Vietnam remains among the poor countries in the world. At the 8th Congress of the Vietnamese Communist Party in 1996, a decision was made to give a high priority to hunger eradication and poverty alleviation as a part of the social and economic development program for the country. The objective of the program is to decrease the poverty rate to less than 10 percent by the end of the year 2005 (Vietnamese Communist Party, 1996).

In order to fulfill the objective of “hunger eradication and poverty alleviation” of the Vietnamese Government, the Ministry of Agriculture and Rural Development has been implementing a program coded “327” for greening barren lands and hills. Greening by fruit trees is one of the priorities for the program, in which litchi is considered as the most efficient crop for the program in northern Vietnam.

In recent years, fruit tree production has been developing and expanding rapidly in Vietnam, where there is a strong demand for exotic fruit and fruit with export potential. During the last twenty years of 20th century, fruit tree area in Vietnam increased continuously. In 1980, whole country had 210,800 ha of fruit trees but by the end of the year 2000, this figure reached 520,000 ha (nearly 2.5 times increased as compared with that of 1980). The proportion of fruit tree areas in the growing areas also increased from 2.24 percent in 1980 to 3.74 percent in 1988 and during this period its annual growth rate was 3.6 percent, of which the group of fruit trees of longan, litchi and rambutan increased rapidly (Tuc, 2001).

Litchi production has developed rapidly and became the main crop in some districts of Bacgiang, Haiduong and Quangninh provinces in northern Vietnam. However, litchi productivity of Vietnam remains relatively low as compared with those of some major producers. According to Mitra (2001), litchi yield varied widely among the growing countries, averaging from 1 to 15 tons ha⁻¹ in different countries of the world. In Taiwan, the productivity was about 9.4 tons ha⁻¹ as compared with 7.63 tons ha⁻¹ in India, 3.83 tons ha⁻¹ in Thailand, 2 tons ha⁻¹ in Vietnam, 1.8 tons ha⁻¹ in China and 1.66 tons ha⁻¹ in Australia. Because of this, litchi production in Vietnam still has a high potential to close the yield gap.

1.2 Overview of litchi production

Today, litchi is cultivated widely in the world, from the northern to southern hemisphere, from Asia to America, Africa and Australia although our globe has not many regions with a suitable climate condition for its fruiting since litchi is one of the most environmentally sensitive fruit trees.

1.2.1 History and original provenance of the litchi tree

Litchi or Lychee (*Litchi chinensis* Sonn.), which originated in southern China and northern Vietnam, belongs to the *Sapindaceae* family which is widely distributed in the tropics and warm sub-tropics. The most widely cultivated fruit trees in this family other than litchi are rambutan (*Nephelium lappaceum* L.) and longan

(*Dimocarpus longan* Lour.). The main center of origin of litchi is believed to be between latitudes 23-27⁰ North in the subtropical parts of southern China, northern Vietnam and Malaysia (Singh, 2001) because of the evidences found from the wild litchi trees and historical records. China has a long history of litchi cultivation for more than 2,000 years. From China it reached Burma (Myanmar) by the end of 17th century and was introduced in India and Thailand about 100 years later. Litchi reached Madagascar and Mauritius around 1870 and was introduced in Hawaii in 1873 by a Chinese trader. It arrived in Florida from India between the years 1870 and 1880, and was introduced in California in 1897. Litchi was probably brought to Australia by Chinese migrants in 1954, and arrived in Israel sometime between 1930 and 1940. China, Taiwan, Thailand, India, Vietnam, South Africa, Madagascar, Mauritius and Australia are now the major litchi producing countries in the world (Saucu and Menini, 1989).

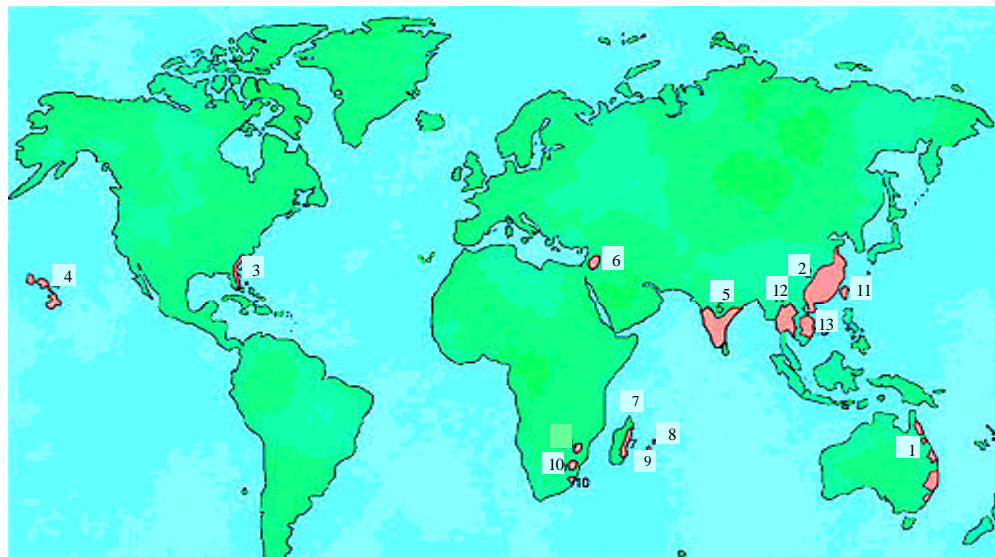
With respect to its common name, in Castilian, it would be "litchi", the name by which it is known in northern China, and "laichi", as it is known in southern China. Hence the confusion surrounds its name in English. For instance, in Florida, it is known as "lychee", while in Hawaii it is called "litchi". The common names in other languages are fairly similar. In Italian it is "lici", in Portuguese, "litchi or lichia" in French, "litchi" (Saucu and Menini, 1989).

1.2.2 World litchi production

The litchi (*Litchi chinensis* Sonn.) is one of the most environmentally sensitive fruit trees. It is adapted to the tropics and warm sub-tropics between 13- 32°North and 6- 29°South. It grows best in regions where winters are short, dry and cool but frost free, and summers that are long and hot (daily maximums above 25°C) with high rainfall (1,200 mm) and high humidity. Good protection from wind is essential. Litchi has a long history in Southeast Asia with unofficial Chinese records going back to about 2000 B.C. From about 1600 A.D., the species was distributed to much of the tropical and sub-tropical world, but it is currently not widely grown because it does not flower and crop successfully over a wide range of climates (Singh, 2001).

Acid soils with a pH of between 5.5 and 6.5 are generally recommended as ideal for commercial litchi production. They may also be planted in alkaline soils with a pH of up to 8.5, subject to an adequate supply of micro-nutrients being provided. It has also been observed that litchi grows better in soils in which their roots form mycorrhizal associations. This occurs very readily in acid soils containing abundant organic matter or in previously cultivated soils (Sauco and Menini, 1989).

Poor production of litchi is experienced in most countries. This is often because winters are not cool or dry enough to induce a growth check prior to flowering. Irregular flowering in litchi is related to variations in the timing of flushing. If early flush development when buds swell coincides in days of 20°C or cooler, then flower panicles will be initiated. On the other hand, if the warm or the cool weather arrives when the buds are longer than a few millimeters, then the flush will be vegetative (Menzen and Simpson, 1994).



Source: *Institute for Tropical and Subtropical Crops, 2002.*

Notes: 1. Australia, 2. China, 3. Florida, 4. Hawaii, 5. India, 6. Israel, 7. Madagascar, 8. Mauritius, 9. Reunion, 10. South Africa, 11. Taiwan, 12. Thailand and 13. Vietnam
The red color shows the litchi planted regions

Figure 1 Area distribution of world litchi production

Litchi production does not occur in many countries, the main distribution of world litchi production is shown in Figure 1. Figures for world litchi production are not easy to come by. One reason is that many producer countries do not compile statistics. An estimate prepared by Cadillat (1983) for 1981, put world litchi output at between 250,000 and 300,000 tons, of which India and China were major producers with the yields of 92,000 tons and 62,000 tons, respectively equivalent to 60 percent of the world output (Sauc o and Menini, 1989).

According to Singh (2001) in the report of “The Expert Consultation on Litchi Production in the Asia-Pacific Region” held by the FAO in May 2001 in Bangkok, there were approximately 1,700,000 tons of litchi produced in Asia. Total production in the Southern Hemisphere (mainly Africa, Madagascar and Australia) was around 50,000 tons in 1999. There were also small industries in the USA and South America. The largest producers in Asia were China (1,000,000 tons), India (430,000 tons), Taiwan (110,000 tons), Thailand (85,000 tons) and Vietnam (40,000 tons). Further expansion is occurring in these as well as other countries to meet demand generated by the increasing regional affluence. In some of the traditional growing countries of Asia, the production is easily outstripped by local demand, although expansion is limited by available horticultural land.

1.3.3 Litchi production in Vietnam

Northern Vietnam includes part of the geographical area where litchi originated. Nowadays, litchi production occurs mainly in the mountainous region bordering the northern edge of the Red River Delta in northern Vietnam. Although litchi has grown in Vietnam for many centuries, its production has only expanded rapidly since the past ten years. There has been no annual formal statistics data on litchi production in Vietnam. In 1998, the total area under cultivation was estimated about 25,000 ha, with 10,000 ha under bearing trees and the total production was 27,000 tons (Trung, 1999).

In the year 2000, litchi production was estimated to be about 40,000 ha and approximately 50,000 tons (Table 1). The provinces of Bacgiang, Haiduong, and

Quangninh were the leading ones for litchi cultivation. About 70-75 percent of the fruit was locally consumed with the rest being exported to China, Hong Kong, ASEAN and European countries. Although many varieties of litchis are now grown in the northern provinces of Vietnam, only one variety called “Thieu-Thanhha”, which dominates over the others with more than 90 percent of the production is extensively grown for commercial purposes (Hai and Dung, 2001).

Table 1 Area and production of litchi in Vietnam, 2000

Province	Area (ha)	Production (tons)	Remarks
Bacgiang	20,275	20,248	
Haiduong	9,325	11,645	
Quangninh	4,925	6,840	
Thainguyen*	3,640	-	Not available
Hoabinh*	1,660	-	Not available
Others	827	-	Not available
Whole country	40,652	Approx. 50,000	

Source: Hai and Dung, 2001; (*) Loc, 2000

According to Hai and Dung (2001), the main constraints for litchi production in Vietnam were lack of elite varieties, the short harvesting period (about one and a half months), unavailability of high quality planting material, poor crop management practices, and inadequate technical knowledge of the extensionists and the farmers. The other constraints that hold back litchi production in Vietnam were considered to be lack of post-harvest technologies involving equipment and facilities needed for fruit preservation, and storage. To improve the situation, it is necessary to cooperate with regional and international institutions concerned to exchange and diversify genetic resources, from which well-adapted superior varieties could be identified and developed; and to get experience in integrated crop management practices.

1.3 Statement of the problem

Litchi is a preferable fruit tree because of its exceptional taste and high demand in the market. Many researches on litchi production mostly focused on cultivation

technique aspects such as planting, fertilizing, irrigation, pest and disease control, propagation (by seed, grafting, cutting and layering), pruning, pollinating, and post-harvest technology. There have also been some studies on economic analysis of litchi production that mainly expressed the cost-benefit analysis. Moreover, up to now the empirical studies on technical and allocative efficiency using the stochastic frontier production function approach conducted in Vietnam, have focused on annual crops only. Surprisingly, these studies ignored perennial crops, especially fruit trees in which litchi is a symbolic case.

The prospects of reduction in inefficient input use or input saving, improving productivity and increasing income of the litchi farmers, given the inputs and existing technology have been paid much attention by authorities, economists and producers. In other words, the farmers have not achieved the full potential output yet with given input levels that they can afford. This occurs due to the farmer's management capability that relates to lacks of awareness of cultivation practices. The question raised here is how to estimate the litchi potential outputs, to measure the factors that affect litchi yield and the determinants of technical inefficiency, and to give policy implications for the litchi production industry of the country.

Potential for further development of litchi industry appears to be good. However, the litchi is one of the most environmentally sensitive fruit trees, under rapid development and inadequate knowledge on appropriate crop cultivation practices, production process may cause deviations of productivity and technical efficiency among the producers in the region. This study therefore focuses on the cultivation practices and yield gap problem that are expressed by an evaluation of the factors affecting litchi yield through quantitative methods.

1.4 Objectives of the study

The overall objective of the study is to investigate the existing litchi production system and its management practices to identify and to evaluate the factors affecting litchi productivity. The specific objectives of the study consist of the followings

1. To describe the litchi production system in Bacgiang province
2. To estimate a stochastic frontier production function of litchi yield, and evaluate the factors affecting litchi yield in the area, and
3. To draw technical efficiency of the specific litchi farms and to identify the factors causing technical inefficiency

1.5 Usefulness of the study

Measuring productive efficiency of the firm is always a concern of scientists, policy makers, and economists. The estimations of frontier production function and technical efficiency are important to know about the difference between the actual output and potential output, and how far a given firm can be expected to increase its output by simply increasing its efficiency without absorbing any further resources. Due to the scarcity of resources, the policy makers must make the best use of what they have in order to get more and more income.

Study on technical efficiency would provide best practices for those who have not achieved potential output, background knowledge for decision making and policy incentive implication for improving litchi production as well as for further study on this field in Vietnam.

Estimates on extent of inefficiency can also help the policy makers decide whether to improve efficiency or develop new technologies to raise agricultural productivity in case the industry is fully efficient.