

# SPATIAL AND INSTITUTIONAL ORGANIZATION OF VEGETABLE MARKETS IN HANOI

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## **FOREWORD**

This work takes place within the framework of the regional AVRDC-CIRAD project Sustainable Development of Peri-urban Agriculture in Southeast Asia (Susper) project. It is the first issuance of results from continuous teamwork between CIRAD (Paule Moustier and Isabelle Vagneron) and RIFAV (Hoang Bang An, Le Nhu Thinh, Dang Dinh Dam, Ngo Van Nam, Le Thuy Hang, Trinh Quang Thoai).

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## SUMMARY

Thanks to improving living standards, Vietnamese have been consuming increasing amounts of fresh vegetable over the past ten years. Yet, the market for fresh vegetable seems quite sketchy and disorganized. The aim of this research is to provide a more transparent picture of this apparently chaotic market, by addressing questions related to: the origin of the vegetable sold in Ha Noi at different times of the year ; the means of transportation used ; the organization of the vegetable marketing chains; the relationship between seasonality, the geographic origin of vegetables and the marketing chain; the atomicity of the market and its consequences in terms of organization; and the opportunities for developing off-season production for various vegetables.

To answer such questions, surveys were conducted in March, June, August and November, in order to take into account changes in the origin of the products, and in the organization of the supply chain. The interviews focused on the different actors participating in Ha Noi's main vegetable markets; e.g. producers (if they sold vegetables themselves), wholesalers, assemblers, retailers, etc. The survey was carried out on the main wholesale or producer markets, i.e. markets on which vegetable products are exchanged overnight between traders, wholesalers, assemblers and/ or producers (who bring the products from the main production areas), and the retailers (who sell them to the urbanites during the day). Seven retail markets were surveyed during the daytime.

The main results of the survey indicate that:

Almost all leafy vegetables sold in Ha Noi are grown close to the city: 95-100 % of the lettuce comes from less than 20 km away, and 73-100 % of the kangkong is grown within 10 km from the city. Although leafy vegetables can be grown throughout the year, their yield may decrease during the cold season. Yet, these vegetables never come from outside the Red River Delta.

Most temperate vegetables (carrot, tomato, and headed cabbage) sold in Ha Noi come from the Red River Delta during the cold season. When the climatic conditions are favorable (in March and November), 75 % (resp. 90 %) of the tomatoes (resp. cabbages) sold in Ha Noi come from less than 30 kilometers away from the city. Changes in the origin of the temperate vegetables sold in Ha Noi occur mainly during the hot and wet season (July-September), with vegetables coming from as far as Son La and Lam Dong provinces or China (resp. 6 %, 14 % and 80 % of all tomatoes sold in August).

Most vegetables are transported by two-wheeled vehicles (bicycles and motorcycles). A very small share of the total amount of vegetables (1 %) is transported by trucks.

Producers represent 43 % (August) to 65 % (March) of the sellers present on the markets. One quarter of the sellers stop selling vegetables on the market several months per year. 81 % of these sellers are producers, who quit selling in the hot wet season because they do not have enough products to sell (84 %), and because they are busy in their farm (40 %).

During the high season, most temperate vegetables are either directly brought by the farmers to the markets, or sold by the farmers to the traders present on the markets. As the season

fades away, the farmers become less present: tomato producers represent 79 % of the sellers present on the night markets in November, are completely absent in June (tomatoes are then sold by traders supplied by wholesalers), and represent 11 % of the sellers in June.

Leafy vegetables are mainly sold by the producers themselves, yet traders are more present at some times of the year. In March, June, August and November, all kangkong sellers present on Ha Noi wholesale markets are farmers who come to the markets with their production and sometimes that of other farmers. Choysum is sold mainly by the producers in March (81 %) and June (67 %), while 85 % of the lettuce sold between March and November is sold directly by the producers.

Seasonality was also studied through the analysis of vegetables retail prices gathered on two urban and two peri-urban markets of Ha Noi. These prices series, which cover a five-year period (1996-2001), were provided by the General Statistical Office of Vietnam (GSO). The data show that: (1) vegetable prices have been growing faster than the overall price index over the study period, which may be explained by the increasing demand for vegetables; (2) vegetable prices experience very strong seasonal variations, especially temperate vegetables that must be brought from distant provinces or even China during the summer. Seasonal variations in the price of vegetables match the survey results on the origin of fruitify vegetables, and changes in the activity of the markets over the year.

In conclusion, this study links together seasonality, the organization of supply, the origin of the vegetables sold, the identity of the vegetable sellers and the overall level of activity on the markets. Moreover, it highlights the major role played by peri-urban farmers in the supply of food to the city. Finally, it stresses the importance of off-season production, through the extension of hot season production for temperate vegetables (tomatoes, cabbages) in the vicinity of Ha Noi, and through the diversification of production away from some of these crops (cabbages) during the cold season. Finally, the number of farmers present on the markets and the atomized nature of vegetable trade, both put the accent on the need for improved information flows about prices, volumes and areas of production throughout the year.

# INTRODUCTION

The main idea of the second module of the SUSPER project – “*Market development of peri-urban food commodities*” – is to provide a more accurate picture of the spatial and institutional organization of vegetable markets. It is essential to enhance our understanding of how markets function over the year. By understanding this we can achieve such objectives as helping harmonise peri-urban production with urban consumption in terms of quality, quantity and regularity. Additionally we can determine how information can be efficiently spread among the actors of the market in order to reach as many people as possible. In this perspective, a study of the organization of the vegetable marketing chain was carried out throughout 2002. A survey, carried out in various seasons, focused on such issues as: (1) seasonal variations in the origin, price and amount of vegetable sold in Hanoi. (2) The identity and the distribution of responsibilities among the different actors involved in fresh vegetable markets and (3) mapping out vegetable flows between Hanoi and the surrounding areas.

## I - THE SURVEY

### A) METHODOLOGY

#### 1. Scope and method of the survey

The interviews focused on the different actors participating in Hanoi’s main vegetable markets – the producers (if they sold vegetables themselves), the wholesalers, the retailers, the transporters, the basket vendors, etc. The survey was thus carried out at the main wholesale or producer markets. Precisely *markets at which vegetable products are exchanged overnight between traders, wholesalers, assemblers and/or producers (who bring the products from the main production areas), and the retailers and basket vendors (who will sell them to the urbanites during the day)*. A number of retail markets were also surveyed during the daytime.

Five rounds of surveys have been completed so far; March, June, August, November and January. The surveys were carried out with a standardized questionnaire. They focused on a fairly representative sample of traders present at Hanoi’s main wholesale and retail markets. The survey comprises a total number of 1,369 interviews distributed as follows:

**Table 1 – Number of surveys per season and per type of market**

	Wholesale		Retail		Total	
	Census	Survey	Census	survey	census	Survey
March	604	124	238	61	842	185
June	797	183	213	70	1,010	253
August	1,403	245	216	71	1,619	316
November	1,587	254	231	51	1,818	305
January	1,238	247	252	63	1,490	310
Total	5,629	1,053	1,150	316	6,779	1,369

In order to have a better idea of the variations in the origin, the types of vegetable sold, and in the marketing chain that occurs within the year, various rounds of surveys were carried out at different times of the year corresponding to different production seasons (Table 2).

**Table 2 – Vegetables selected for the different rounds of survey**

Month	Vegetables	nb.
March	Cabbage, Chinese cabbage, choysum, cucumber, kangkong, lettuce, tomato, and yard long bean	8
June	Cabbages, Chinese cabbage, Ceylon spinach, choysum, cucumber, kangkong, lettuce, smooth <i>loofah</i> , tomato, <i>wax gourd</i> , <i>vegetable mustard</i> and yard long bean.	12
August	Cabbage, Chinese cabbage, Ceylon spinach, choysum, cucumber, kangkong, lettuce, smooth loofah, <i>spring onion</i> , <i>star gooseberry</i> , tomato, wax gourd, vegetable mustard and yard long bean.	14
November	Cabbage, <i>cauliflower</i> , Chinese cabbage, choysum, cucumber, kangkong, <i>kohlrabi</i> , lettuce, <i>radish</i> , spring onion, star gooseberry, tomato, vegetable mustard and yard long bean.	14
January	Cabbage, carrot, Chinese cabbage, cauliflower, choysum, cucumber, French bean, kohlrabi, lettuce, radish, spring onion, tomato, vegetable mustard, wax gourd.	14

A pre-survey was carried out the last week before Têt<sup>1</sup> celebrations at two retail and two producer markets of Hanoi. A total number of 39 questionnaires were completed on this occasion. The aim of this pre-test was not to gather observations. Rather it was to: (a) make sure that the surveyors understood the questions and were able to carry out the survey; (b) check whether the questions were consistent and well understood by the interviewed persons; (c) assess the duration of the questionnaires; and (d) give a first picture of the quality of the data gathered.

## 2. Methodological problems encountered

Various problems came to light during the course of the survey, among which the following shall be briefly discussed:

- ★ The large number of retail markets in Hanoi made it quite difficult to select the markets for the survey. As a consequence, a sample of middle-sized markets disseminated within the city was drawn, which does not take into account the very numerous small local markets. A special study should focus on both the small local markets, and on basket street vendors, which represent an important channel through which Hanoi's inhabitants buy their food.
- ★ Vietnamese households consume a wide variety of vegetables, not all of which are available throughout the year. In order to take into account the seasonal variations in the range of products available on the markets, a census was conducted the week before each round of surveys at all relevant wholesale and retail markets. The traders selling the different vegetables were counted and a list was made. The vegetables representing 80% of vegetables sold by all traders on the markets were then kept for the survey held the following week. The main idea was to focus on the vegetable sold by the largest number of traders, as determined by the preliminary census.
- ★ Identifying the night markets was not difficult, yet important changes occurred at the time of our survey, necessitating adjustment of our list of night markets. Dich Vong market located in the western part of the city – next to Cau Giay – was created in March 2002, and was included in the survey from the 2<sup>nd</sup> round onwards. Phia Nam, the new southern wholesale market scheduled to replace Mo and Nga Tu So night markets<sup>2</sup>, started operating in August 2002. As a consequence, Mo night market was abandoned by the traders (and thus by the surveyors), while Nga Tu So night market kept operating. These changes appear in the 3<sup>rd</sup> round of surveys.

<sup>1</sup> The Vietnamese (Chinese) New Year.

<sup>2</sup> According to the People's Committee of Hanoi, and to the manager of Phia Nam market.

- ★ The method used by the interviewers to “choose” the traders to interview is linear systematic walking. The interviewers stop at every five traders for night markets, and every three traders for daytime retail markets (one out of four practiced for the first round did not give enough data).
- ★ Time of the surveys. The surveys were made more strenuous by their schedule – night markets operate from 2:00 am to 6:00am each day.
- ★ During the surveys, traders often conceal the exact origin of the vegetables, i.e. those coming from China. Indeed, Chinese products have a bad reputation related to the excessive use of chemical products. Most surveyors are aware of this problem, and declare being able to recognize the vegetables from China themselves, using a set of criteria including the physical aspect, the price, and the packaging of the vegetables. Moreover, vegetables from China are mainly sold at Bac Qua and Long Bien markets.
- ★ Estimating the quantities. If the estimation of the total amount of vegetables sold in Hanoi is one of the targets of this survey, it will be necessary to know where the customers come from in order to be able to assess the final destination of the vegetables. An in-depth study of peri-urban wholesale markets (Dong Anh, Gia Lam) should also provide interesting outcomes. Finally, the imbalance between the number of wholesale and retail markets also calls for a survey of the consumers, so as to identify where they buy their vegetables.

## **B) Hanoi’s main wholesale and retail markets (See Appendix - Map 1)**

In Hanoi, many markets take place on streets and alleys. According to the Trade Department, the city counted 300 markets (100 of which were schemed) in September 2001. 40 old and new markets are planned to be built and improved. Among the wholesale markets surveyed, only Dich Vong market and the new Southern market (Phia Nam) were planned, the remaining are all spontaneous markets. We give below the characteristics of the five Hanoi wholesale markets (which were all surveyed) and of the seven retail markets, which were surveyed.

### 1. Wholesale markets

- *Long Bien and Bac Qua.* Long Bien and Bac Qua markets are located in the northeastern part of Hanoi (Hoan Kiem district), next to Long Bien and Chuong Duong bridges. They are connected through the river and the road system to the cities of Hai Phong and Hai Duong; to Lang Son, Bac Ninh, Hung Yen, and Vinh Phuc provinces; and to Gia Lam and Van Giang districts. Long Bien train station is very close. Long Bien market was created in 1991-92. It covers a total area of 1,800 m<sup>2</sup>. These markets were initially built for the consumers. However, thanks to its favourable location, Long Bien market soon became a major market for buying and selling fruits and vegetables.

Vegetables are traded on the pavement along Tran Nhat Duat and Yen Phu streets, from 2:00 a.m. to 6:00 a.m. every day. The daytime retail market is located on the other side of the street. The vegetables sold here come from the Red River Delta and the northern midlands, thus allowing for a great variety of supplies. During the hot wet season, temperate and tropical vegetables are transported to the market from Da Lat or China.

The geographic location of Long Bien and Bac Qua markets (at the convergence of waterways, roads, and railways) is a big advantage. Moreover, these markets are located in densely populated residential areas, where the consumption of vegetables is important. However, since nighttime trading activities are spontaneous, the place where the vegetables are traded was not schemed properly. Consequently, trade greatly affects the city’s traffic (especially in the early morning) and the surrounding environment (noise, smells, waste, etc.).

- *Dich Vong market.* This market is located in the northwestern part of Hanoi (Cau Giay district). Dich Vong market is one of the 8 agricultural and foodstuff markets planned for Hanoi. It has been operating since late 2001. The market covers an area of 5,000 m<sup>2</sup> and comprises of three roofed buildings. There is a selling section for each sort of vegetable. Many universities, colleges, and state agencies are located in this area. This creates great conditions for the trade of agricultural products, especially fresh vegetables. The market is located near a junction where Xuan Thuy street (leading to Ha Tay and Thang Long) and Noi Bai highway (leading to Vinh Phuc, Thai Nguyen and the vegetable producing areas in Dong Anh and Tu Liem) meet. Vegetables are sold from 2:00 a.m. to 7:00 a.m. Customers are mainly hotels, street vendors and consumers. The vegetables sold here come from Hung Yen, Vinh Phuc, and Ha Tay provinces. Some wholesalers buy vegetables from Long Bien market and resell them at Dich Vong market (these vegetables often come from Lam Dong and China). A day market operates in the daytime.
- *Phia Nam (Southern market).* This is located in the southern part of Hanoi (Hai Ba Trung district), near Den Lu residential area. It is one of the biggest agricultural markets in southern Hanoi, with a total area of 23,400 m<sup>2</sup>. The warehouse area for agricultural products is the biggest with 7,462 m<sup>2</sup>. It is divided into three buildings. Trucks can bring the goods right to one of the 136 stands. The night market section covers 2,200 m<sup>2</sup> (400 stands have started since 1/8/2002) and the daytime retail section covers 1,400 m<sup>2</sup> (96 stands). The southern market is located near the ring roads in the SouthEast and South West (Thanh Tri bridge, Phap Van- Cau Gie street). The vegetables sold here come from the outskirts of Hanoi (Thanh Tri and Thuong Tin districts), from neighbouring provinces (Hung Yen, Ha Tay, Vinh Phuc), as well as provinces located further away (Son La).
- *Nga Tu So market.* This market is located in the southwestern part of Hanoi (Thanh Xuan district). It was founded in the 1990's. It is located near the New bridge, at So intersection between Nguyen Trai street (to Ha Tay, Hoa Binh), Truong Trinh street (to the southern provinces), Tay Son street and Lang street. Initially planned as a day market for the area, it spontaneously became a night market for vegetables. Vegetables are traded by wholesalers from the vegetable producing areas around Hanoi – Ha Tay, Vinh Phuc, Hung Yen provinces. This trading activity mainly takes place at night; from 2:00 a.m. to 6:00 a.m. Vegetables are bought and sold along Nguyen Trai street (500 m). With its present position, time, and character, the market is greatly affecting the traffic and the environment. Day market continues in the same area.
- *Cau Giay market.* This market is located in the southeastern part of Hanoi (Cau Giay district), between So intersection and Dich Vong. It is situated near the Lang-Hoa Lac highway to Ha Tay. Like Nga Tu So market, Cau Giay was planned to be a day market. Yet, the trade of vegetables from the provinces around Hanoi – Ha Tay, Hung Yen, Vinh Phuc – still takes place there. Vegetable trading activities mainly take place during the night, from about 2:00 a.m. to 6 a.m. Vegetables are bought and sold along Lang street (500 m). Although the market is small, the trading activities are quite important, with volume and types of vegetables comparable to Nga Tu So or Dich Vong markets. Again, this greatly affects the traffic, security (mainly theft) and the environment.

## 2. Retail markets

- *Hom market.* This market is located in Hai Ba Trung district. It was reconstructed and started operating in 1993. It covers a total area of 6,038 m<sup>2</sup> (3 floors) and counts more than 600 stands trading different goods, 500 of which have their business registered. Vegetables are sold on the first floor, near the market's gate. The area for selling vegetables is about 300 m<sup>2</sup>. About 30 permanent stands sell vegetables. Fresh vegetables are displayed and sold on tables. In addition to permanent stands, there are some less regular retailers. Hom market has three gates leading to Pho Hue, Bui Thi Xuan and Ngo Thi Nham streets. Many vegetables sold there come from Bac Qua market, some are sold to retailers at the market by sellers. This big market is quite popular.

- *Thanh Cong market.* This market is located in Ba Dinh district. The market was founded in the 50s and covers a total area of 14,000 m<sup>2</sup>. There are about 320 stands selling different products, among which 40 are permanent stands. The vegetable selling section covers an area of about 250 m<sup>2</sup>. Vegetable stands are not concentrated in one place, which is not convenient for customers. The market is located near the residential areas of Thanh Cong and Giang Vo streets, so the number of customers is quite big and stable. Although the market takes place during the day, many people from vegetable producing areas around Hanoi come here around 3:00 a.m. to sell their products. Many Thanh Cong' retailers buy vegetables here and resell in the daytime.
- *Mo market.* This market is located in Hai Ba Trung district, right at the corner between Bach Mai and Minh Khai streets – an important intersection between the North-South highway and the city center. It was founded in the 1950s and covers a total area of 14,000 m<sup>2</sup>. The vegetable section covers an area of about 250 m<sup>2</sup>. There are a total of 900 stands, 800 of which have their business registered. In addition to 18 regular vegetable stands, some traders selling vegetables are scattered outside the market, which is convenient for buyers but influences the city's beautiful looks, the environment and the traffic. The market used to take place both during the day and at night. However, since the creation of Phia Nam southern market, Mo night vendors were relocated there. Mo day market still takes place as usual.
- *Buoi market.* This market is located in Tay Ho district. It covers an area of about 5,300 m<sup>2</sup>. The total number of stands in the market is 300, among which 170 are registered businesses. The vegetable section covers 200 m<sup>2</sup>. There are 20 permanent vegetable stores. The vegetable section is located next to the gates leading to Lac Long Quan and to Thuy Khue streets. Most vegetables come from Cau Giay and Dich Vong markets, the sellers bring the rest. The market takes place from 5:00 p.m. to 19:00 p.m. daily.
- *19-12 market.* This market is located in Hoan Kiem district – its usual name is "Hell market". It has two gates: one leads to Hai Ba Trung street, the other to Ly Thuong Kiet street. The market is organized quite similarly to other retail markets. A special section for fruit and vegetable trade gathers most vegetable stores (about 30). Several vegetable stores are also scattered at different places of the market. Many vegetables sold at 19-12 market come from Bac Qua, Cau Giay, and Dich Vong markets, but large amounts of vegetables are directly brought to the retailers by the sellers. Many vegetables are sold here to various customers including restaurants, hotels, and foreigners. The layout of vegetables stores in the market is relatively convenient for trading. However, the scattered stores should be regrouped into the fruits and vegetables section so that it will be more convenient for buying and management.
- *Hang Da market.* Hang Da market is located in Hoan Kiem district. Its gates lead to Hang Da, Nguyen Van To, and Thanh street. The market has 2 floors, the vegetable section is on the first floor, near the market's gates. About 35 people sell vegetables everyday. Many types of vegetable are sold at the permanent stores. Vegetables sold here come from Bac Qua, Cau Giay, and Dich Vong markets. A very low proportion of the vegetables sold are directly supplied at the market by the sellers. This is because Hang Da is very close to the main wholesale markets, which makes it convenient for buying and selling vegetables.
- *Hang Be market.* This market is located in Hoan Kiem district, next to Dinh Liet, Hang Be, Cau Go streets. The vegetable section is scattered near the entrance and is not organized. About 40 people sell vegetables every day. The number of sellers here outnumbers other retail markets. However because the sellers are scattered in the market, it is inconvenient for the management of aesthetics and for buying and selling. Many types of vegetables are sold in permanent stores, while irregular retailers sell a smaller range of vegetables. The vegetables sold here mainly come from Bac Qua, and Long Bien markets. The amount of vegetables directly sold to the retailers at the market is very low.

## C) VEGETABLE PRODUCTION IN NORTH VIETNAM

### 1. Climatic data and production schedules

Climatically, North Vietnam experiences four distinctive seasons – hot and dry, hot and humid, cold and dry, cold and humid (Table 3). Monthly minimum air temperatures vary between 14°C (in January) and 26°C (in June-July). July is the sunniest month, with 194 hours of sunshine, while the less sunny month is February with 29 hours only. Over the year, the average rate of humidity is 80 %. The hot and humid season (June-August) is not very suitable for temperate vegetable, both because of the high monthly temperatures (up to 33°C in July), and heavy precipitations (288 mm in July). Conversely, the cold season, characterized by cool temperatures and light rainfalls, is much more appropriate for temperate vegetable crops.

**Table 3 – Climatic data for Hanoi**

	hot & humid			cold & dry			Cold & humid			Hot & dry		
	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Temperature (°C)												
Mean Daily Max.	<b>32.9</b>	31.9	30.9	28.6	25.2	21.8	19.3	19.9	22.8	27.0	31.5	32.6
Mean Daily Min.	<b>26.1</b>	25.7	24.7	21.9	18.5	15.3	<b>13.7</b>	15.0	18.1	21.4	24.3	<b>25.8</b>
Mean	28.9	28.2	27.2	24.6	21.4	18.2	16.4	17.0	20.2	23.7	27.3	28.8
Rainfall (mm)	288	318	265	131	43	23	19	26	44	90	189	240
Humidity (%)	82	81	83	79	74	77	77	80	87	85	79	76

Source: Statistical Yearbook, various years.

Such weather conditions make it possible to grow most leafy vegetables (kangkong, Ceylon spinach, choysum) throughout the year, but render the year round production of temperate vegetables (tomato, headed cabbage, carrot) much more problematic (Table 4).

**Table 4 – Technical production information for North Vietnam**

Vegetable	Best season	Cycle length	Type of cultivation	Nb. of harvests	Perishability
Cabbage	all year	60-80 days	Bed	One	*
Carrot	October-May	90-120 days	Bed	One	*
Ceylon spinach	all year	45-50 days	Bed	Several	****
Chinese cabbage	October-June	50-70 days	Bed	One	***
Choysum	all year	30-40 days	Bed	One	****
Cucumber	all year	45-70 days	bed, staking	6-12	***
Kangkong	all year	40-50 days	water, bed	once/month	****
Lettuce	August-June	30-60 days	Bed	One	****
Radish	October-June	50-90 days	Bed	One	**
Smooth loofah	all year	120-150 days	bed, staking	Several	**
Spring onion	October-June	60-70 days	Bed	One	****
Star gooseberry	all year		Bush	Several	**
Tomato	October-June	90-150 days	bed, staking	5-15	**
Vegetable mustard	all year	30-40 days	Bed	One	****
Wax Gourd	all year	100-160 days	bed, staking	Several	**
Yard long bean	all year	45-90 days	Staking	Several	***

Sources : H. de Bon, To Thi Thu Ha, Toscano-Gil B. 2002. *La production maraîchère pendant la saison chaude autour de Hanoi. Cahiers Agricultures*, 11: 323-31. J.S. Siemonsma and Kasem Pilnek (eds). 1994. *Plant Resources of South-East Asia*, n°8, *Vegetables*, Prosea, Bogor, Indonesia, 412 p.

## 2. Vegetable production in Northern Vietnam

Northern Vietnam includes the Red River Delta<sup>3</sup> and the North Mountain and Midland regions. North Vietnam accounts for 41 % of the total vegetable area, and for 44 % of the total vegetable production. The Red River Delta alone accounts for 23 % of the total vegetable area, and for 29 % of the total vegetable production (Ali, 2002, p. 111). Table 5 summarizes some features of the main vegetable producing provinces<sup>4</sup>.

**Table 5 – Vegetable production in various provinces**

Provinces	Total Area (ha)	Vegetables					
		Area ('000 ha)		Yield (kg/ha)		Output ('000 tons)	
		1999	2000	1999	2000	1999	2000
Bac Ninh	79,900	8.0	8.3	142.4	138.1	113.9	114.6
Hai Duong	166,100	20.2	<b>21.3</b>	158.1	145.8	319.3	310.6
Hanoi	97,000	7.7	8.0	169.4	179.1	130.4	143.3
Ha Tay	214,800	17.8	15.9	134.3	128.1	239.1	203.6
Hung Yen	89,500	10.6	9.9	159.7	140.9	169.3	139.5
Lam Dong		15.1	18.9	217.5	<b>228.8</b>	328.5	<b>432.4</b>
Ninh Binh	138,800	4.4	4.6	125.0	119.6	55.0	55.0
Nam Dinh	166,900	12.5	13.3	115.7	123.6	144.6	164.4
Son La	142,100	2.7	<b>2.7</b>	95.2	<b>101.1</b>	25.7	<b>27.3</b>
Vinh Phuc	136,200	7.0	7.2	135.3	141.7	94.7	102.0

Source: GSO Statistical Yearbook.

The Winter-Spring crop begins in September and finishes in March of the following year. During this crop, the productivity of vegetables often reaches its peak if farming is intensive enough. The productivity of these vegetables will fall sharply during the summer crop due to high temperatures and heavy rainfall. Most farmers then grow summer vegetables. Besides the major vegetables (tomato, cabbage, kohlrabi, leafy vegetables), several high quality vegetables such as broccoli, white cauliflower, sweet pepper, and baby cucumber account for about 20% of the annual vegetable area.

Hanoi is the biggest city in North Vietnam. The city covers a total area of roughly 921 km<sup>2</sup>, of which 91 % is rural land and 9 % is urban area. Hanoi is divided into 7 inner districts (Hoan Kiem, Hai Ba Trung, Ba Dinh, Dong Da, Cau Giay, Tay Ho, Thanh Xuan) and 5 outer districts (Gia Lam, Dong Anh, Thanh Tri, Tu Liem, Soc Son). The agricultural area is 43,755 ha. Hanoi has two major rivers (Hong and Duong) in addition to a system of small rivers, ponds and lakes that supply water for cultivation. Hanoi totals 2,734,100 inhabitants, of which 54 % live in the urban areas and 46 % in the outskirts. Population density is very high (2,969 people/km<sup>2</sup>). The population growth rate is a little over 1 %. Hanoi's natural and social conditions are favourable to the production of fruit and vegetable, especially during the winter. In Hanoi province, vegetable production areas are mainly located in the outer districts. Since 1997, because of urbanization and the opening of many industrial areas, the vegetable area has tended to decrease. However, thanks to better seeds and intensive farming techniques, the productivity of vegetables has been increasing. The winter-spring crop begins in September and finishes in March of the following year. At that time, the productivity of vegetable production often reaches its peak, before falling sharply in the summer, due to high temperatures and heavy rainfall. It is hence important to give priority to summer crop vegetables. Several highly valued vegetables such as green cauliflower, white cauliflower, sweet pepper, and baby cucumber account for about 20% of the total vegetable area. Finding markets for the vegetable produced in Hanoi province is a pressing question to develop permanent and stable vegetable areas.

<sup>3</sup> Bac Ninh, Hai Duong, Hai Phong, Hanoi, Ha Nam, Ha Tay, Hung Yen, Nam Dinh, Ninh Binh, Thai Binh provinces.

<sup>4</sup> For the purpose of the study, statistical figures include Son La and Lam Dong provinces.

Located in the Red River Delta southwest of Hanoi, Hung Yen province is surrounded by the provinces of Hanoi, Ha Tay, Ha Nam, Thai Binh, Bac Ninh, and Hai Duong. Most of its highlands are situated in the northwestern part of the province (Van Giang, Khoai Chau, Van Lam districts), while its lowlands can be found in the south (Phu Cu, Tien Lu, An Thi districts). Hung Yen has a dense network of waterways, with two main rivers (Hong and Luoc) and the Bac Hung Hai polder. An extensive system of canals ensures the irrigation of the fields. Hung Yen enjoys favourable weather conditions, suitable for the production of high quality flower vegetables for processing and exporting. Hung Yen is a major supplier of tomato, cabbage, kohlrabi, beans of all kinds, cucumber and fruits for big cities such as Hanoi, and Hai Phong. It also supplies export processing factories with fruits and vegetables, and residential areas with fresh flowers. Hung Yen has abundant labour resources, with a little over half a million people in working age (46% of the population). Agriculture alone provides labour to 85 % of the workers of province. Thanks to a tradition of cultivating, farmers have constantly improved their working techniques: they have applied scientific and technological developments to raise plant yields (including flowers and vegetables) by increasing the number of crops, planting counter-season vegetables, higher crop rotation. They know how to take advantage of short-day seeds to develop winter vegetables.

Also located in the Red River Delta, Hai Duong province is surrounded by Bac Ninh, Bac Giang, Quang Ninh, Hai Phong, Thai Binh, and Hung Yen provinces. Hai Duong is crossed by two big rivers (Thai Binh and Kinh Mon), Bac Hung Hai polder, and a network of local rivers relatively favourable to irrigation. The land is rich, except in the half-mountain half-plain areas of Kim Mon and Chi Linh. Farmland represents 91,117 ha. Rice is the main crop (88 % of the land), followed by annual crops (3 %), while unused land with agricultural potential represents (less than 1 %). At the end of 2000, the province counted 1.6 million inhabitants, with a population density of 1,010 people/km<sup>2</sup>. Being located further away from Ha Noi than other vegetable producing areas, the amount of vegetables from this province is low (e.g. 350 kg of green pumpkins are sold in Hanoi each day).

Located in Lam Dong province, Da Lat is a small temperate enclave. The history of Da Lat is closely connected with the process of agricultural development. Thanks to peculiar climatic and land conditions, Da Lat is specialized in the production of temperate zone vegetables and flowers. Da Lat vegetables are considered as specific local products, and are increasingly consumed. In the 1970s, the yield of mustard vegetables reached 70,000 ton/year and the first vegetable shipments were exported to Singapore and Hong Kong by sea. Nowadays, Da Lat covers over 10,000 ha of agricultural land – 6,150 ha for industrial crops and fruit trees, about 4,100 ha for short-day crops and 3,900 ha for vegetables and flowers. Short-day crops (cabbage, cauliflower) have an average cycle of alternation of crop (2.4 crops/year). In 2000, the total labour force in agriculture and forestry for Da Lat was 25,583. The number of mouths in agriculture is 56,545 people. In general, the labour force in agriculture and forestry accounts for a relatively high proportion of local economic branches. Each day, Da Lat sells about 400 ton of vegetables to the domestic markets. The biggest market is Ho Chi Minh City (60% of vegetables and flowers sold each year). The mid costal and southwestern regions consume about 30%, and a small amount is consumed by the northern markets.

## **D) ANALYSIS OF PRICES AND PRICE VARIATIONS**

### **1. General remarks**

Such variations in the supply of vegetable translate on the markets into high price variations over the year. The following analysis is based on data gathered by the General Statistical Office (GSO) between 1996 and 2001. The data comprise of retail prices of fresh vegetable collected from four retail markets: two urban markets (Mo and Nga Tu So) and two peri-urban markets (Dong Anh and Gia Lam). These data were gathered three times per month (on the 25<sup>th</sup> of the previous month, and on the 5<sup>th</sup> and the 15<sup>th</sup> of the current month).

The vegetables for which the price series are available are carrot, cucurbits, cucumber, fresh onion, headed cabbage, kangkong, tomato, and wax gourd. These vegetables being very different (tropical/temperate, fruit/leafy), they are not cultivated in the same areas or at the same periods, and are not consumed in the same amounts. Therefore, they exhibit quite different prices and price variations over the year (Table 6).

**Table 6 – Descriptive price statistics (1996-2001)**

Unit: Vietnam dong

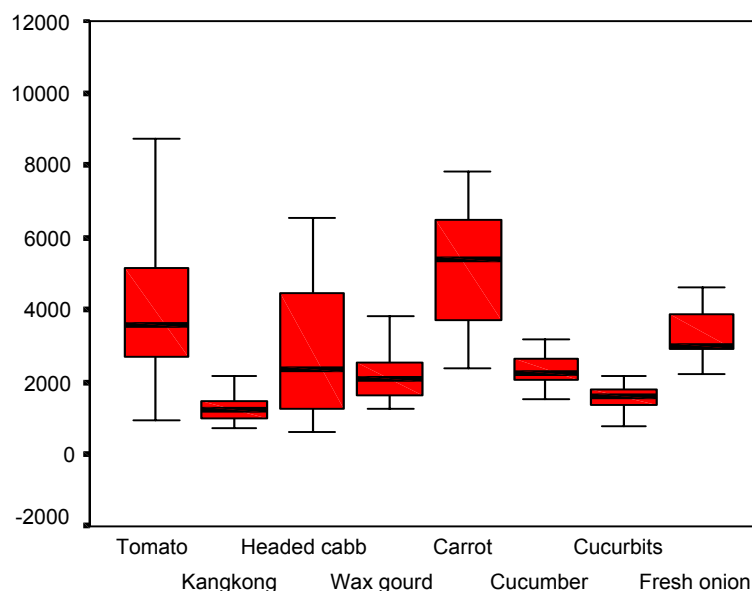
	Carrot	Tomato	Fresh onion	Headed cabbage	Cucumber	Wax gourd	Cucurbits	Kangkong
Average price	<b>5,202</b>	4,061	3,258	2,944	2,309	2,187	1,574	<b>1,273</b>
Median	5,421	3,600	3,008	2,379	2,250	2,098	1,583	1,222
Stand. dev.	1,503	2,110	657	1,806	449	675	339	361
Minimum	2,392	958	2,333	<b>617</b>	1,533	1,233	775	702
Maximum	7,808	<b>10,250</b>	5,525	6,533	4,125	3,800	2,558	2,363

Source: GSO.

Carrot has the highest average price, kangkong has the lowest. This can mainly be explained by the fact that carrot is a temperate vegetable (it cannot be grown all year) which is not widely consumed by Vietnamese. Conversely, kangkong is cultivated all year in and around Hanoi, and is widely consumed by Vietnamese households. Tomato and headed cabbage are both widely consumed and very seasonal: by the end of the rainy season, tomato can reach 10,000 VND per kilo, and headed cabbage 6,500 VND per kilo. During the cold and humid season, prices fall as low as 960 VND for tomato, and 620 VND per kilo for headed cabbage. The very low price for headed cabbage may probably explained by the huge amounts present on the markets during the high season. This vegetable is fairly easy to grow, is traditionally grown by North Vietnamese farmers either alone or in rotation with other crops (Pham Van Hung and Nguyen Thi Minh Hien, 2000), and is widely consumed by Vietnamese households. It is likely that these factors result in overproduction, and hence in extremely low prices.

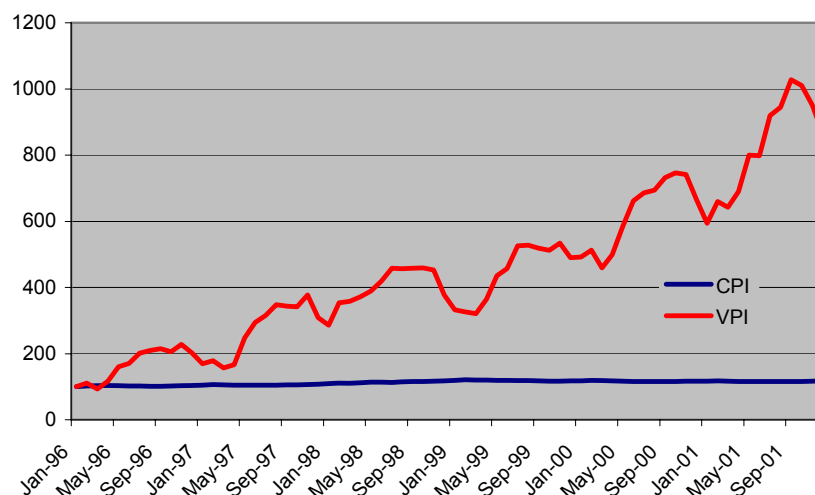
Graph 1 - Distribution of vegetable prices

(1996-2001)



Graph 1 shows the distribution of prices of various vegetables between 1996 and 2001. The upper and lower limits of the boxes represent the first and the last quartiles. The boxes' width represents the interval between the quartiles (the larger the box, the wider the range span of values). The lines extending from each box represent the smallest and the largest observations of the group. Tomato, headed cabbage and carrot display the widest price distributions. Conversely, the prices of kangkong and cucurbits seem to be more homogenous.

Graph 2 - Comparison of CPI and VPI (1996-2001)



The comparison between a vegetable price index<sup>5</sup> (VPI) and the overall consumer price index (CPI) between 1995 and 2001 (Graph 2) shows a strong increase in the VPI relatively to the CPI over the period. Indeed, the monthly growth rate of the CPI was 0.2 %, while the monthly growth rate of the VPI was 3 %. This may be explained by the growing demand for vegetables from both the urban and the rural consumers over the past ten years. Between 1987 and 1999, vegetable consumption was multiplied by 1.5<sup>6</sup>.

## 2. Price series analysis

Monthly price observations have quite complex patterns since these data include seasonal and short-run adjustment components, random components, and longer-term trends and cycles. Hence the need to decompose the series into their main components – trend, seasonal variation, cyclical variation and disturbance –, and to estimate the patterns of these components so as to assess their relative importance.

The *trend* shows the long-term evolution of the series. The price trends of the different vegetables were compared. For each vegetable, the trend was calculated by regressing the price series corrected for seasonal variations over time. The significance of the trend was then tested. It is worth noting that none of the vegetables studied experienced a significant declining price trend over the period. While for tomato, headed cabbage and wax gourd, the trend was not significant, it was both ascending and significant for carrot, cucumber, cucurbits, fresh onion and kangkong (Table 7).

<sup>5</sup> The VPI includes the price of carrot, cucumber, cucurbits, French bean, fresh onion, headed cabbage, kangkong, tomato, and wax gourd.

<sup>6</sup> Muriel Figuié, 2003. Vegetable consumption in Vietnam. AVRDC/CIRAD SUSPER project, Hanoi.

**Table 7 – Price trends for various vegetables (1996-2001)**

Trend	Vegetables	Annual growth rate
Not significant	Headed cabbage	+ 2.8 %
	Tomato	- 1.8 %
	Wax gourd	- 0.5 %
Significant	Carrot	+ 5.1%
	Cucumber	+ 4.6 %
	Cucurbits	+ 1.5 %
	Fresh onion	+ 2.0 %
	Kangkong	+ 2.8 %
Consumer Price Index (CPI)		+ 2.7 %

A comparison between these annual growth rates and the average annual rate of inflation given by the consumer price index (CPI) indicates an important growth in prices of carrot and cucumber.

The *seasonal variations* show the evolution of prices within the year. They are periodical and may usually be explained by climatic changes and/or special events (religious celebrations, holidays). For each vegetable, the price series were smoothed by using moving averages, and a ratio to moving average (current price divided by moving average) was calculated. This ratio was then used to compute a new monthly index, by eliminating the highest and the smallest values before averaging the ratios for each month. The different vegetables may be sorted according to their seasonality (see Appendix 3):

- Temperate vegetables such as tomato, headed cabbage, or carrot have a very strong seasonality. Their price is very high between July and September. This may be explained by the fact that the yield of these vegetables drops during the hot and wet season, due to pests and diseases: headed cabbage then suffers from diseases caused by bacteria (e.g. black rot, soft rot), and from the attack of pests (e.g. diamondback moth); tomato is subject to fungal and bacterial diseases (e.g. bacterial wilt and spot). The variation between the lowest and the highest seasonality indexes can reach 152 % for carrots, 246 % for tomato, 473 % for headed cabbage.
- Local vegetables such as wax gourd and kangkong are quite seasonal. Prices of these vegetables experience a similar evolution: they are quite low during the hot and wet season (when they are easily grown) and are high between December and February. Indeed, at average temperatures under 23°C, the growth rate of kangkong is too slow to make it an economic crop; wax gourd is best grown between 23 and 28°C<sup>7</sup>. Another explanation for the peak in wax gourd prices may be that this vegetable is currently used to make sweets consumed during the Têt festival. The variation between the lowest and the highest seasonality indexes reaches 94 % for kangkong and 201 % for wax gourd.
- Cucumber and fresh onion have more hectic seasonality indexes. The optimal temperature for growth is about 30°C, but cucumber is grown all year round. The variation between the lowest and the highest seasonality indexes reaches 62 % for fresh onions, 76 % for cucumber.

*Random price disturbances.* Once the trend and seasonal variations have been isolated, the remaining component of the price series – called the disturbance or irregular component – shows the variations in the price series that may not be forecasted. These variations are related to unpredictable events (political unrest, economic crises, strikes, etc.). For the vegetables studied, the vegetables with the highest coefficient of variation for its irregular component were tomato and headed cabbage (0.3), followed by cucurbits (0.17), fresh onion, kangkong, and wax gourd (0.16), and finally carrot and cucumber (0.15)

<sup>7</sup> J.S. Siemonsma and Kasem Pilnek (eds). 1994. Plant Resources of South-East Asia, n°8, Vegetables, Prosea, Bogor, Indonesia, 412 p.

## II - SPATIAL AND INSTITUTIONAL ORGANIZATION OF VEGETABLE MARKETS

Following Avrdc (1990), the vegetables are sorted into the following groups: fruit vegetables (cucumber, smooth loofah, tomato, wax gourd, yard long bean), leafy vegetables (Ceylon spinach, choysum, kangkong, lettuce, star gooseberry, vegetable mustard), root, bulb and tuber crops (carrot, kohlrabi, radish, spring onion), and heading coles (cabbage, Chinese cabbage, cauliflower).

### A) Fruit vegetables

A little over 16 tons of non-leafy vegetables are brought to Hanoi by wholesalers each day, from many different areas. These vegetables are less perishable than leafy vegetables, so losses during the transportation process to wholesale markets are less important. In June, Hanoi province alone accounts for 24 % of the fruit vegetables (3.9 ton/day) sold on Hanoi wholesale markets, followed by Hung Yen (21 % with 3.4 ton/day), and Vinh Phuc (17 %, with 2.8 ton/day) provinces. In June, Da Lat supplies roughly 4,180 kg/day of cabbage and tomato to Hanoi.

#### 1. Tomato

Tomato requires a relatively cool and dry climate, and is hence mainly cultivated from October to June. This quite fragile vegetable may be attacked by bacterial diseases and insects, and is not easily stored. Its production cycle varies from 3 to 5 months. The yearly supply of tomato to Hanoi wholesale markets bears the mark of these special features. Information concerning the amount of tomatoes sold on wholesale markets is summarized in Table 8. From the survey, it is possible to infer that each day, between 13 and 45 tons of tomatoes are sold on Hanoi night markets (with a daily average of 26 tons).

**Table 8 – Daily tomato wholesales**

	Nb. Traders (survey)	Nb. traders (census)	Average Amount (kg)	Total Amount (kg)	Estimated daily amount (tons)
March	22	103	188.4	4,145	19.4
June	29	85	156.4	4,535	13.3
August	29	130	270.3	7,840	35.1
November	52	267	168.2	8,745	44.9
January	27	136	115.4	3,115	15.7

Over the year, great variations occur in the origin of the tomatoes sold in Ha Noi (Table 9). As expected, during the full tomato season (March-January), all the tomatoes sold on the wholesale markets come from Ha Noi and the neighbouring provinces: 60% of the tomatoes are grown within 30 km from the market, and 91 % are grown within 50 km. Ha Noi City is an important supplier of tomatoes, especially in January (31 %). Ha Tay is also an important province for full-season tomato (supplying 28-36 % of all tomatoes sold in Ha Noi, but production completely stops during the hot and humid season. In contrast, Vinh Phuc province is a more regular producer of tomatoes, although the share of tomatoes supplied by this province falls under 10 % from June to November).

**Table 9 – Origin of the tomato**

	January	March	June	August	November
Bac Ninh		10 %			24 %
Ha Noi	31 %	11 %	2 %		10 %
Ha Tay	<b>35 %</b>	<b>36 %</b>			<b>28 %</b>
Hung Yen	13 %	11 %			12 %
Vinh Phuc	22 %	32 %	9 %		8 %
Bac Giang					2 %
Son La				6 %	13 %
Lam Dong			39 %	14 %	
China			<b>50 %</b>	<b>80 %</b>	3 %
Total	100 %	100 %	100 %	100 %	100 %

Indeed, as soon as June, the production areas start shifting away from the Red River Delta towards the Central Midlands and China: 96 % of the tomatoes sold on Hanoi wholesale markets are grown more than 50 km away from the markets at that time. In August, the Red River Delta provinces come completely out of the picture, and all the tomatoes sold on Hanoi wholesale markets come either from China, Lam Dong or Son La provinces. In November, some tomato still come from China, while Son La province becomes the third supplier behind Ha Tay and Bac Ninh.

The main tomato supplying districts are the following:

- Hanoi province : Dong Anh (13 %) and Thanh Tri (18 %) in January;
- Ha Tay province: Thuong Tin in January (15 %), March (25 %) and November (16 %);
- Vinh Phuc province: Me Linh is the only district to supply tomato.
- Hung Yen province: Van Giang is the main area, which supplies 7 % of the tomato sold in Hanoi in January, 11 % in March and 13 % in November.
- Bac Ninh province, Vo Cuong district supplies 11 % of the tomato sold in November.

**Table 10 – Means of transportation (tomato)**

	Bicycle	motorcycle	no transport	Truck	other
January	27 %	65 %	6 %		1 %
March	23 %	46 %	31 %		
June		81 %	19 %		
August		29 %	49 %		22 %
November	11 %	47 %	21 %	21 %	

Table 10 shows that two-wheeled vehicles remain the main means of transportation used for tomatoes in January (92 %), March (69 %), June (81 %) and November (58 %). Trucks are fairly marginal modes of transportation, except in November, when they bring 20 % of the tomato sold in Hanoi. "No transport" means that the trader is not responsible for transporting the products. It is very likely that in November and June this percentage mainly represents tomatoes brought by producers directly to the trader interviewed in Hanoi, while in August it may represent tomatoes brought by the wholesalers by truck.

On the night markets, a distinction was made between the actors who only engage in activities related to trading, collecting and transporting the goods (“wholesalers”), and those who also grow vegetables themselves (“producers”). Concerning the organization of the supply of tomatoes to Hanoi night markets (Table 11), most of the tomatoes are sold by traders in March (81 %), June (94 %) and August (100 %). In November and January the proportion of tomato sold by producers is relatively higher (resp. 29 % and 30 % of the tomato).

**Table 11 – Type of seller on the market (tomato)**

	January	March	June	August	November
Wholesalers	69 %	81 %	94 %	100 %	70 %
Producer	31 %	19 %	6 %	-	30 %
Total	100 %	100 %	100 %	100 %	100 %

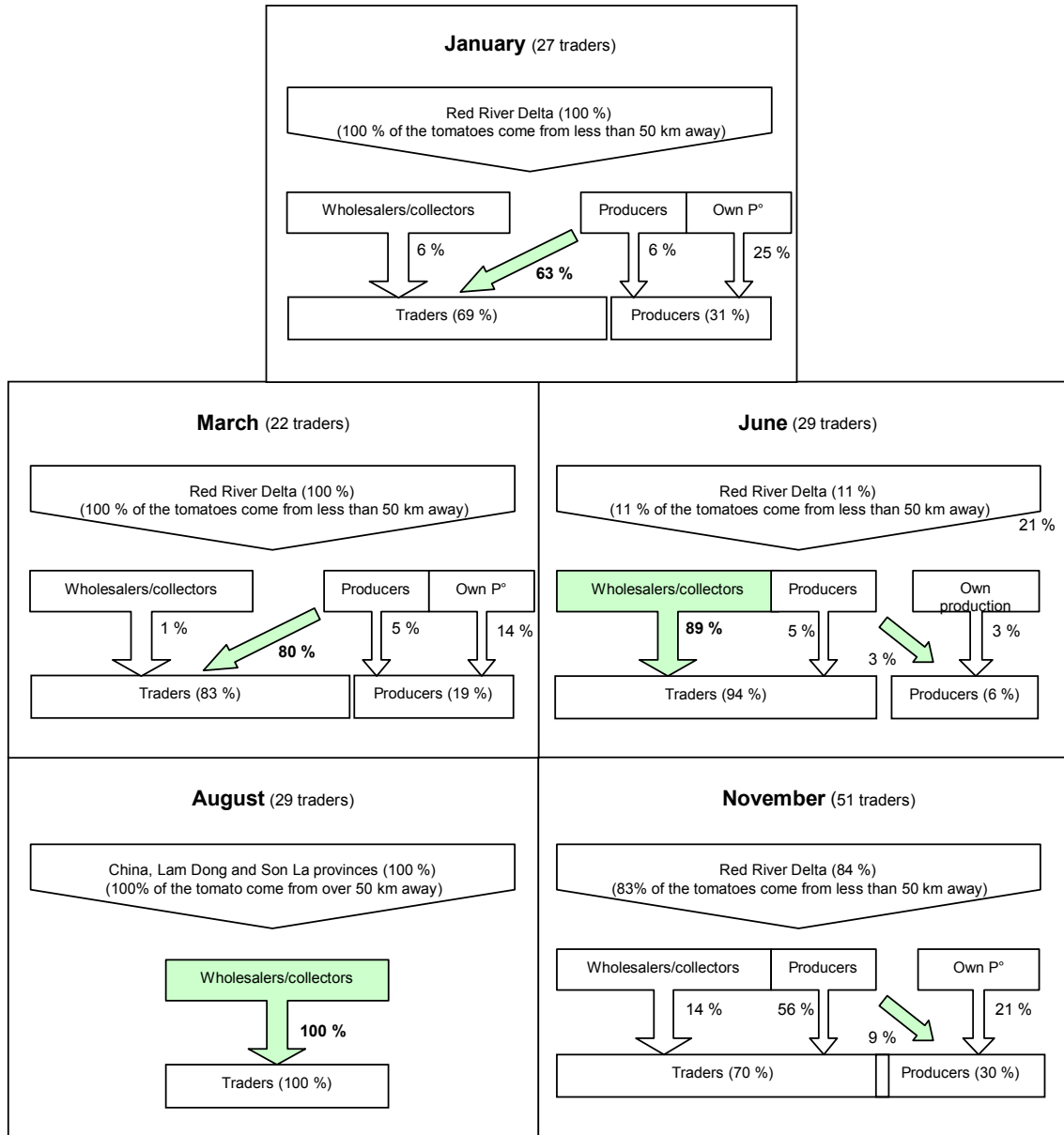
There are relatively more producers on the market in January, March and November, when tomatoes are grown in the Red River Delta (Table 11). In August, all the tomatoes sold on the night markets are sold by wholesalers who bought the tomatoes from other wholesalers (Table 12). This is consistent with the fact that at that time of the year all the tomatoes come from Lam Dong and Son la provinces, and from China.

**Table 12 – Type of supplier (tomato)**

	January	March	June	August	November
Wholesaler	6 %	1 %	89 %	100 %	14 %
Producer	94 %	99 %	11 %	-	86 %
Total	100 %	100 %	100 %	100 %	100 %

Figure 1 summarizes the information about the supply of tomatoes to Hanoi.

**Figure 1 – Tomato supply chain (wholesale markets)**



## 2. Cucumber

Cucumber is quite adapted to the climatic conditions that prevail in Northern Vietnam. The optimum temperature for cucumber growth is about 30°C and the optimum night temperature is 18-21°C. (Gildemacher and Jansen, 1994) It is thus quite abundant all year round on the markets, which translates into fairly uniform prices throughout the year. Daily cucumber sales vary between 7 and 17 tons per day, and the mean volume of cucumbers supplied to Hanoi each day is 13 tons, with a coefficient of variation of 0.3 (Table 13).

**Table 13 – Daily cucumber wholesales**

	Nb. traders (survey)	Nb. traders (census)	Average amount (kg)	Total amount (kg)	Estimated daily amount (tons)
Janvier	11	52	318.8	3,500	16.6
March	11	51	224.5	2,470	11.4
June	16	40	179.4	2,870	7.2
August	14	60	250.0	3,500	15.0
November	14	67	250.0	3,500	16.8

Table 14 shows the origin of the cucumbers sold in Hanoi. From March to November, all the cucumbers supplied to Hanoi come from the Red River Delta area, which confirms that this crop is well adapted to the region. Ha Tay, Hung Yen and Vinh Phuc provinces seem to be quite important suppliers of cucumbers. Yet, the production seems to be quite instable, with major shifts in what the farmers grow, and wide variations in the weight of each province in the total supply. For example Vinh Phuc province is a major supplier in March and November, but is marginal in June suggesting that the farmers might turn to more lucrative crops during this season. In January, most of the cucumber supplied to Hanoi comes from Hai Phong (26 %), Lang Son (21 %) and Ha Nam (24 %) provinces.

**Table 14 – Origin of cucumber**

	January	March	June	August	November
Ha Noi	11 %		<b>38 %</b>	<b>33 %</b>	11 %
Ha Tay	13 %	<b>27 %</b>	20 %		4 %
Hung Yen		11 %	<b>40 %</b>	<b>51 %</b>	29 %
Vinh Phuc		<b>35 %</b>	2 %	16 %	<b>42 %</b>
Bac Giang	5 %	27 %			14 %
Hai Phong	<b>26 %</b>				
Lang Son	<b>21 %</b>				
Ha Nam	<b>24 %</b>				
Total	100 %	100 %	100 %	100 %	100 %

The main cucumber supplying districts are the following:

- Hanoi province: Dong Anh supplies 38 % of the cucumber sold in Hanoi in June and 33 % in August; Tu Liem supplies 19 % of the cucumber sold in January, and Gia Lam supplies 10 % of the cucumber sold in November;
- Ha Tay province: Hoai Duc provides 17 % of the cucumber sold in June; Chuong my supplies 21 % of the cucumber sold in January, and 23 % in March;
- Vinh Phuc province: Me Linh provides 32 % of the cucumber sold in November, Tham Thanh district is an important supplier in March (16 %);
- Hung Yen province: Van Giang supplies 21 % of the cucumber sold in June, 25 % in August and 19 % in November; Yen My supplies 26 % of the cucumber sold in August;
- Hai Phong province: Duy Tien district alone supplies 39 % of the cucumbers sold in January and then disappears from the market.

Although seasonal patterns are less marked for cucumber, there are differences between the cold and the warm season in the origin of the supply. The share of cucumber grown less than 30 km away from Hanoi is 37 % in January, 65 % in March, 97 % in June, 100 % in August and 84 % in November.

Table 14 shows that transportation by two-wheeled vehicles is even more important for cucumber than for tomato. This mode of transportation brings all the cucumbers sold in Hanoi in March and June, and 80 % of the cucumbers sold in August. In November, a little less than 50 % of the total volume of cucumbers sold in Hanoi are brought by two-wheeled vehicles and 36 % is transported by trucks. Trucks remain quite important in January (17 %), which may be explained by the origin of the cucumber at that time of the year (Hai Phong, Lang Son and Ha Nam provinces). It is quite surprising to note that although the cucumbers brought to Hanoi wholesale markets seem to come from the same areas, and from the same distance in March and November, the means of transportation are quite different. This may probably be explained by the identity of the cucumber sellers (mostly producers in March, and mostly traders in November).

**Table 15 – Means of transportation (cucumber)**

	January	March	June	August	November
bicycle		4 %	12 %	8 %	10 %
motorcycle	61 %	96 %	88 %	73 %	39 %
no transport	21 %				15 %
truck	17 %				36 %
other				19 %	
total	100 %	100 %	100 %	100 %	100 %

Over the year, traders represent a large share of the actors present on the night markets in Hanoi. Indeed, 61 % of the cucumber sellers are traders in March, 83 % in June, 87 % in August, 82 % in November and 79 % in January. These figures are consistent with the percentage of the total amount of cucumbers traded by each type of actor (Table 16).

**Table 16 – Type of seller on the market (cucumber)**

	January	March	June	August	November
Traders	79 %	61 %	83 %	87 %	82 %
Producers	21 %	39 %	17 %	13 %	18 %
Total	100 %	100 %	100 %	100 %	100 %

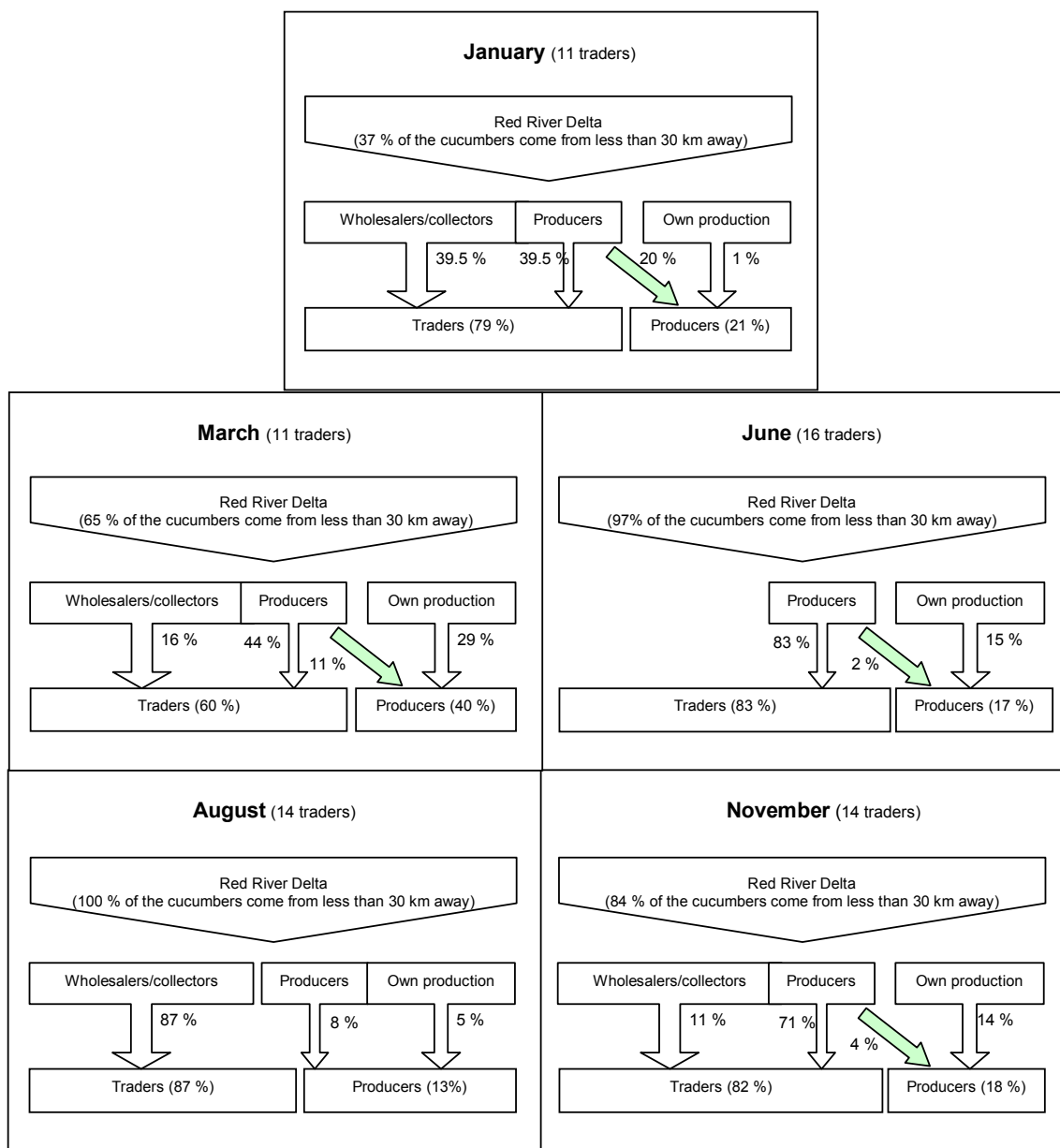
All the cucumber sold on the night markets comes from the surroundings of Hanoi, and almost all the suppliers are producers. In January, a larger share of the volumes traded is supplied by traders, which may be related to the relatively high share of cucumbers coming from Hai Phong, Ha Nam and Lang Son provinces – maybe through well organized networks.

**Table 17 – Type of supplier (cucumber)**

	January	March	June	August	November
Traders	39 %	16 %	-	-	11 %
Producers	61 %	84 %	100 %	100 %	89 %
Total	100 %	100 %	100 %	100 %	100 %

Figure 2 summarizes the previous information about the supply of cucumbers to Hanoi.

**Figure 2 – Cucumber supply chain**



### 3. Yard long bean

Yard long beans may be cultivated all year round, provided day temperatures remain around 25-35°C, and night temperatures do not drop below 15°C (Grubben, 1994). This may explain why so few yard long beans are traded on night markets in November, when the temperatures are much cooler. The production cycle for yard long bean varies from 1.5 to 3 months. From the survey, 5-7 tons of yard long beans are traded each night on Hanoi wholesale markets. The average volume is 6 tons per day and the coefficient of variation is quite low (0.2).

**Table 18 – Daily yard long bean wholesales**

	Nb. traders (survey)	Nb. traders (census)	Average amount (kg)	Total amount (kg)	Estimated daily amount (tons)
January	-	-	-	-	-
March	16	74	97.3	1,655	7.2
June	9	32	153.3	1,380	4.9
August	13	50	129.8	1,688	6.5
November	-	8	-	-	-

According to Table 19, all the yard long beans sold on Hanoi wholesale markets come from the Red River delta provinces. The main producing areas are Hung Yen in March, Vinh Phuc in June and Ha Tay in August. Since almost no yard long beans were traded in November, this vegetable was temporarily removed from the survey.

**Table 19 – Origin of yard long bean**

	March	June	August
Hanoi	6 %	13 %	13 %
Ha Tay	12 %	21 %	<b>51 %</b>
Hung Yen	<b>83 %</b>	9 %	29 %
Vinh Phuc		<b>57 %</b>	7 %
Total	100 %	100 %	100 %

In June, all the yard long beans supplied by Hanoi province come from Dong Anh district. In August they mainly come from Tu Liem district (11 % of the yard long beans sold in Hanoi). In Ha Tay province, Hoai Duc is the province's only supplier of yard long beans in March and June. In August, this district accounts for 40 % of the yard long beans sold in Hanoi. In Hung Yen province, the main production zone is located in Van Giang district (60 % of the yard long beans sold in Hanoi in March, and all of the 29 % supplied in November). All yard long beans produced in Vinh Phuc province come from Me Linh district.

**Table 20 – Means of transportation (yard long bean)**

	March	June	August
bicycle	<b>54 %</b>		16 %
motorcycle	47 %	<b>100 %</b>	<b>84 %</b>
total	100 %	100 %	100 %

All yard long beans supplied to Hanoi wholesale markets come by two-wheeled vehicles. In March, 86 % of the yard long beans sold on Hanoi wholesale markets come from less than 30 km away (100 % in June, and 97 % in August). The means of transportation used by the traders thus seems more related to the type of seller than to the distance from the production area (Table 21).

**Table 21 – Type of seller on the market (yard long bean)**

	March	June	August
Traders	46 %	96 %	81 %
Producers	54 %	4 %	19 %
Total	100 %	100 %	100 %

The share of producers present on the wholesale markets also varies over the year: producers represent half of the salesmen in March, less than 11 % in June, and almost a third in August. These differences could be related to the rice cultivation agenda. Indeed, rice is transplanted and weeded in August, and harvested in October-November. These activities are likely to reduce the time spent on vegetable crops and marketing activities.

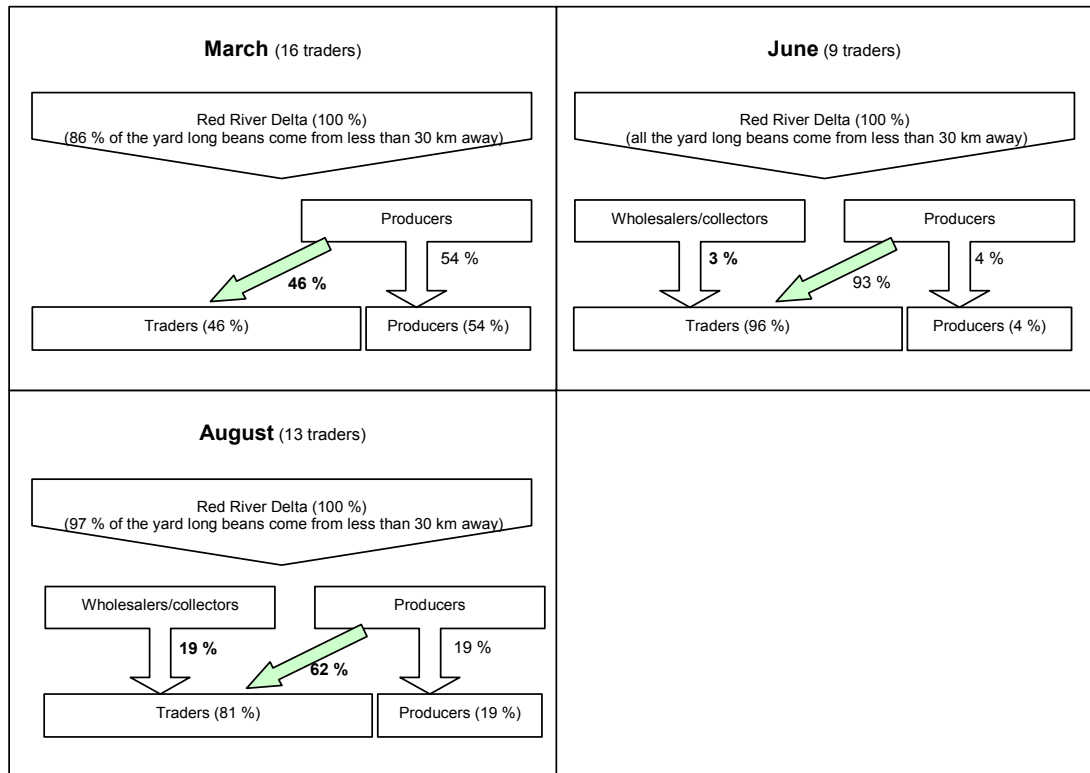
Finally, regardless of the season, 81-100 % of the yard long beans sold on Hanoi wholesale markets are supplied by directly the farmers to the traders (Table 22).

**Table 22 – Type of supplier (yard long bean)**

	March	June	August
Wholesaler	-	3 %	19 %
Producer	100 %	97 %	81 %
Total	100 %	100 %	100 %

The general features of the yard long bean marketing chain throughout the year are displayed in Figure 3. In March over one half of the yard long beans were sold on Hanoi wholesale markets directly by the producers. Conversely, in August almost 20 % of the yard long beans passed through the hands of both a trader and a wholesaler.

**Figure 3 – Yard Long Bean supply chain**



#### 4. Wax gourd

Wax gourd may be grown in moderately dry areas, with an optimum average temperature of 23-28°C. Mature fruits may be stored for a long time thanks to the waxy layer that protects them. Increasing prices from November to January (see Appendix) indicate a rise in sales: indeed, the flesh of the wax gourds is cut into pieces and candied with sugar for the Têt festival. The average amount of wax gourd sold on Hanoi night markets ranges between 13 and 31 tons per night (Table 23).

**Table 23 – Daily wax gourd wholesales**

	Nb. traders (survey)	Nb. traders (census)	Average amount (kg)	Total amount (kg)	Estimated amount (tons)
January	12	54	243.8	2,925	13.2
June	17	45	344.7	5,860	15.5
August	21	87	351.2	7,375	30.6

The wax gourd sold in Hanoi comes from Hanoi, Hai Duong and Hung Yen provinces mainly. Dong Anh district accounts for all the wax gourd supplied by Hanoi province in June and August. Similarly, Me Linh is the only supplier of wax gourd for Vinh Phuc province. Van Giang district is the main supplier of wax gourd for Hung Yen province. In Hai Duong province, Cam Giang district supplies most of the wax gourds in January.

**Table 24 – Origin of the wax gourd**

	January	June	August
Hanoi	3 %	<b>44 %</b>	28 %
Hung Yen	<b>50 %</b>	25 %	<b>41 %</b>
Hai Duong	<b>30 %</b>	6 %	3 %
Vinh Phuc		26 %	28 %
Bac Ninh	9 %		
Ha Tay	8 %		
Total	100 %	100 %	100 %

In January, June and August, respectively 54 %, 94 % and 97 % of the wax gourds supplied to Hanoi come from less than 30 km away from the city.

**Table 25 – Means of transportation (wax gourd)**

	January	June	August
Bicycle	3 %		
Motorcycle	97 %	64 %	73 %
No transport		36 %	
Other		36 %	27 %
Total		100 %	100 %

The bulkiness of the wax gourd (the fruit can weigh up to 45 kg) is the main reason why bicycles do not seem to be used much by the sellers (Table 25).

**Table 26 – Type of seller on the market (wax gourd)**

	January	June	August
Traders	86 %	85 %	88 %
Producers	14 %	15 %	12 %
Total	100 %	100 %	100 %

According to Table 26, most wax gourd sellers are traders in January, June and August. It is interesting to note that the share of producers remain constant over the year. Producers directly supply all the sellers on the market.

## B) THE HEADING COLES

### 1. Headed cabbage

Headed cabbage grows best at average daily temperatures of 15-20°C, and requires a diurnal variation of at least 5°C (Van der Vossen, 1994). The best season for growing this vegetable in Northern Vietnam is thus October to May. The estimates for daily supplies of headed cabbages to Hanoi seem to confirm this fact: between 7 and 36 tons of headed cabbage is sold each night on the wholesale markets (the average is 20 tons and the coefficient of variation is 0.6). The maximum daily sales (21, 30 and 36 tons) occur during the beginning of the cold and wet season and the end of the cold and dry season.

**Table 27 – Daily headed cabbage wholesales**

	Nb. traders (survey)	Nb. traders (census)	Average amount (kg)	Total amount (kg)	Estimated daily amount (tons)
January	43	223	135.9	5,845	30.3
March	26	108	192.0	4,993	20.7
June	10	27	239.5	2,395	6.5
August	14	60	294.6	4,125	17.7
November	46	224	162.2	7,460	36.3

No headed cabbage comes from nearby Hanoi during the hot season: in June, headed cabbages come from Da Lat (38 %) and China (62 %) and in August, all the headed cabbages sold comes from China. The rest of the year, Hanoi province provides 28-50 % of the headed cabbages sold, followed by Ha Tay and Hung Yen provinces (Table 28).

**Table 28 – Origin of headed cabbage**

	January	March	June	August	November
Hanoi	<b>28 %</b>	<b>51 %</b>			<b>50 %</b>
Ha Tay	35 %	15 %			37 %
Hung Yen	35 %	34%			2 %
Ha Nam	2 %				8 %
Hai Duong					8 %
Vinh Phuc					3 %
Lam Dong			38 %		
China			<b>62 %</b>	<b>100 %</b>	
Total	100 %	100 %	100 %	100 %	100 %

The most important areas for the production of headed cabbage are: Gia Lam district in Hanoi province (40-46% of the cabbage sold in Hanoi in March and November). Secondly by Hoai Duc district in Ha Tay province (7 % of the cabbage sold in Hanoi in March, 25 % in January and 31 % in November), and Yen My district in Hung Yen province (25 % of the cabbage sold in Hanoi in January, 28 % in March, none in November). Many other districts contribute more marginally to the supply.

**Table 29 – Means of transportation (headed cabbage)**

	January	March	June	August	November
Bicycle	38 %	29 %			48 %
Motorcycle	<b>49 %</b>	<b>57 %</b>	36 %	25 %	<b>49 %</b>
No transport	2 %		30 %	42 %	3 %
Truck	11 %	14 %	<b>34 %</b>		
Other				33 %	
Total	100 %	100 %	100 %	100 %	100 %

Again, bicycles and motorcycles remain the main means of transportation during the high season (January, March and November), when respectively 93 %, 92 % and 88 % of the cabbage travels less than 30 km. As soon as the supply of cabbages from the surrounding provinces stops (in June and August all the cabbages sold on Hanoi wholesale markets come from over 300 km), the importance and weight of other modes of transportation, such as trucks, increases.

**Table 30 – Type of seller on the market (headed cabbage)**

	January	March	June	August	November
Traders	47 %	32 %	100 %	100 %	30 %
Producer	53 %	68 %	-	-	70 %
Total	100 %	100 %	100 %	100 %	100 %

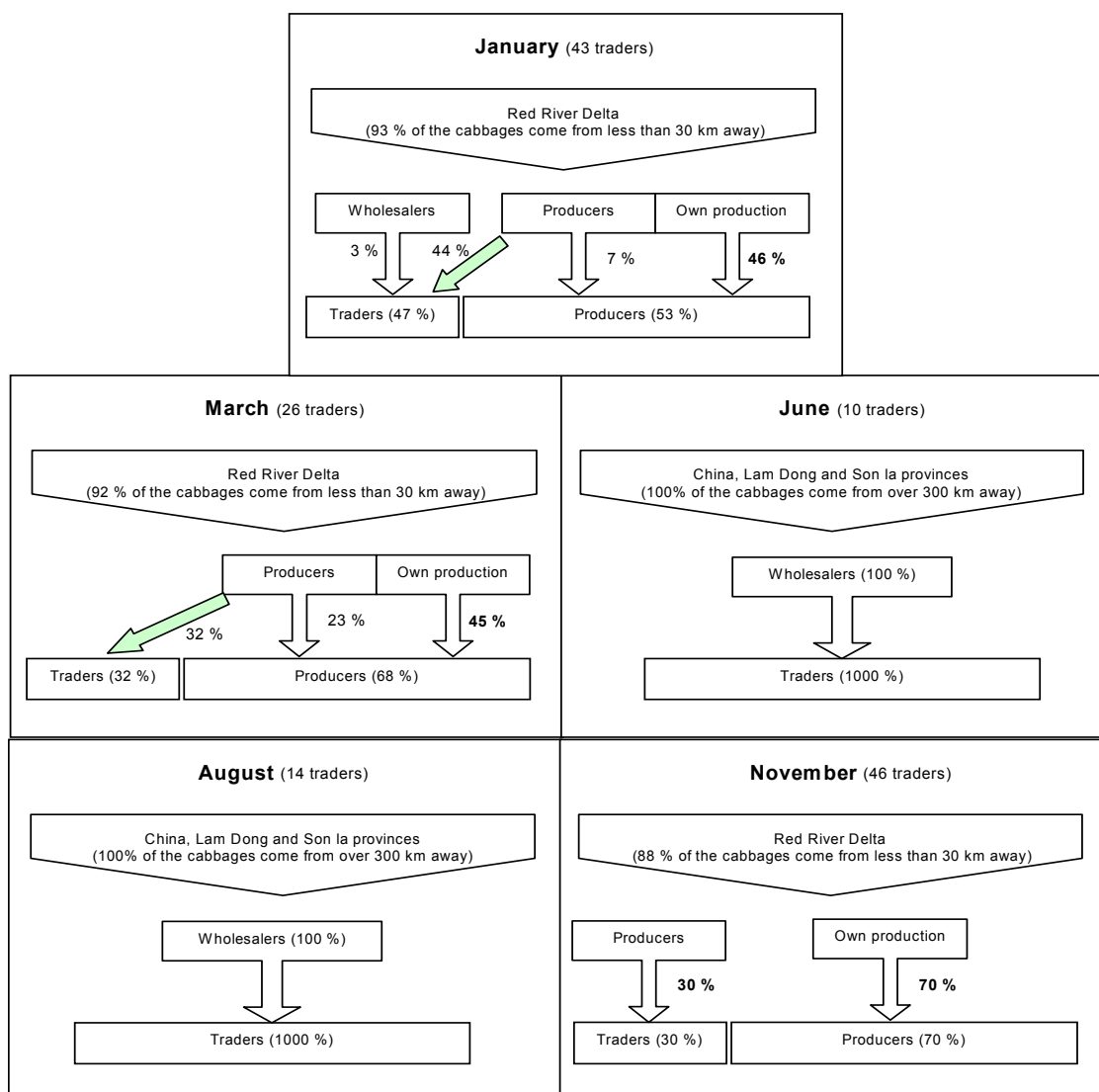
According to Table 30, all the headed cabbages supplied to Han Noi wholesale markets are sold by traders in June and August. The share of headed cabbages sold on Hanoi markets by producers is 53 % in January, 68 % in March and 70 % in December.

**Table 31 – Type of supplier (headed cabbage)**

	January	March	June	August	November
Wholesaler	98 %	-	100 %	100 %	-
Producer	2 %	100 %	-	-	100 %
Total	100 %	100 %	100 %	100 %	100 %

In January, March and November, 98-100 % of the headed cabbages sold on Hanoi wholesale markets are supplied by producers who either come to the market themselves or sell to traders at their farm or on surrounding markets. In June and August, wholesalers supply the headed cabbages from China and Da Lat to the traders on the night markets. The supply chain for headed cabbage is summarized in Figure 4.

**Figure 4 – Headed cabbage supply chain**



## 2. Chinese cabbage

Chinese cabbage grows best with temperatures in the range of 12-22°C. Temperatures above 25°C prevent temperate cultivars from forming heads, so does flooding (Kuo and Toxopeus, 1994). This may explain the absence of Chinese cabbage on Hanoi wholesale markets in August (hot and wet season). The average amount of Chinese cabbages sold on the wholesale markets ranges between less than half a ton and 6 tons each night, with an average of 4 tons and a coefficient of variation of 0.8.

**Table 32 – Daily Chinese cabbage wholesales**

	Nb. traders (survey)	Nb. traders (census)	Average amount (kg)	Total amount (kg)	Estimated amount (tons)
January	4	24	142.5	570	3.4
March	7	40	157.9	1,105	6.3
June	2	2	217.5	435	0.4
August	-	2	-	-	-
November	9	45	132.2	1,190	5.9

The period of shortage starts early for the Chinese cabbages, since imports from China supply Hanoi massively as early as June (Table 33). In January, the main districts for Chinese cabbage are Gia Lam (Hanoi), Thuong Tin (Ha Tay) and Yen My (Hung Yen). In March (resp. in November), Gia Lam provides alone 75 % (resp. 91 %) of the Chinese cabbage sold in Hanoi.

**Table 33 – Origin of Chinese cabbage**

	January	March	June	November
Hanoi	39 %	<b>77 %</b>		<b>91 %</b>
Ha Tay	<b>40 %</b>	23 %		
Hung Yen	22 %			9 %
China			<b>100 %</b>	
Total	100 %	100 %	100 %	100 %

In June, all the Chinese cabbage sold on Hanoi wholesale markets comes from China. None of the traders surveyed on the markets were in charge of transporting the products; both were supplied by wholesalers who probably brought the Chinese cabbages to Hanoi by trucks.

**Table 34 – Means of transportation (Chinese cabbage)**

	January	March	June	November
Bicycle		20 %		40 %
Motorcycle	100 %	80 %		60 %
No transport			100 %	
Total	100 %	100 %	100 %	100 %

Note : the percentages above should be taken very cautiously since they are based on a fairly limited number of observations.

## C) LEAFY VEGETABLES

### 1. Choysum

Choysum may be grown all year round. The estimated volume of choysum sales varies between 11 and 26 tons each night, with an average of 16 tons.

**Table 35 – Daily choysum wholesales**

	Nb. traders (survey)	Nb. traders (census)	Average amount (kg)	Total amount (kg)	Estimated amount (tons)
January	17	80	137.4	2,335	11.0
March	17	83	137.4	2,335	11.4
June	25	82	142.4	3,560	11.7
August	31	135	193.7	6,005	26.2
November	23	115	158.7	3,650	18.3

In January, 30 % of the choysum sold in Hanoi comes from Yen My district alone (Hung Yen province). In March and November, the main choysum producing zone is in Hanoi province (38 % of the choysum sold comes from Gia Lam district alone during these months). In June and August, Van Giang and Yen My districts of Hung Yen province supply most of the choysum sold in Hanoi (14 % and 23 % respectively). All the choysum from Vinh Phuc (respectively. Ha Tay) province is grown in Me Linh (respectively Thuong Tin) district.

**Table 36 – Origin of the choysum**

	January	March	June	August	November
Hanoi	<b>44 %</b>	<b>43 %</b>	17 %	25 %	<b>52 %</b>
Ha Tay		23 %	10 %	3 %	3 %
Hung Yen	43 %	10 %	<b>37 %</b>	<b>39 %</b>	23 %
Hai Duong		7 %			
Vinh Phuc	13 %	17 %	36 %	33 %	22 %
Total	100 %	100 %	100 %	100 %	100 %

According to Table 37, motorcycle is the main means used for transporting choysum to Hanoi. Bicycles seem to be more used in March and June, when respectively 70 % and 90 % of the choysum comes from less than 30 km away. In August, November and January, respectively 95%, 99 % and 100 % of the choysum comes from less than 30 km away, yet less than 23 % of the choysum sold is transported by bicycle. Only in March does some (30 %) of the choysum sold on Hanoi wholesale markets come from further away than 50 km from the capital.

**Table 37 – Means of transportation (choysum)**

	January	March	June	August	November
Bicycle	23 %	47 %	36 %	6 %	10 %
Motorcycle	69 %	53 %	64 %	63 %	70 %
No transport	8 %			18 %	20 %
Other				13 %	
Total	100 %	100 %	100 %	100 %	100 %

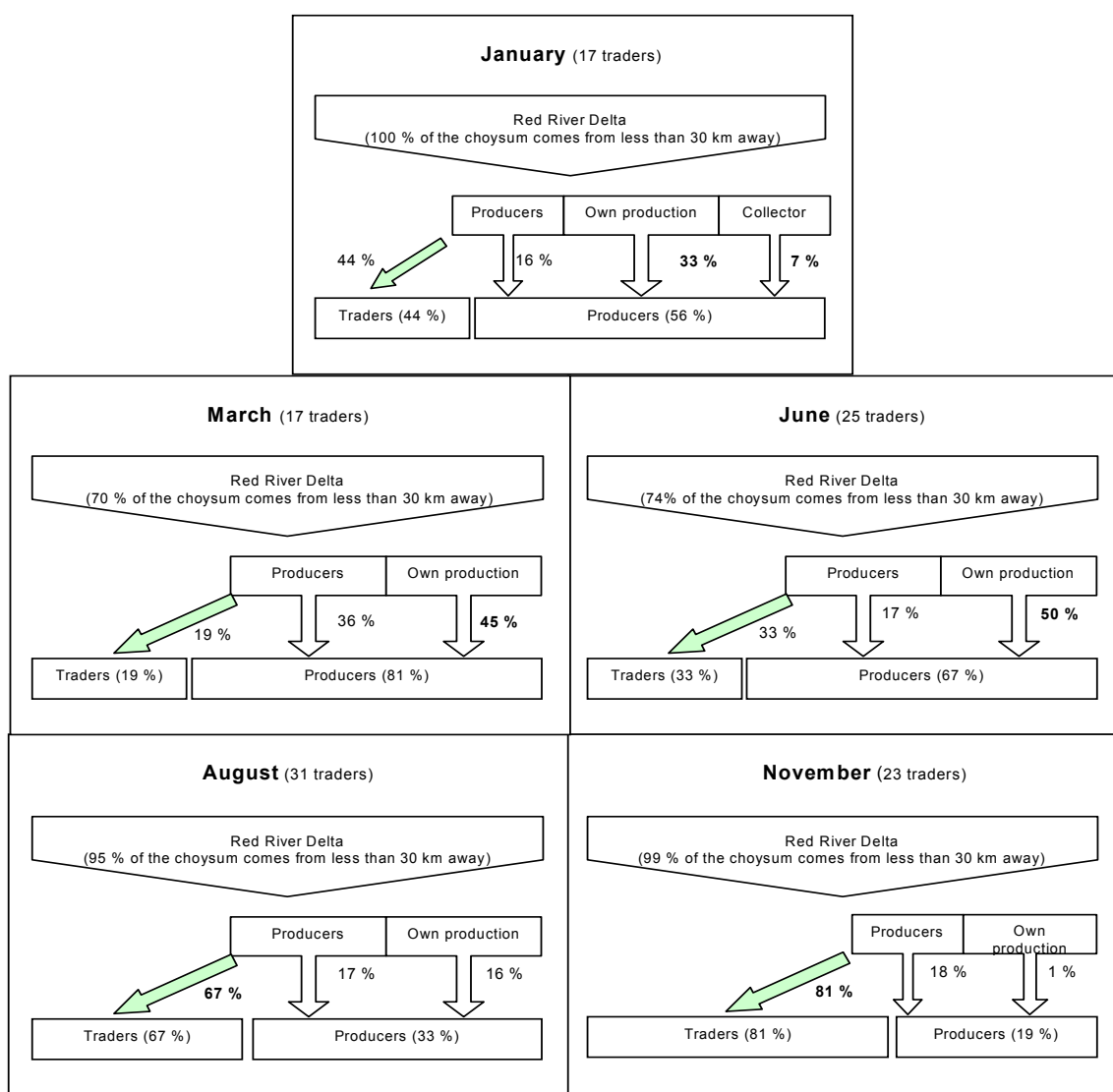
According to Table 37, in August and November, 18-20 % of the choysum sold on Hanoi wholesale markets is brought directly to the traders – they are hence not responsible for transporting the products. This is consistent with the fact that, all the choysum sold on Hanoi wholesale markets is then supplied directly by the producers to the traders (there are no intermediate actors between the producers and the traders). Finally, 19 to 67% of the choysum is sold on the wholesale markets of Hanoi by the producers themselves (Table 38).

**Table 38 – Type of seller on the market (choysum)**

	January	March	June	August	November
Traders	44 %	19 %	33 %	67 %	81 %
Producer	56 %	81 %	67 %	33 %	19 %
Total	100 %	100 %	100 %	100 %	100 %

Between March and November, the sellers' suppliers are only producers. The relevant information concerning the supply chain for choysum is summarized below.

**Figure 5 – Choysum supply chain**



## 2. Lettuce

Since lettuce needs moderate day temperatures of 15-20°C and cool nights, it is quite adapted to Northern Vietnam's cool season (Grubben and Sukprakarn, 1994). This leafy vegetable is highly perishable, making it necessary for the producers to locate as close to the markets as possible. Lettuce is quite popular among Vietnamese households: between 2 and 4 tons of lettuce are sold each night on Hanoi wholesale markets (average is 3.2 tons).

**Table 39 – Daily lettuce wholesales**

	Nb. traders (survey)	Nb. traders (census)	Average amount (kg)	Total Amount (kg)	Estimated amount (tons)
January	14	68	55.7	780	3.8
March	17	84	52.8	898	4.4
June	14	40	47.5	665	1.9
August	17	70	46.8	795	3.3
November	14	78	34.5	483	2.7

95 % to 100 % of the lettuce supplied to Hanoi comes from less than 20 km away from Hanoi. Tu Liem district (which is very close to Dich Vong market) is a very important production area for lettuce, making it possible for vegetable traders to save on their transportation expenses and limit the loss of vegetables. All the lettuce from Ha Tay comes from Thuong Tin district.

**Table 40 – Origin of lettuce**

	January	March	June	August	November
Hanoi	95 %	97 %	100 %	100 %	100 %
Ha Tay	5 %	3 %	-	-	-
Total	100 %	100 %	100 %	100 %	100 %

Lettuce is mainly transported to the markets by bicycle and motorcycle (Table 41).

**Table 41 – Means of transportation (lettuce)**

	January	March	June	August	November
Bicycle	7 %	27 %	45 %	13 %	30 %
Motorcycle	86 %	73 %	48 %	87 %	70 %
No transport	7 %		7 %		
Total	100 %	100 %	100 %	100 %	100 %

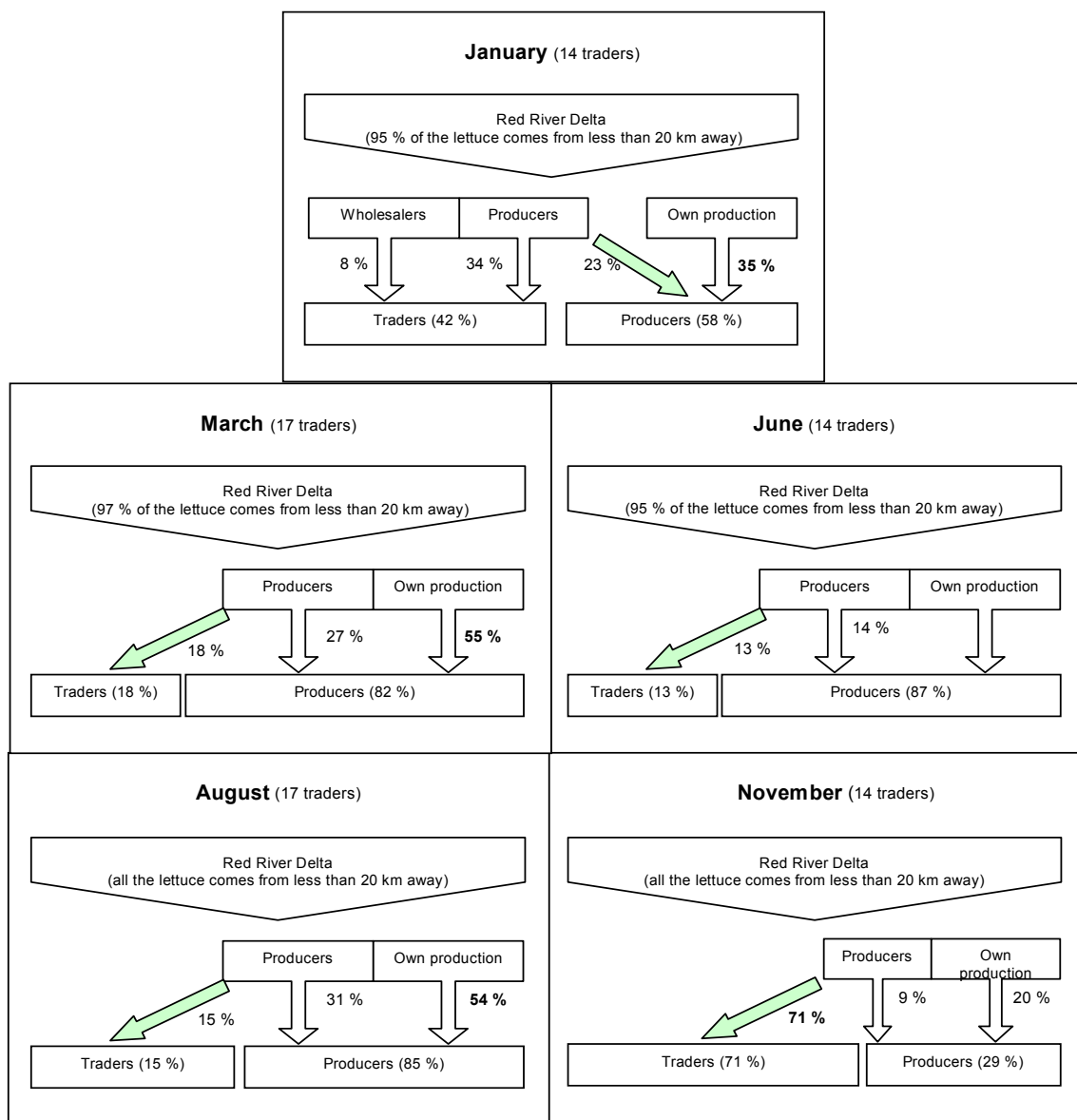
As for choysum, producers are present on the wholesale markets throughout the year. Due to the very short distances between production areas and markets, there are no middlemen (the producers either come to the market or directly supply the traders present on the markets). It is worth noting that farmers seem less active on the markets in November, which might be explained by the fact that this is usually a busy season on the farms, making it more difficult for them to sell their products directly.

**Table 42 – Type of seller on the market (lettuce)**

	January	March	June	August	November
Traders	42 %	18 %	13 %	15 %	<b>71 %</b>
Producer	<b>58 %</b>	<b>82 %</b>	<b>87 %</b>	<b>85 %</b>	29 %
Total	100 %	100 %	100 %	100 %	100 %

Figure 6 summarizes the features of the supply chain for lettuce.

**Figure 6 – Lettuce supply chain**



### 3. Kangkong

Kangkong is adapted to high temperatures and short day conditions. Diseases and pests do not cause many harms. It is a very popular vegetable in Vietnam, where it is mainly grown as a summer vegetable. According to our survey, 3 to 5 tons of kangkong are traded each night on Hanoi wholesale markets, with an average of 4 tons and a coefficient of variation of 0.3.

**Table 43 – Daily kangkong wholesales**

	Nb. traders (survey)	Nb. traders (census)	Average amount (kg)	Total amount (kg)	Estimated amount (tons)
March	13	61	52.5	683	3.2
June	18	69	67.8	1,220	4.7
August	14	63	55.9	783	3.5
November	11	54	48.2	530	2.6

After harvest, due to its high degree of perishability, kangkong must be sold rapidly. This may explain why 89-100 % of the kangkong sold in Hanoi comes from Hanoi province (Table 44).

**Table 44 – Origin of kangkong**

	March	June	August	November
Hanoi	100 %	89 %	100 %	100 %
Ha Tay	-	11 %	-	-
Total	100 %	100 %	100 %	100 %

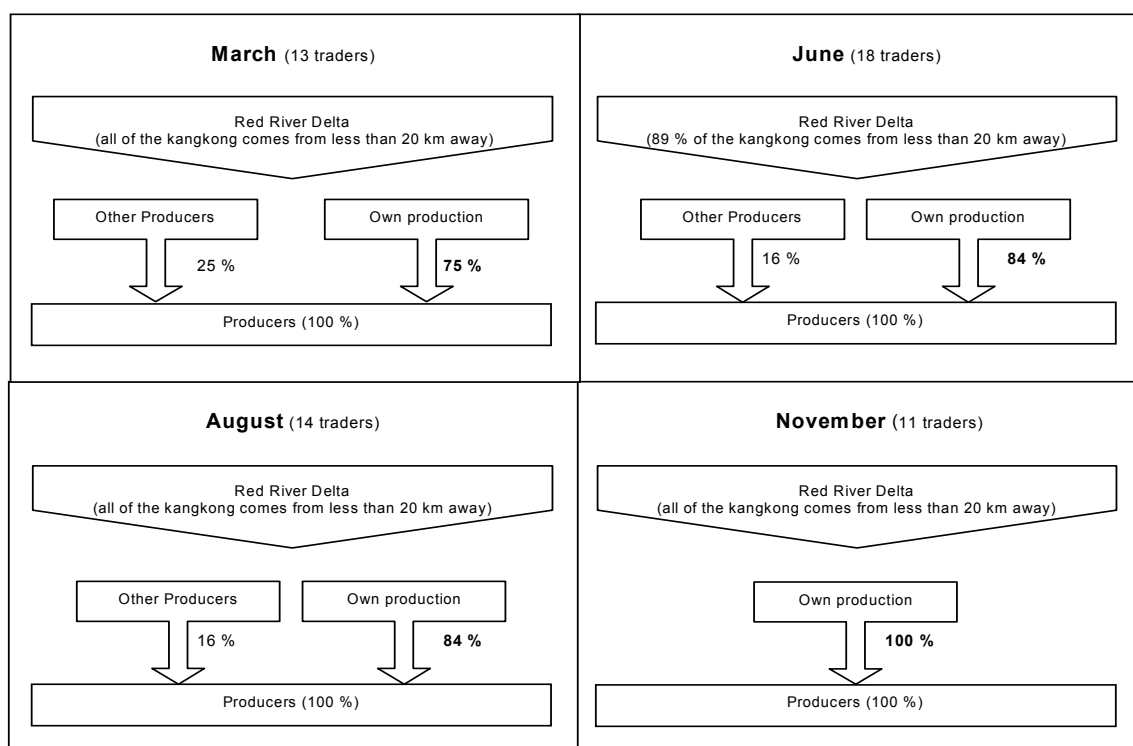
Throughout the year, 73% to 100 % of the kangkong sold on Hanoi wholesale markets is grown within 10 km from the city. All of it is grown within 20 km from the city except in June, when 11 % of the total volume of kangkong sold on Hanoi wholesale markets come from over 30 km away. Kangkong is brought by bicycle (100%) in March and June; by bicycle (90 %) and motorcycle (10 %) in August; and by bicycle (86 %), motorcycle (7 %) and foot (7 %) in November (Table 45).

**Table 45 – Means of transportation (kangkong)**

	March	June	August	November
bicycle	100 %	100 %	90 %	86 %
motorcycle	-	-	10 %	7 %
foot	-	-	-	7 %
total	100 %	100 %	100 %	100 %

In March, June, August and November, all kangkong sellers present on Hanoi wholesale markets are farmers who come to the markets with their production and sometimes that of other farmers. There are no intermediate actors.

Figure 7 – Kangkong supply chain



#### 4. Vegetable mustard

Vegetable mustard is very well adapted to high temperatures and humidity. It is thus a good substitute for headed cabbage during the hot wet season (Opeña, 1994). Vegetable mustard is mainly consumed pickled, as a side dish. According to the survey (Table 46), 3 to 8 tons of vegetable mustard are sold each night on the wholesale markets of Hanoi (the average is 3.8 tons). The decline in the average amount of vegetable mustard sold in November – when the sales of headed cabbage pick up – appears to confirm the complementary relationship between cabbage and vegetable mustard.

**Table 46 – Daily vegetable mustard wholesales**

	Nb. traders (survey)	Nb. traders (census)	Average amount (kg)	Total amount (kg)	Estimated amount (tons)
January	13	65	68.5	890	4.5
June	19	64	71.1	1,350	4.5
August	21	92	81.1	1,703	7.5
November	11	61	40.9	450	2.5

Between March and November, all the vegetable mustard sold on Hanoi wholesale markets comes from Hanoi and Ha Tay provinces (Table 47). Two thirds of vegetable mustard sold comes from less than 20 km from Hanoi in June (mainly from Tu Liem and Gia Lam districts), one half in August (Tu Liem district), and all of it in November (mainly from Tu Liem district). Further away, the main production area in June and August is located in Thuong Tin district. In January, 91 % of the vegetable mustard sold in Ha Noi comes from less than 10 km away from the capital and the remaining 9 % come from 10-20 km away.

**Table 47 – Origin of the vegetable mustard**

	January	June	August	November
Hanoi	100 %	66 %	50 %	<b>100 %</b>
Ha Tay	-	34 %	50 %	-
Total	100 %	100 %	100 %	100 %

One again, bicycles and motorcycles are widely used for transporting the vegetables to the markets (Table 48).

**Table 48 – Means of transportation (vegetable mustard)**

	January	June	August	November
Bicycle	63 %	58 %	13 %	82 %
Motorcycle	37 %	42 %	78 %	18 %
No transportation	-	-	9 %	-
Total	100 %	100 %	100 %	100 %

A closer look at who sells vegetable mustard on the wholesale markets indicates an important share is the producer. It is worth mentioning that all the suppliers are producers (there are no middlemen between the producers and the traders).

**Table 49 – Type of seller on the market (vegetable mustard)**

	January	June	August	November
Traders	35 %	19 %	42 %	8 %
Producer	<b>65 %</b>	<b>81 %</b>	<b>58 %</b>	<b>92 %</b>
Total	100 %	100 %	100 %	100 %

## D) THE ACTORS PRESENT ON THE WHOLESALE MARKETS

In recent years, the demand for vegetables has been increasing, mainly because producing vegetables brings higher income than other plants such as rice or corn. Vegetables are not only produced in Hanoi, but also in Hung Yen, Ha Tay or Vinh Phuc. According to our surveys on Hanoi's wholesale markets, the vegetables supplied to Hanoi pass through different actors such as producers, wholesalers, collectors, retailers or actors who combine two or more of these functions. Concerning the frequency of the selling activity, 78 % of the interviewees sell vegetables on the wholesale markets every day of the week, either exclusively to retailers (77 %), exclusively to collectors (1 %) or at the same time to retailers, hotels and restaurants, and final consumers (22 %). A little over one half of the traders present on the wholesale markets come from Hanoi province, 22 % come from Ha Tay province, 16 % from Hung Yen province, and 8 % from Vinh Phuc province.

### 1. The producers

Among all vegetable sellers on Hanoi wholesale markets, producers play a crucial role in preserving the regular activities of the markets. Many farmers bring their vegetable products directly to Hanoi night markets (Table 50). Most farmers know Hanoi night markets, and are able to decide where to sell their vegetables (*i.e.* where they can sell the highest amount with highest price). Regardless of the time of the year or the vegetables sold, 51 % of the sellers present on the wholesale markets of Hanoi are producers who grow, maybe collect from other farmers, and transport the vegetables to the markets. Traders exclusively in charge of selling, transporting and collecting the vegetables represent 50 % of the sellers present on the markets. Producers are more present on the markets in March (68 %), while traders are more present in June (55 %) and August (57 %), the other months being almost balanced.

**Table 50 – Type of sellers present on the wholesale markets**

	January	March	June	August	November
Traders	<b>55 %</b>	32 %	49 %	<b>57 %</b>	48 %
Producer	45 %	<b>68 %</b>	<b>51 %</b>	43 %	<b>52 %</b>
Total	100 %	100 %	100 %	100 %	100 %

When considering total quantities, the share of vegetables sold by traders is generally much higher. This may be explained by the fact that traders usually sell a larger average amount of vegetables each night, than that sold by the producers. For example, in June the average amount of vegetables sold by the traders (202 kg) is higher<sup>8</sup> than that sold by the producers (92 kg).

Producers selling on wholesale markets are often forced to sell at certain prices by the collectors and wholesalers, which makes it difficult for them to sell their products. To limit the negative competition from other vegetable sellers, farmers from the same production areas group together to sell their products at certain places in the markets (e.g. for Van Duc or Le Chi areas).

## 2. The traders

Collectors-wholesalers are responsible for collecting and choosing vegetables from different vegetable areas. They are in charge of transporting the vegetable to Hanoi night markets or there will be people buying vegetables right at the markets. These people are clearly aware of vegetable producing areas. They know when and where the different kinds of vegetables are produced in large amounts. This information helps them decide what vegetables to trade each month, so as to make the biggest profit. They market many different kinds of vegetables, each season has its own vegetables. In a market day, they can trade 2-3 different kinds of vegetables. The point of sale for these people are often in bright places, so that the buyers can see and choose the products they need to buy. Collectors- wholesalers often have their own regular customers so they often prepare beforehand plastic bags for customers to put their goods in. Regular customers here are often from retail markets.

Wholesalers in Hanoi night markets often rely on a network of fellow traders to supply vegetables regularly. For wholesalers of tomato, cabbage and mustards, the vegetables are transported from Da Lat or China and distributed from the trucks to wholesaler networks in the markets according to the written lists of head traders about kinds and amounts. Big traders often distribute goods to wholesalers mainly at Long Bien and Bac Qua markets. They often exchange information and trade with each other over the phone. Customers of big head-traders are often wholesalers in Hanoi night markets. Kinds of vegetables are often not plentiful. There are only some main kinds of vegetables such as: tomato, cabbage, mustard and they are sold in months when the North is scare of these products.

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<sup>8</sup> - The difference is significant at 95 % of the gross level.

### 3. Seasonality in trading activities

When asked if they ever stop selling vegetables, 78 % of the sellers present on the wholesale markets answer negatively.

The characteristics of the 22 % (209 sellers) who do stop selling are these:

- most (92 %) of these sellers do so because they do not have enough products to sell, the second reason mentioned for not selling is the amount of work to do on the farm (47 %)<sup>9</sup>;
- 70 % of the sellers stop their activity 1-4 months per year (22 % of the sellers stop 2 months, and 30 % stop 3 months);
- One out of five sellers stops selling in April (19 %), the average duration of the stop is 4 months. 17 % of the sellers stop in May, 11 % of the sellers stop in June and 11 % stop in October for an average duration of 3 months;
- the most quoted months for a pause in trading activities are June (quoted by 51 % of those who stop), May (48 %) and July (45 %);
- The least quoted month for the cessation of trading activities are February (quoted by 18 % of those who stop) and September (20 %).

The sellers were also asked about variations in the amount of sales over the year. According to the wholesale market sellers, November and December are the most dynamic months in the year (respectively mentioned by 51 % and 48 % of the sellers). The slowest months seem to be March and April.

\* \* \* \* \*

As a conclusion to this section, it is necessary to stress the importance of taking into account the impact of seasonality on the spatial and institutional organization of vegetable flows to the city. Indeed, great variations occur within the year, that are mainly due to dramatic climatic changes. These climatic changes determine what types of vegetables are grown, and where. During the cold season, most temperate vegetables are grown very close to Ha Noi, while the yield of hot season (especially leafy) vegetables declines. During the hot wet season, such temperate vegetables are very rare due to the weather, which is then unsuitable for these crops, and leafy vegetables are plentiful. To meet the demand of the market, it is then necessary to bring these vegetables from further away (Lam Dong, Son La provinces and even China). This has very big implications on the organisation of the marketing chain. Indeed, as long as the vegetables are produced close to the city, they are mainly brought to the markets by the producers themselves, using bicycles or motorcycles. When the vegetables come from further away, they are sold by wholesalers who rely on organized networks, trade large amounts of vegetables, and transport them by trucks.

## **E) QUANTITIES AND TYPES OF VEGETABLES**

In June, the leafy vegetables sold on Ha Noi wholesale markets come from Ha Noi, Vinh Phuc, Hung Yen, Ha Tay, Lam Dong provinces, and from China. Ha Noi province accounts for almost 34 % of the leafy vegetables sold on Ha Noi wholesale markets (3.5 ton/day). The lettuce, Ceylon spinach and vegetable mustard from Ha Noi province mainly come from Tu Liem, Thanh Tri, Dong Anh, and Gia Lam districts.

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<sup>9</sup> Since several answers were allowed, the sum does not equal 100%.

In June, the total amount of leafy vegetables supplied to the markets was 3.5 tons/day. These vegetables are mostly sold at Nga Tu So market (1.1 ton/day, 33 % of all leafy vegetables sold on Ha Noi night markets). 48 % of all Ceylon spinach was sold at Long Bien market (100kg/day), 62 % of the choysum was sold at Nga Tu So market (385kg/day), 41 % of the salad was sold at Dich Vong market (275kg/day). The supply of fruit vegetables from Ha Noi province to Ha Noi night markets was 3.9 tons/day, most of which were sold at Nga Tu So market (1.5 ton/day, or 37 % of all fruit vegetables sold on the markets). Wax gourd was the most sold fruit vegetable (54 % with 1.4 ton/day). Wax gourd is mainly produced in Dong Anh district, and has its own selling section in Nga Tu So market.

Hung Yen province supplies in average 1.3 ton/day of leafy vegetables to Ha Noi, most of which are sold at Long Bien market (1.2 ton/day). Hung Yen accounts for 88 % of the total vegetables sold on Ha Noi night markets in June. Leafy vegetables sold there are mainly sweet mustard, which is mainly produced in Van Giang district, located about 20 km from Long Bien market so there are many advantages in transportation and consumption. Hung Yen province supplies 3.4 ton/day of fruit vegetables to the night markets. These are sold in large quantities at Long Bien market (accounting for 30 %) and Bac Qua market (accounting for 31 % of the total vegetables researched in the markets). Fruit vegetables sold on Ha Noi night markets are mainly cucumbers (1.1 ton/day), wax gourd (1.4 ton/day) and smooth loofah (710 kg/day).

Since Hai Duong is located further away from Ha Noi than other vegetable producing areas, it only represents a small proportion of the vegetables sold on Ha Noi markets. As a result, mainly wax gourd from this province can be found in June (350 kg/day).

The supply of leafy vegetables from Ha Tay to Ha Noi night markets is 1.2 ton/day, most of which are sold at Mo market (625 kg, e.g. 52 % of all leafy vegetables sold on Ha Noi night markets). Most leafy-vegetables for sales is green mustard (375kg/day, e.g. 82 % of Ha Tay's green mustards sold on Ha Noi night markets). The supply of fruit vegetables from Ha Tay to Ha Noi night markets is 1.7 ton/day, most of which is sold at Nga Tu So market in large quantities (760 kg/day, e.g. 44 % of all vegetables sold). Fruit vegetables from Ha Tay include smooth loofah (865 kg/day), cucumber (585 kg/day) and yard long bean (285 kg/day).

The supply of leafy vegetable from Vinh Phuc to Ha Noi night markets totals 1.4 ton/day, most of which is sold at Dich Vong market (600 kg, e.g. 42 % of all leaf vegetables sold at Ha Noi's night markets). The leafy-vegetables sold here are mainly sweet mustard (600 kg/day, e.g. 47 % of the sweet mustard sold by Vinh Phuc province on Ha Noi night markets). Vinh Phuc supplies 2.9 tons/day of fruit vegetables, mainly sold at Dich Vong market in large quantities (1.6 ton/day, accounting for 59 %). These vegetables include wax gourd, (1.5 ton/day) and yard long bean (790 kg/day).

### III - CONCLUSION

This survey aimed at understanding the spatial and institutional organization of vegetable trade in Ha Noi reveals the following features:

The traded quantities are small, mainly because the farm land allotted to each farmer is small, leaving them with spare time to market their products themselves. Another reason for this might be that market mechanisms are new, and that most producers do not entirely trust the middlemen in giving them back the exact price they are entitled to. The market is thus characterized by a large number of small traders, and by a high level of competition among them.

There seems to be a very strong relationship between characteristics of the vegetables, their origin and the organization of the marketing chain:

- non bulky, highly perishable vegetables that are well adapted to the climate of Northern Vietnam (choysum, kangkong, lettuce, mustard) are mainly produced in the outskirts of Ha Noi and brought to the markets by the farmers themselves;
- bulky, mildly perishable temperate vegetables are mainly produced around Ha Noi as long as the climatic changes allow to do so. As soon as the hot season sets in, the amount of this type of vegetables that is produced in the vicinity of Ha Noi drops and new sources of supply must be found in Vietnam (Lam Dong and Son La provinces) and in China. Therefore, it is possible to say that imports are still limited to some vegetables and some periods of the year (temperate vegetables during the hot wet season).

More generally, this study shows the very important role of peri-urban agriculture in the supply of vegetables to the city. Indeed, whenever the weather is suitable, most vegetables come from less than 30 km from Ha Noi. Table 51 summarizes the origin of various vegetables according to the season.

**Table 51 – Percentage of vegetables grown less than 30 km from Ha Noi**

		January	March	June	August	November
Leafy vegetables	Lettuce	95 %	97 %	100 %	100 %	100 %
	Kangkong	-	100 %	89 %	100 %	100 %
	Choysum	100 %	70 %	90 %	95 %	99 %
	Mustard	100 %	-	66 %	62 %	100 %
Fruit vegetables	Tomato	73 %	73 %	11 %	0 %	63 %
	Cucumber	37 %	65 %	97 %	100 %	73 %
	Wax gourd	45 %	-	94 %	96 %	-
	Yard Long Bean		86 %	100 %	97 %	-
Cruciferous	Chinese cabbage	67 %	77 %	-	-	100 %
	Cabbage	93 %	92 %	0%	0%	88 %

 Low season

It is thus important to identify the production zones around Ha Noi where attempts could be made to grown temperate vegetables during the hot season, so as to guarantee a more regular supply of vegetables throughout the year. For example, in June 11 % of the tomatoes sold on Ha Noi wholesale markets are grown within 30 km away from the city (Me linh and Dong Anh districts).

#### IV - Appendix 1 – Vegetable lexicon

English name	Scientific name	Vietnamese name
cauliflower	Brassica oleracea L. cv. group Cauliflower	sup lo trang
Ceylon spinach	Basella alba L.	mong ti
Chinese cabbage	Brassica rapa L. cv. group Chinese cabbage	cai bao
choysum	Rapa L. cv. group Choysum	cai ngot
cucumber	Cucumis sativus L.	dua chuot
headed cabbage	Brassica oleracea L. cv.group Headed Cabbage	cai bap
kangkong	Ipomea aquatica Forsskal	rau muong
kohlrabi	Brassica oleracea L. cv. group Kohlrabi	su hao
lettuce	Lactuca sativa L.	xa lach
radish	Raphanus sativus L.	cai cu
smooth loofah	Luffa cylindrica L.	muop thuong
spring onion	Allium cepa L. cv. group Aggregatum	hanh tay
tomato	Lycopersicon esculentum Miller	ca chua
vegetable mustard	Brassica juncea (L.) Czernjaew	ci xanh ngät
welsh onion	Allium fistulosum L.	hanh hoa
wax gourd	Benincasa hispida (Thunberg ex Murray) Cogniaux	bi dao
yard-long bean	Vigna sesquipedalis L.	dau dua

Source : Siemonsma and Kasem Piluek (1994).

#### V - Appendix 2 – Vegetable production in various provinces

Table A1 – Vegetable production in Hanoi province (1999- 2000)

		1999	2000
Tomato	Area (ha)	460	461
	Productivity (quintal/ha)	176.9	475.2
	Yield (tons)	8.1	8.1
Cucumber	Area (ha)	40	40
	Productivity (quintal/ha)	197.5	205.0
	Yield (tons)	0.8	0.8
Cabbage	Area (ha)	579	536
	Productivity (quintal/ha)	185.4	177.9
	Yield (tons)	10.7	10.6
Vegetable mustard	Area (ha)	1,318	1,369
	Productivity (quintal/ha)	154.8	153.6
	Yield (tons)	20.4	25.2
Onion and garlic	Area (ha)	397	40
	Productivity (quintal/ha)	185.6	205.0
	Yield (tons)	7.4	0.8

Source : Hanoi Statistics Handbook

**Table A2 – Vegetable production in Hai Duong province (1997-2000)**

		1997	1998	1999
Total vegetable	Area (ha)	18,269.8	21,236.0	20,240.0
	Productivity (quintal/ha)	167.4	122.2	157.4
	Yield (tons)	305,781.6	259,567.6	318,577.6
Tomato	Area (ha)	755.0	928.0	1,027.0
	Productivity (quintal/ha)	215.5	200.5	187.8
	Yield (tons)	16.3	18.6	19.3
Cucumber	Area (ha)	555.0		400.0
	Productivity (quintal/ha)	295.4		280.2
	Yield (tons)	16.4		11.2
Beans	Area (ha)		697.0	870.0
	Productivity (quintal/ha)	6.7	7.7	7.5
	Yield (tons)		5.4	6.5

Source: Department of Agriculture and Rural Development of Hai Duong

**Table A3 – Vegetable production in Da Lat**

Year	Area (ha)			Yield (ton)		
	Cultivation	Plantation	Compared with 1996(%)	Harvest	Export	Compared with 1996(%)
1996	1,446	3,470	-	82,448	-	100.0
1997	1,798	4,314	124.3	102,670	-	124.5
1998	1,920	4,609	132.8	107,041	-	129.8
1999	2,038	4,891	141.6	118,450	-	143.7

Source: Department of Agriculture and Rural Development of Da Lat

**Table A4 – Vegetable production in Hung Yen province (1997-2000)**

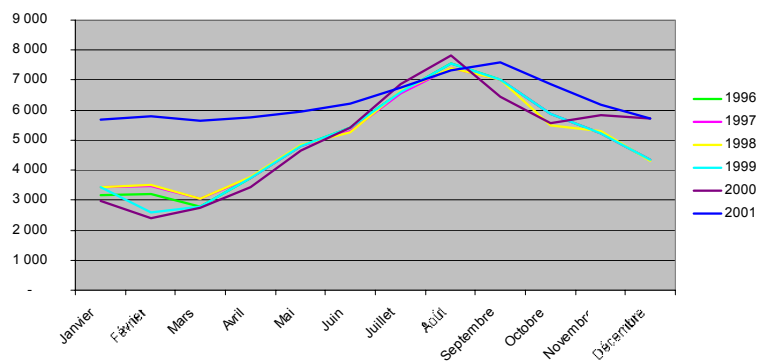
		1997	1998	1999	2000
Total vegetable area (ha)		8,218	11,275	10,785	10,282
Ceylon spinach	Area (ha)	445	885	1,085	1,043
	Productivity (quintal/ha)	144.5	139.7	155.4	143.0
	Yield (tons)	6.4	12.4	16.9	14.9
Mustard	Area (ha)	1,521	2,604	2,018	1,725
	Productivity (quintal/ha)	128.4	120.2	121.4	128.6
	Yield (tons)	19.5	3.1	24.5	22.2
Cabbage	Area (ha)	429	545	722	625
	Productivity (quintal/ha)	242.7	207.3	237.0	181.4
	Yield (tons)	10.4	11.3	17.1	11.3
Kohlrabi	Area (ha)	404	544	661	624
	Productivity (quintal/ha)	156.6	188.1	227.0	136.8
	Yield (tons)	6.3	10.2	15.0	8.5

Potato	Area (ha)	1,460.0	2,519.0	1,557.0	1,136.0
	Productivity (quintal/ha)	135.3	117.2	135.7	116.7
	Yield (tons)	19.7	29.5	21.1	13.3
Onion & garlic	Area (ha)	289.0	408.0	463.0	395.0
	Productivity (quintal/ha)	63.7	72.2	82.1	76.9
	Yield (tons)	1.8	2.9	3.8	3.0
Tomato	Area (ha)	300.0	702.0	886.0	564.0
	Productivity (quintal/ha)	201.2	195.4	198.5	156.2
	Yield (tons)	6.1	13.7	17.2	8.8
Pepper	Area (ha)	5.0	-	-	-
	Productivity (quintal/ha)	40.0	-	-	-
	Yield (tons)	20.0	-	-	-
Cucumber	Area (ha)	227.0	196.0	-	-
	Productivity (quintal/ha)	381.4	187.5	-	-
	Yield (tons)	8.7	3.7	-	-
Beans	Area (ha)	586.0	512.0	557.0	430.0
	Productivity (quintal/ha)	11.5	12.0	112.9	114.4
	Yield (tons)	672	613	6.3	4.9
Wax gourd	Area (ha)	276.0	909.0	1,238.0	1,255.0
	Productivity (quintal/ha)	224.8	208.5	204.0	180.4
	Yield (tons)	6.8	19.0	25.3	22.6
Other vegetables	Area (ha)	2,276.0	1,481.0	1,998.0	2,485.0
	Productivity (quintal/ha)	141.7	186.5	142.1	140.1
	Yield (tons)	322.5	276.3	284.0	348.0

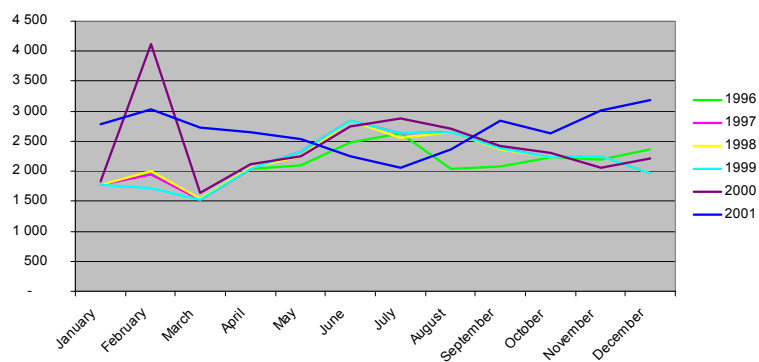
Source: Hung Yen agriculture and agricultural development service.

## VI - Appendix 3 – Vegetable prices (1996-2001)

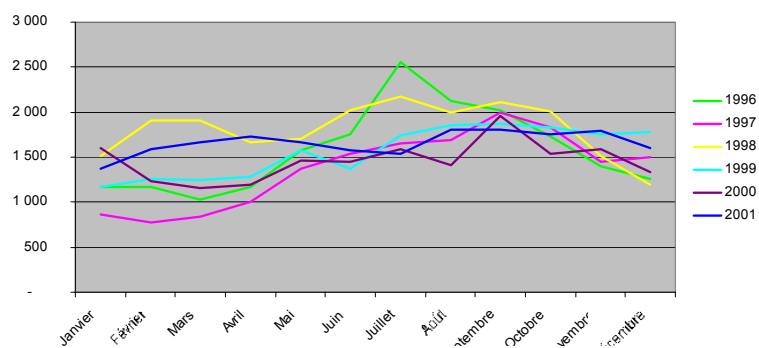
Carrot prices (1996-2001)



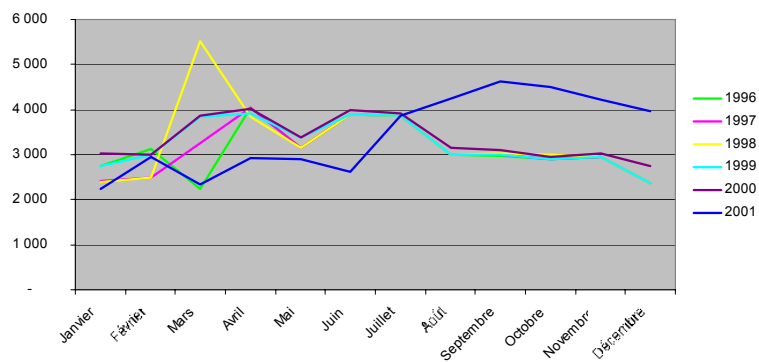
Cucumber prices (1996-2001)

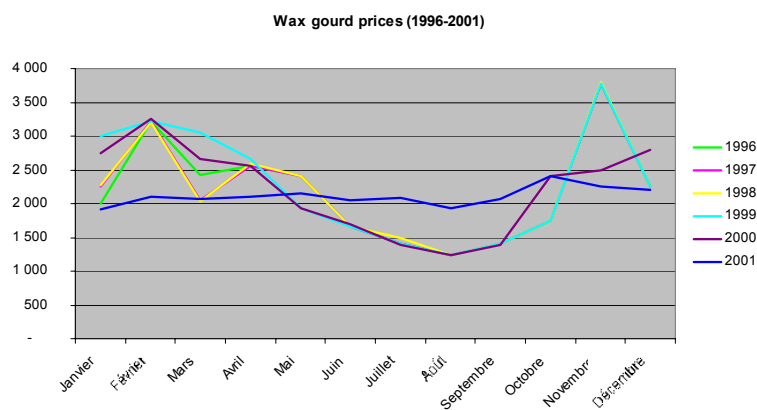
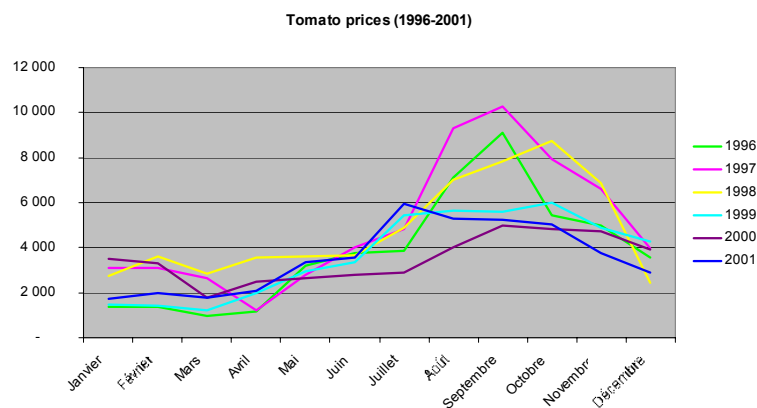
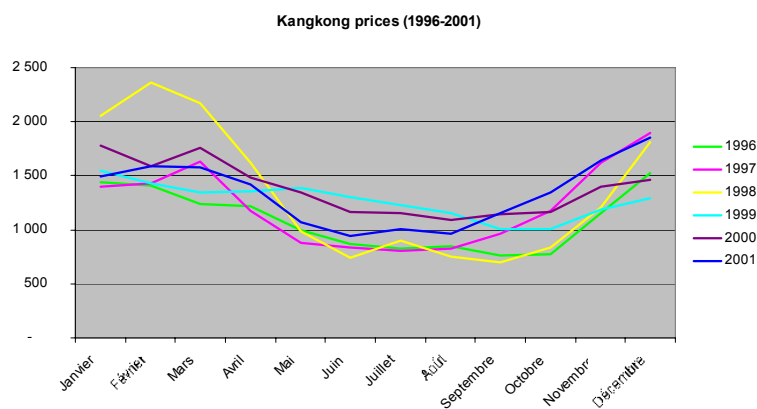
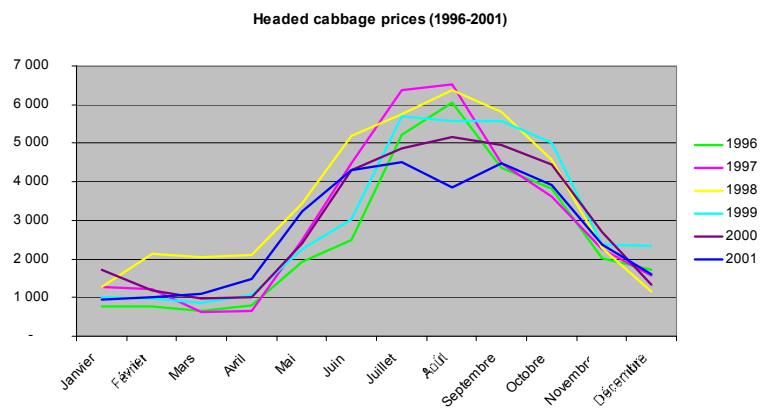


Cucurbit prices (1996-2001)

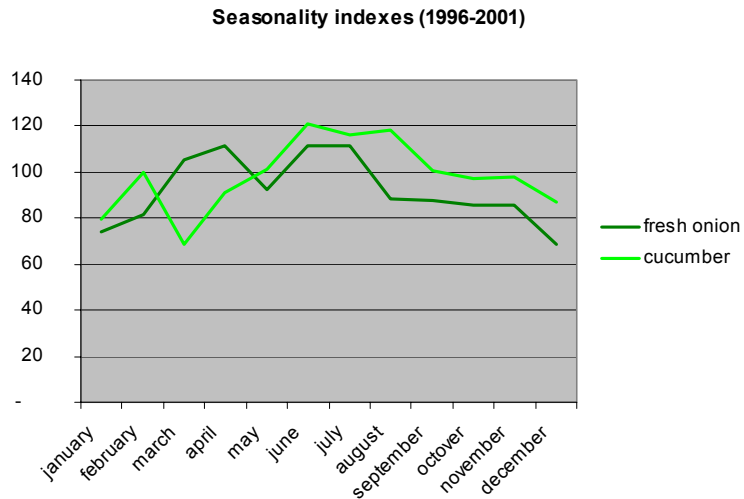
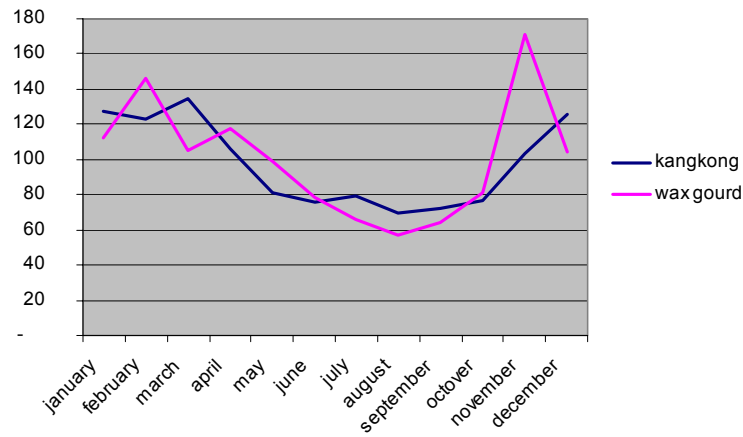
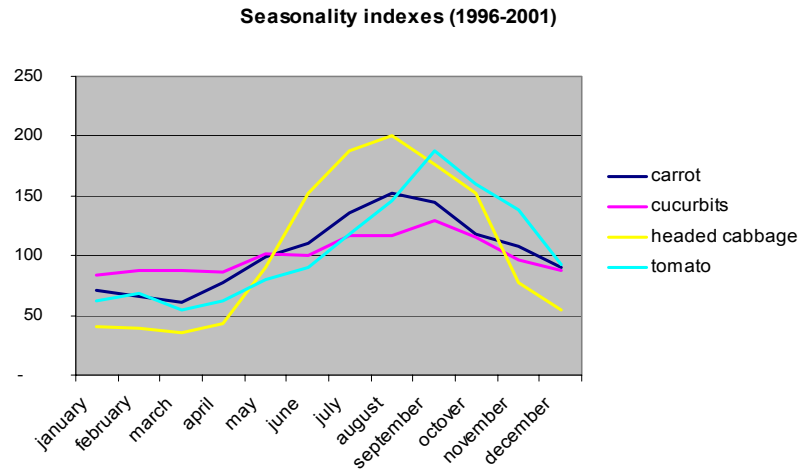


Fresh onion prices (1996-2001)





**VII - Appendix 4 – Seasonality of vegetable prices (1996-2001)**



VIII - Appendix 5 – Marketing chains of various vegetables

Figure 1 – Tomato supply chain

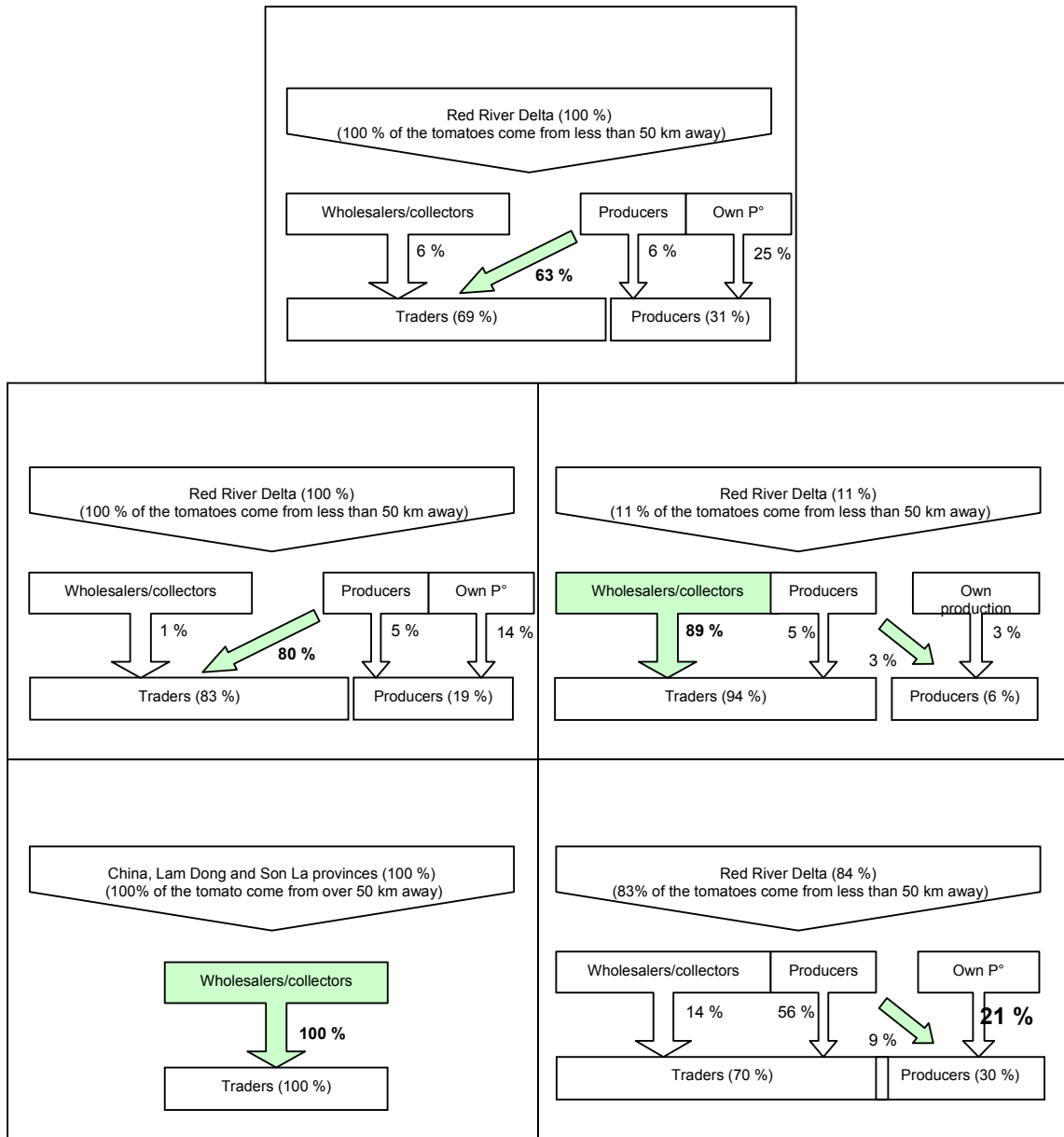
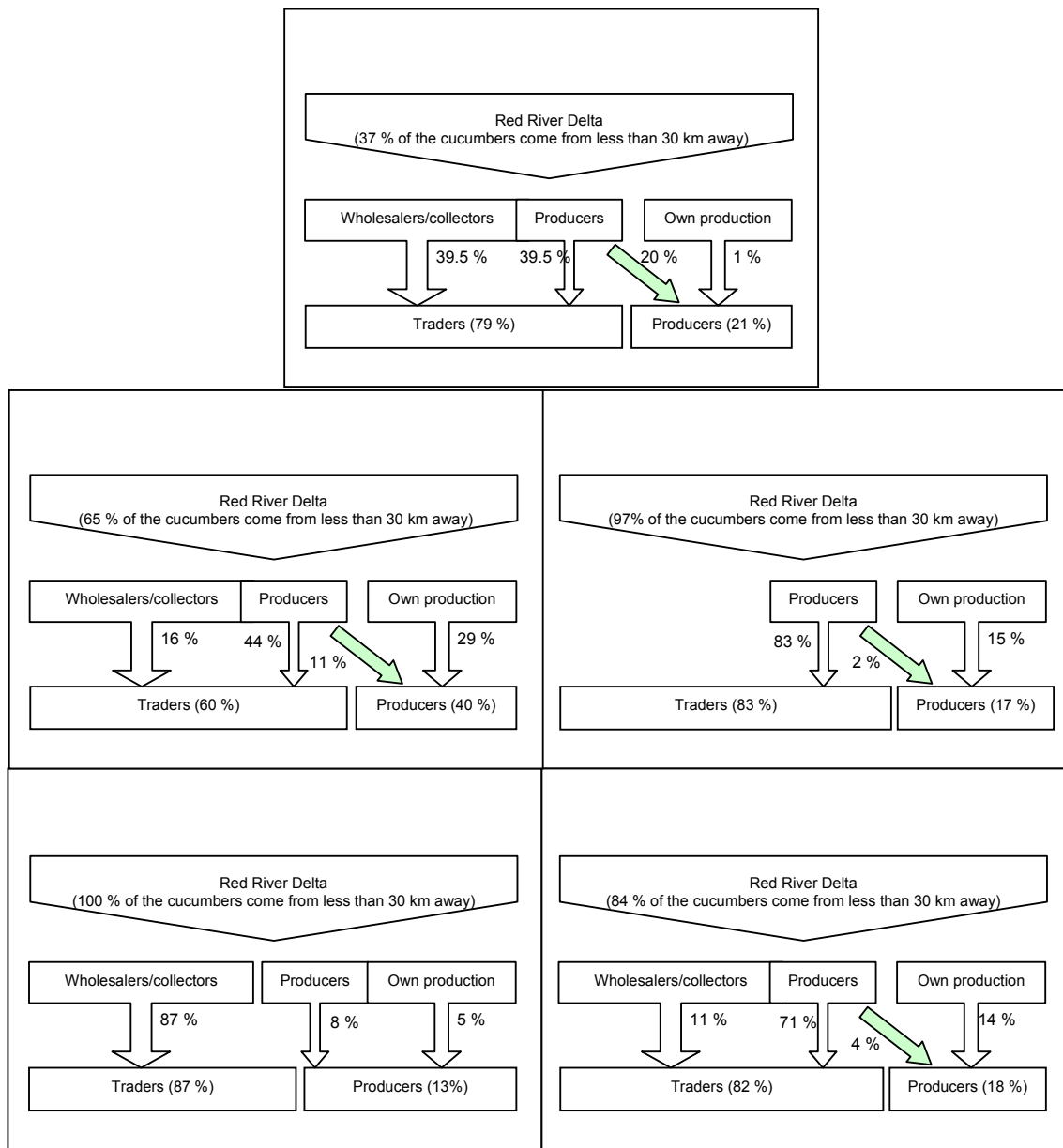


Figure 2 – Cucumber supply chain



**Figure 3 – Yard Long Bean supply chain**

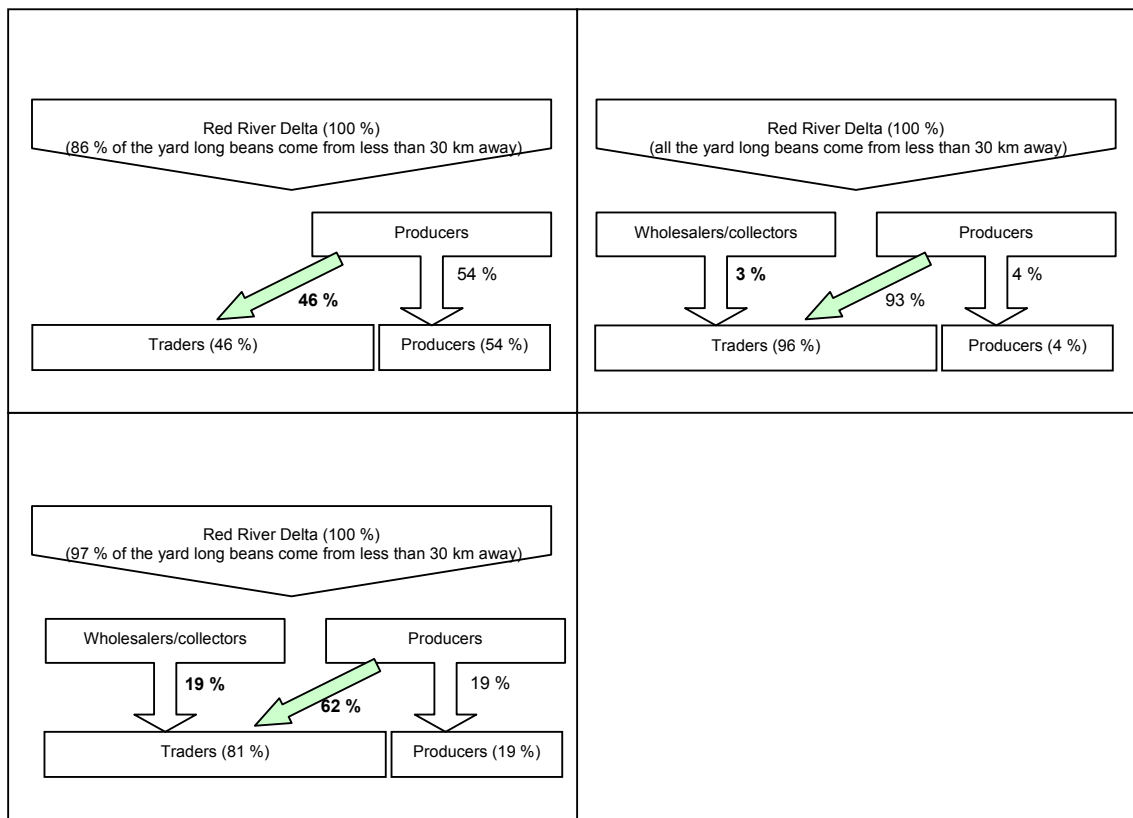


Figure 4 – Headed cabbage supply chain

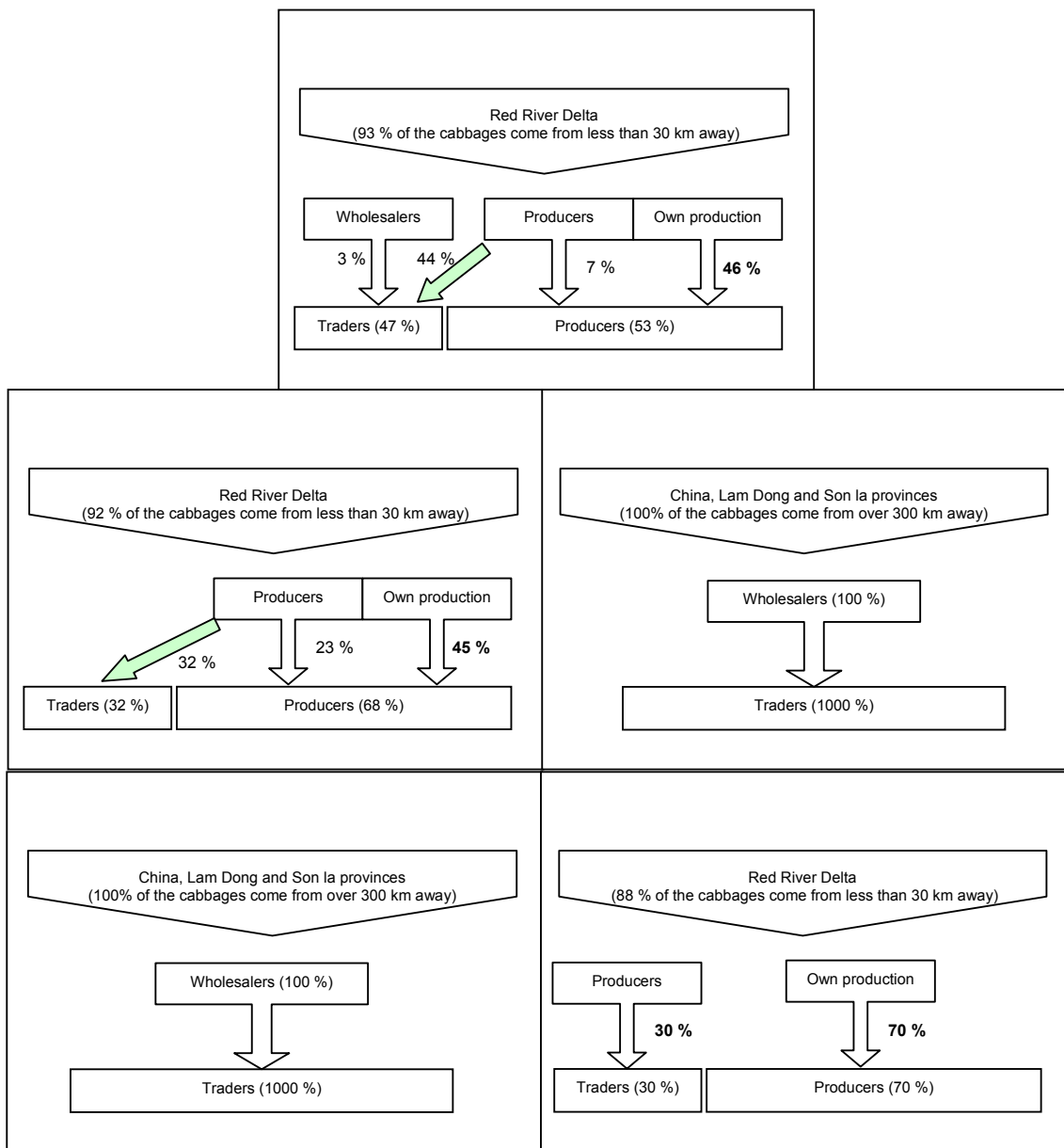


Figure 5 – Choysum supply chain

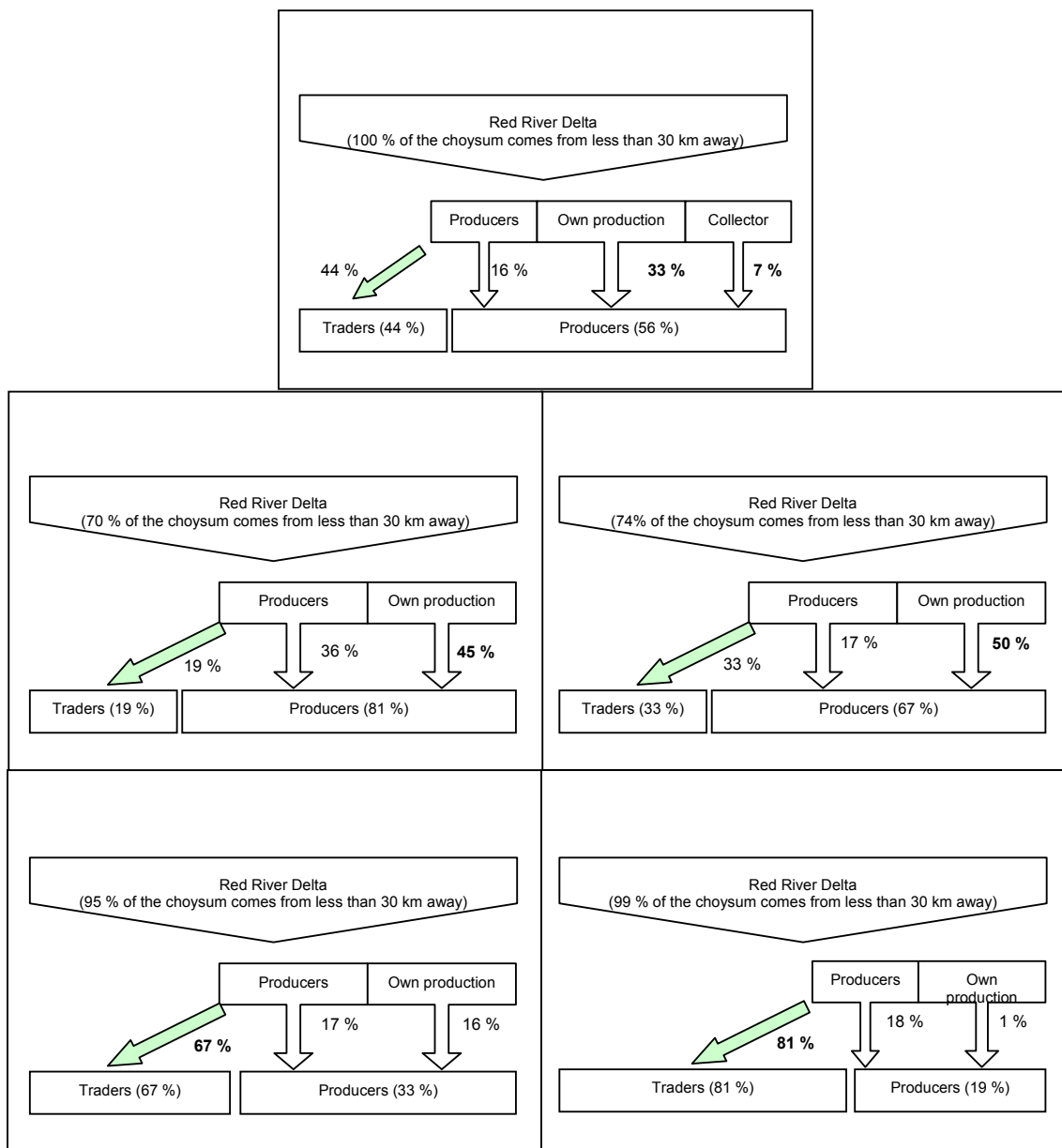
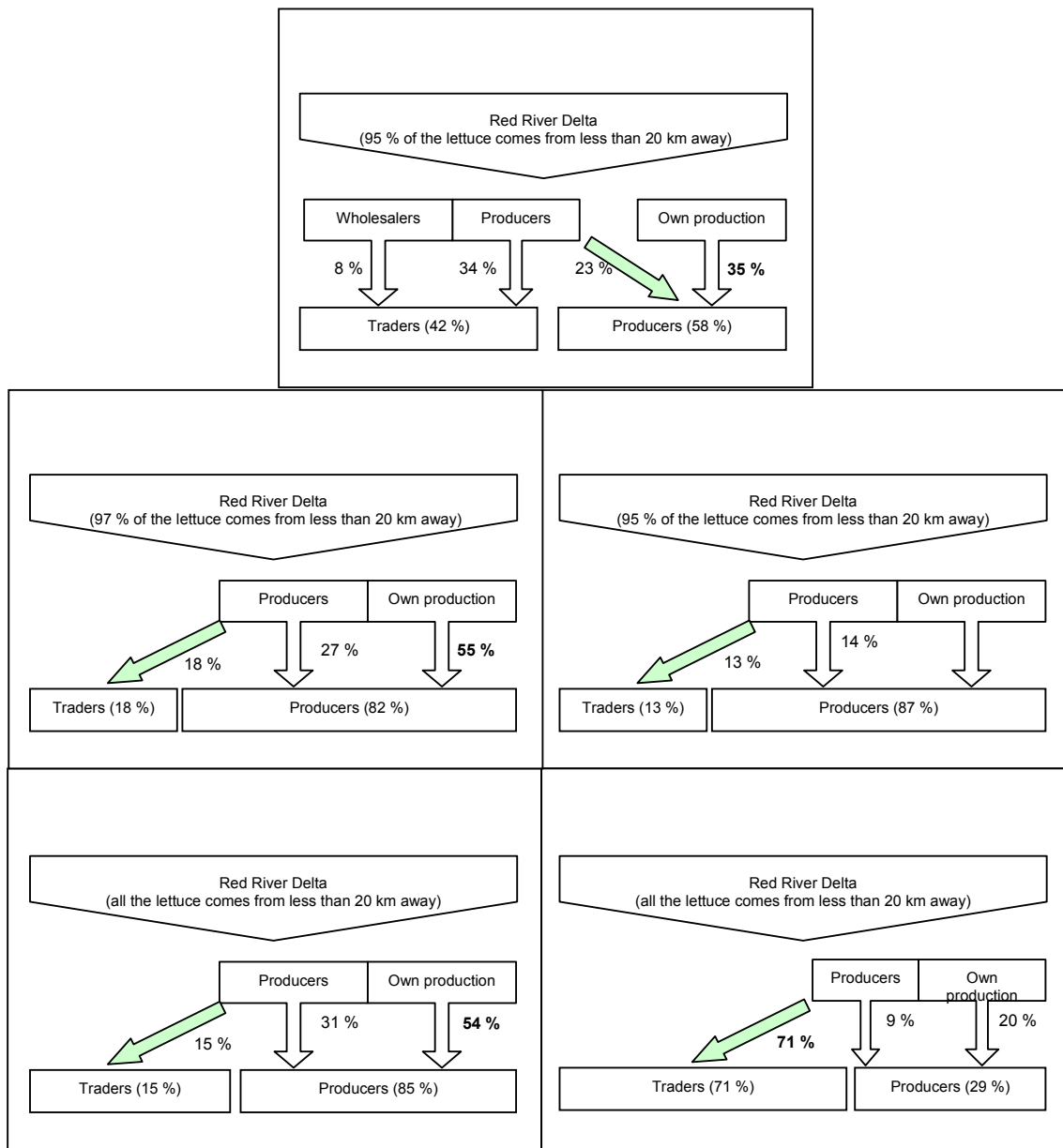
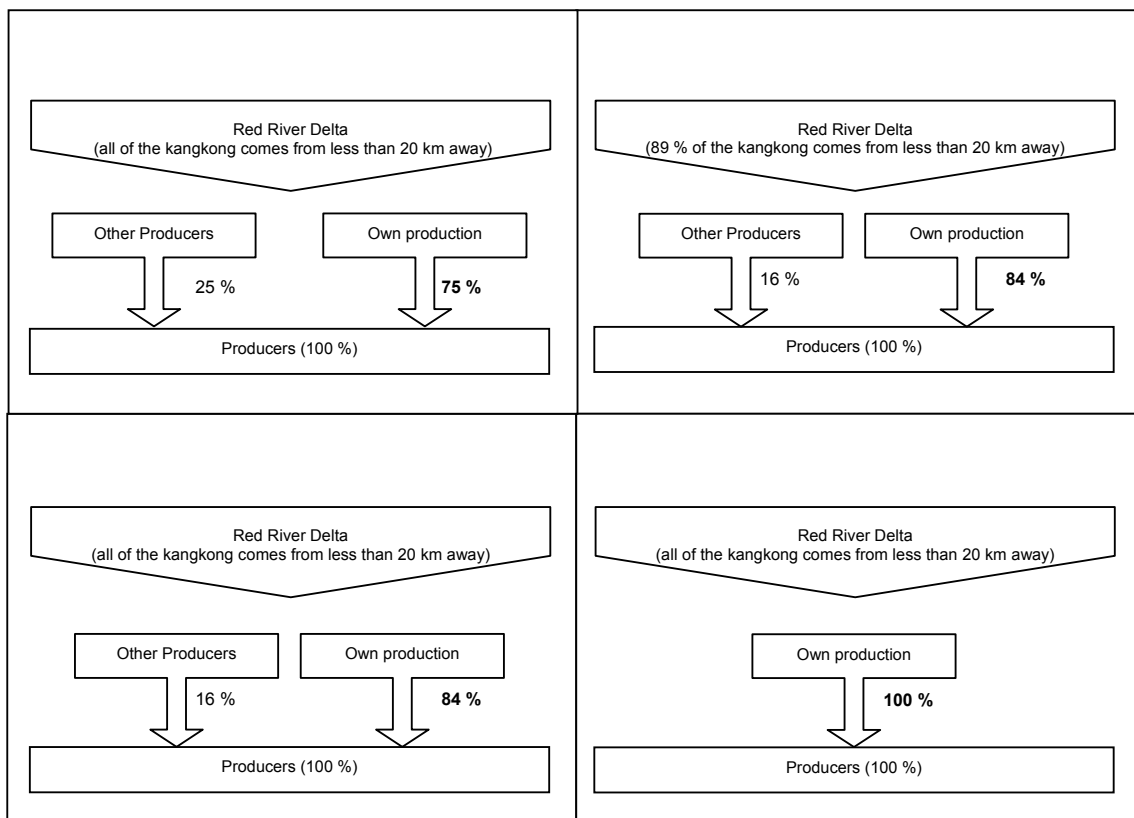


Figure 6 – Lettuce supply chain



**Figure 7 – Kangkong supply chain**



### IX - Appendix 6 – Map of Ha Noi markets

